



## The dark triad and bullying in adolescence: A three-wave random intercept cross-lagged panel analysis

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### ABSTRACT

Few have studied the longitudinal associations between the Dark Triad and bullying in youth and none have examined these relations using analytic techniques that permit separating between- from within-person variability. Random intercept cross-lagged panel modeling was used with three waves of data from a randomly selected sample of 514 Canadian adolescents aged 15–18 to assess the Dark Triad and bullying over time. Controlling for sex and parental education, at the between-person level, random intercepts for Machiavellianism and psychopathy correlated positively with bullying. At the within-person level, moment-to-moment stability was found for narcissism and Machiavellianism. Residual within-time correlations mirrored bivariate associations, indicating that Machiavellianism and psychopathy shared consistent links with bullying. Cross-lagged effects were found for both disposition- and perpetration-driven pathways.

### 1. Introduction

Many researchers have shown how individual differences in the Dark Triad of narcissism, Machiavellianism, and psychopathy (Paulhus & Williams, 2002) are associated with aggressive and antisocial behavior in adults (see Paulhus et al., 2018 for review). Fewer have assessed these relations in adolescents, particularly regarding bullying perpetration (e.g., Wright et al., 2020). Like most of the scholarship on the Dark Triad (see Muris et al., 2017; Vize et al., 2018 for meta-analyses), those studying the Dark Triad and different kinds of aggression in adults and youth have tended to use cross-sectional data with convenience samples. Among the limited longitudinal work (e.g., Sijtsema et al., 2019), researchers have favored the use of analytic techniques that do not separate between- from within-person variability, such as traditional cross-lagged panel modeling (CLPM; Hamaker et al., 2015). Thus, the developmental unfolding of the Dark Triad in youth, as well as how these traits influence one another and predict bullying perpetration over time, particularly at the within-person level, remain equivocal. To attend to these gaps, we examined the between- and within-person longitudinal relations among the Dark Triad and bullying in a random sample of Canadian youth aged 15 to 18 using a three-wave random intercept cross-lagged panel model (RI-CLPM; Hamaker et al., 2015).

#### 1.1. The dark triad of personality

The Dark Triad is a tripartite model of distinct but overlapping socially aversive subclinical personality dimensions including narcissism, Machiavellianism, and psychopathy (Paulhus & Williams, 2002). Narcissism describes a proclivity toward egocentrism, grandiosity, entitlement, and exhibitionism (Miller et al., 2011; Raskin & Terry, 1988). Machiavellianism denotes a tendency toward cynicism, manipulation, and the “bi-strategic” use of coercive and prosocial strategies in a context-specific manner (Christie & Geis, 1970; Hawley, 2003). Psychopathy embodies impulsivity, an erratic lifestyle, heartlessness, and antisociality (Hare & Neumann, 2008; Lilienfeld, 2018). Meta-analytic work shows that across different measures, cultures, and demographic characteristics, a medium effect ( $r = \sim 0.20\text{--}0.30$ ) characterizes the positive correlation between narcissism and the other two Dark Triad dimensions, whereas a large effect ( $r = \sim 0.40\text{--}0.60$ ) describes the correlation between Machiavellianism and psychopathy (Muris et al., 2017; Vize et al., 2018). Due to the theoretical and empirical overlap among the Dark Triad, some researchers encourage using multivariate techniques to isolate the unique variability accounted for by each dimension to avoid misattributing effects (Furnham et al., 2014; Paulhus et al., 2018). Others argue that there are difficulties in interpreting the

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residualized variance of the Dark Triad traits, which may lead to problematic inferences (Miller et al., 2019; Vize et al., 2018). Therefore, it is recommended that investigators conduct and report both bivariate and multivariate analyses to facilitate interpretability and to advance theory.

### 1.2. The dark triad, bullying, and antisocial behavior during adolescence

In conjunction with a stronger expression of “malevolent” personality characteristics during adolescence (Klimstra et al., 2020), the perpetration of various forms of aggressive behavior, including bullying, also increases during this period of development (Girard et al., 2019; Haltigan & Vaillancourt, 2014). Bullying describes the systematic and repetitive abuse of power to inflict harm on others (Olweus, 1994). Among adolescents, estimates of the prevalence of bullying perpetration range from about 15–35% (see Jadambaa et al., 2019; Modecki et al., 2014 for meta-analyses). Several researchers have supported cross-sectional links between the Dark Triad personality characteristics and bullying perpetration in youth (e.g., Wright et al., 2020). In studies where the Dark Triad are collectively assessed in adolescence, researchers often find that the dimensions are differentially related to bullying at the univariate level, with psychopathy sharing the strongest links (Safaria et al., 2020; Sehar & Fatima, 2016; van Geel, Goemans et al., 2017). At the multivariate level, psychopathy sometimes emerges as the only unique predictor of bullying and at times narcissism falls out of significance (Sehar & Fatima, 2016).

Many researchers have also studied the Dark Triad dimensions separately alongside aggressive and antisocial behavior in adolescents with longitudinal data. Over a one-year period among adolescents aged 11–13 years, Fanti & Henrich, 2015 found that year one narcissism positively predicted year two bullying perpetration. Reijntjes et al. (2016) followed children for three years starting in Grade 4 and found that the within-time correlations between narcissism and total bullying were either small or non-significant. Using a two-wave CLPM with adolescents aged 11–14 years, Geng et al. (2017) found significant within-time associations between Machiavellianism with conduct problems. The autoregressive paths among these constructs were also significant, suggesting temporal stability. The cross-lagged path from Machiavellianism to conduct problems was significant, but not the alternative path from conduct problems to Machiavellianism. Frick et al. (2003) studied children from Grades 3–7 and noted differential stability based on trajectory group. Initial parent-reports of low and high psychopathy scores were stable and consistent with later self-reported psychopathy, whereas those below the normative cut-off score decreased in psychopathy across time. Conduct problems (measured during wave two) significantly predicted being in the high psychopathy trajectory. Using CLPM with two-waves of data, Forsman et al. (2010) reported significant autoregressive paths for psychopathy and antisocial behavior from ages 16–17 (Time 1) to 19–20 (Time 2), suggesting temporal stability.

In a three-wave longitudinal study of adolescents by Sijtsema et al. (2019), separate CLPMs were created for each individual Dark Triad dimension with antisocial behavior (a latent construct embodying delinquency and aggression). Most autoregressive paths for narcissism and antisocial behavior across time were significant, indicating temporal stability. The autoregressions for Machiavellianism and psychopathy were significant for girls, but either small or non-significant for boys. The within-time correlations for Machiavellianism and psychopathy with antisocial behavior were significant at each time point for both girls and boys. In contrast, the within-time associations for narcissism and antisocial behavior were either small to moderate or non-significant. Only a significant positive cross-lagged path from antisocial behavior (Time 2) to Machiavellianism (Time 3) for boys emerged.

### 1.3. The present study

There are several important limitations of previous longitudinal

work on the Dark Triad traits and different kinds of aggressive and antisocial behavior. First, researchers tend to examine the Dark Triad dimensions in separate studies (e.g., narcissism; Fanti & Henrich, 2015), or in the same study but in separate statistical models (e.g., Sijtsema et al., 2019). Neither of these approaches permit: (1) controlling for the shared overlap among the Dark Triad (Furnham et al., 2014), (2) discerning how the Dark Triad dimensions influence each other and aggressive and antisocial behavior over time, and (3) examining how the Dark Triad characteristics may be differentially linked with aggression and antisociality (see Paulhus et al., 2018 for review). Furthermore, in previous work, researchers have often relied on longitudinal techniques that only require two waves of data and treat between-person and within-person effects in the Dark Triad dimensions and antisociality as a single combined effect, such as traditional CLPM (e.g., Forsman et al., 2010; Geng et al., 2017; Sijtsema et al., 2019). Traditional CLPM forces the conflation of between- and within-person associations that might differ in important ways, and carries the assumption that individuals vary around a common group mean in constructs over time (Mulder & Hamaker, 2021; Mund & Nestler, 2019). To avoid blending these different sources of variability, in the current study, random intercept cross-lagged panel modeling (RI-CLPM; Hamaker et al., 2015) was employed with three waves of data. RI-CLPM involves estimating latent random intercepts that control for the between-person stability of constructs to assess “pure” residual within-person autoregressions, within-time covariances, and cross-lagged effects. Given that girls/women tend to report lower levels of the Dark Triad dimensions (Muris et al., 2017; Vize et al., 2018) and that parental education is inversely related to adolescent bullying perpetration (Shetgiri et al., 2012), following others (e.g., Geng et al., 2017), participants’ sex and parental education were statistically controlled for in the RI-CLPM analyses.

Many argue that the Dark Triad traits are differentially related to aggressive behavior (reviewed in Paulhus et al., 2018), and meta-analytic work suggests the bivariate relations between narcissism and bullying may be small to moderate (Kjærviik & Bushman, 2021; van Geel, Toprak et al., 2017). In line with previous cross-sectional research (e.g., Safaria et al., 2020; Sehar & Fatima, 2016; van Geel, Goemans et al., 2017), we predicted that the positive correlations for Machiavellianism and psychopathy with bullying would be stronger than the associations between narcissism and bullying at each time point (Hypothesis 1).<sup>1</sup> We further expected that the between-person latent random intercepts for narcissism, Machiavellianism, psychopathy, and bullying would be positively intercorrelated with one another (Hypothesis 2).

Previous work indicates a high level of temporal stability (i.e., rank-order stability) in narcissism (e.g., Fanti & Henrich, 2015) and Machiavellianism (e.g., Geng et al., 2017), as well as moderate to high temporal stability in psychopathic traits (Forsman et al., 2010; Lynam et al., 2009; Neumann et al., 2011). Therefore, there may be limited moment-to-moment stability at the within-person level in these constructs once the between-person stability has been controlled for by the random intercepts. Nonetheless, other higher-order dimensions of personality with significant temporal stability, such as openness to experience, still demonstrate evidence of significant within-person “carry-over” effects from one measurement occasion to another across annual assessments (Osborne & Sibley, 2020). Of note, using autoregressive latent trajectory models with structured residuals (ALT-SR; Curran et al., 2014), a model similar to the RI-CLPM with the addition of slopes, Vaillancourt and Brittain (2019) found that the autoregressive pathways for primary (i.e., callous-unemotionality) and secondary psychopathy (i.e., impulsivity) were either small or non-significant. And Doty et al., 2021 supported significant within-person autoregressive pathways for bullying perpetration using RI-CLPM. Based on these results, we expected significant within-person autoregressions for narcissism, Machiavellianism, and bullying, but not necessarily for psychopathy (Hypothesis 3). That is, we

<sup>1</sup> The hypotheses and analyses for the current study were not pre-registered.

expected deviations from an individual's usual scores in narcissism, Machiavellianism, and bullying would be associated with deviations in the same direction for these constructs at the following time points.

Previous research where RI-CLPM was used indicates that the residual within-person covariances tend to be similar to between-person bivariate associations (e.g., Boer et al., 2020; Filipponi et al., 2020; Orth et al., 2021). Therefore, we expected positive within-person covariances among each Dark Triad dimension with bullying perpetration at each measurement occasion (Hypothesis 4). If so, this would suggest that deviations from person-specific means in each Dark Triad dimension would be accompanied by divergences from person-specific means in bullying perpetration (Mund & Nestler, 2019).

In keeping with previous longitudinal work (e.g., Fanti & Henrich, 2015; Forsman et al., 2010; Geng et al., 2017), we predicted that elevated narcissism, Machiavellianism, and psychopathy would positively predict greater bullying across time (Hypothesis 5). Nonetheless, given the finding by Frick et al. (2003) that conduct problems preceded elevated psychopathy in adolescents and that researchers tend to assume that personality precedes behavior via "disposition-driven pathways" (Sijtsema et al., 2019), we explored cross-lagged relations from bullying perpetration to each Dark Triad trait (i.e., "perpetration-driven pathways"). In case evidence emerged for both pathways, we intended to examine whether disposition- and perpetration-driven pathways were significantly and uniquely contributing to the final overall model.

## 2. Method

### 2.1. Participants

Participants were drawn from the McMaster Teen Study, which is an ongoing longitudinal cohort study in southern Ontario, Canada involving an examination of mental health and academic achievement over time. Beginning in 2008, 875 students in Grade 5 ( $M_{\text{age}} = 10.91$ ,  $SD = 0.36$ ) from 51 randomly selected public elementary schools agreed to participate in the study. Of this original sample, 703 students participated in at least one follow-up assessment between Grade 5 (Time 1) and Grade 12 (Time 8). Assessments have continued each year since the initial date of data collection. At Time 1, median parental education corresponded to "College diploma or trades certificate" ( $n = 198$ , 38.5%). To be included in the analytic sample, participants needed to have data during at least one time point from Time 6 (Grade 10; ages 15–16), Time 7 (Grade 11; ages 16–17), or Time 8 (Grade 12; ages 17–18) from the larger dataset. Longitudinal data for  $N = 514$  (56.8%,  $n = 292$  girls) adolescents between 15 and 18 years of age were included in the final analytic sample. Time 6 was selected as the first time point because this is when Machiavellianism was initially assessed. At Time 6, when students were in Grade 10, the average age was 16 years ( $SD = 0.34$ ).

### 2.2. Procedure

Ethical approval for the McMaster Teen Study has been obtained for every year of data collection from an appointed institutional research ethics board. Parental consent and child assent/consent have been obtained throughout the course of the study. For the first year of data collection, students were asked to complete paper-and-pencil surveys at school. At each subsequent time point, participants have been asked to complete either a paper-and-pencil or online questionnaire at their place of residence. Participants have been compensated with a gift card that has increased in monetary value throughout the study duration. Self-report measures for narcissism, Machiavellianism, psychopathy, and bullying perpetration were used for the present study. For a comprehensive description of the recruitment procedures for the McMaster Teen Study, please see Vaillancourt et al. (2013).

### 2.3. Materials

#### 2.3.1. Narcissism

The 12-item Narcissistic Personality Questionnaire for Children-Revised (NPQC-R; Ang & Raine, 2009) was used to examine individual differences in narcissism. Specifically, a modified 10-item version of the NPQC-R was employed to examine two components of narcissism: superiority and exploitativeness. An example item included "If I ruled the world, it would be a better place". Participants responded to items along a 5-point Likert-type response scale ranging from 0 (*False - Not at all true of me*) to 4 (*Very true of me*). Items were averaged to create a total narcissism score (three items were allowed to be missing when calculating composite scores), with higher scores representing a stronger expression of narcissism. This abridged version of the NPQC-R had good reliability (Cronbach's alpha and McDonald's omega) in the current study ( $\alpha = 0.81$  and  $\omega = 0.79$  at Grade 10;  $\alpha = 0.81$  and  $\omega = 0.78$  at Grade 11;  $\alpha = 0.82$  and  $\omega = 0.79$  at Grade 12).

#### 2.3.2. Machiavellianism

The 20-item self-report Kiddie-Mach Scale (KMS; Christie & Geis, 1970) was employed to measure aspects of a Machiavellian personality in youth, including the absence of faith in human nature, dishonesty, and interpersonal distrust. An example item included, "It is never right to tell a lie" (reverse-scored). Participants responded to items using a 5-point Likert-type scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Mean scale scores were calculated by averaging all the items on the KMS (six items were permitted to be missing when generating total scale scores), with higher scores reflecting a greater expression of Machiavellianism. In the current study, the KMS had good reliability at each time point ( $\alpha = 0.77$  and  $\omega = 0.78$  at Grade 10;  $\alpha = 0.80$  and  $\omega = 0.80$  at Grade 11;  $\alpha = 0.81$  and  $\omega = 0.81$  at Grade 12).

#### 2.3.3. Psychopathy

The 20-item Antisocial Personality Screening Device-Self-Report (APSD-SR) instrument created by Frick and Hare (2001) was used to examine psychopathic traits. This instrument contains three subscales: the 6-item Callous-Unemotional (e.g., "You feel bad or guilty when you do something wrong [reverse-coded]"), 7-item Narcissism (e.g., "You brag a lot about your abilities, accomplishments, or possessions"), and 5-item Impulsivity subscale (e.g., "You do not plan ahead or leave things until the last minute"). Two additional items were included for the total psychopathy score. Participants responded to items along a 3-point Likert-type response scale ranging from 0 (*Not at all true*) to 2 (*Definitely true*). To prevent statistical artifacts resulting from cross-contamination of item content between the APSD-SR and the psychometric measure for narcissism used in the present study (the NPQC-R), items for the Narcissism subscale were removed. The remaining 13 items were averaged to create a total psychopathy score (four items were allowed to be missing in calculating composite scores), with higher scores describing the heightened expression of psychopathy traits. This abridged version of the APSD-SR had low to adequate reliability in the present study at each time point ( $\alpha = 0.73$  and  $\omega = 0.73$  at Grade 10;  $\alpha = 0.67$  and  $\omega = 0.68$  at Grade 11;  $\alpha = 0.70$  and  $\omega = 0.70$  at Grade 12).

#### 2.3.4. Bullying perpetration

Participants first read the following definition of bullying: "There are lots of different ways to bully someone, but a bully wants to hurt the other person (it's not an accident) and does so repeatedly and unfairly (the bully has some advantage over the victim). Sometimes a group of students will bully a student. It is not bullying when two students of the same strength quarrel or fight." Respondents were then asked to complete a 5-item bullying perpetration questionnaire (Vaillancourt et al., 2010), with one item assessing general bullying tendencies ("Since the start of the school year [September], how often have you taken part in bullying another student?"), physical bullying ("How often have you taken part in physically bullying others by hitting, shoving, kicking, spitting or



beating up others”), verbal bullying (“How often have you taken part in verbally bullying others by insults, put downs, or threats?”), social bullying (“How often have you taken part in bullying others by exclusion, rumors, or getting others not to like someone?”), and cyberbullying respectively (“How often have you taken part in bullying others using the computer, text messages, or email messages/pictures to threaten someone or make them look bad?”). Items were rated on a 5-point Likert-type scale, ranging from 0 (*Not at all*) to 4 (*Many times a week*). Items were averaged to create composite scores (one item was allowed to be missing to calculate mean scale scores), which were internally consistent across time points ( $\alpha = 0.77$  and  $\omega = 0.83$  at Grade 10;  $\alpha = 0.81$  and  $\omega = 0.85$  at Grade 11;  $\alpha = 0.80$  and  $\omega = 0.84$  at Grade 12).

#### 2.4. Analytic plan

SPSS (version 27) and Mplus (version 8.1) were used for analyses in the present study. SPSS was used to calculate mean scale scores and to examine missing data. In comparison to those who were not selected, participants in the analytic sample were more likely to identify as a girl,  $\chi^2(1, N = 875) = 8.04, p = .005$ ; although, this difference was characterized by a small effect ( $\phi_{\text{Cramer}} = 0.10$ ; Ferguson, 2016). Parental education was significantly higher for adolescents in the analytic sample in comparison to those who were not selected,  $t(805) = -7.96, p < .001$ . This difference was characterized by a medium effect ( $d = 0.57$ ; Cohen, 1988). In the analytic sample, across measured variables, an average of 13.7% of the data were missing (min. = 11.9%, max. = 16.1%). Little’s Missing Completely at Random (MCAR) test indicated that data in the analytic sample were missing completely at random,  $\chi^2(173) = 161.85, p = .718$ . Nonetheless, there was evidence of covariate-dependent missingness regarding sex and parental education, which is distinct from Little’s MCAR, indicating that these covariates should be controlled for statistically (discussed in Matta et al., 2018).

SPSS was further used to assess evidence of skewness and kurtosis. Structural equation modeling (SEM) procedures depend on the assumption that data are approximately normally distributed with skew values  $< \pm 3$  and kurtosis values  $< \pm 10$  (Kline, 2016). Skewed and kurtotic data can increase the risk of Type I errors by biasing parameter and model fit estimates with SEM (Ryu, 2011). If normality was violated, outliers (i.e., extreme scores) were winsorized to the next less extreme value, which helps to retain data and improve statistical power (Reifman & Keyton, 2010). It was expected that bullying perpetration would be positively skewed and leptokurtic, because this has been the case in previous research on adolescents using the same measure of bullying employed in the current study (Farrell & Vaillancourt, 2020). SPSS was also used to conduct independent and paired samples *t*-tests, and Pearson product-moment correlations. To test whether the links between bullying with Machiavellianism and psychopathy were significantly stronger than those between bullying and narcissism at each time point (Hypothesis 1), Steiger’s *z* (Steiger, 1980) for dependent correlations was used.

Mplus was then used to estimate RI-CLPM models to separate within-from between-person associations within and across time points (Hamaker et al., 2015). To estimate models, full information maximum likelihood estimation (maximum likelihood robust estimation with missing data) was selected. To assess model fit, the  $\chi^2$  test of significance, comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were used. A non-significant  $\chi^2$  suggests adequate model fit; however, this test has been shown to be sensitive to sample size (Kline, 2016). CFI and TLI values  $> 0.95$ , RMSEA values  $< 0.06$ , and SRMR values  $< 0.08$  indicate adequate model fit (Hooper et al., 2008).

Following Hamaker et al. (2015), an RI-CLPM including between- and within-person model components was estimated. For the between-person portion of the model, random intercepts were generated for the Dark Triad dimensions and bullying. Random intercepts were regressed

onto parental education and participants’ sex to statistically control for their influence. To test Hypothesis 2, we examined if the random intercepts for the Dark Triad and bullying shared positive correlations with one another. For the within portions of the model, autoregressive paths (e.g., Grade 10 narcissism  $\rightarrow$  Grade 11 narcissism), within-time correlations (e.g., Grade 10 Machiavellianism with Grade 10 psychopathy), and cross-lagged paths (e.g., Grade 10 Machiavellianism  $\rightarrow$  Grade 11 bullying) were estimated. As recommended by Hamaker et al. (2015), we compared this unconstrained base model (i.e., Model 1) to models with equality constraints in repeated parameters (i.e., constrained to be equal over time) for the residual autoregressions (Model 2), within-time correlations (Model 3), and cross-lagged paths (Model 4). We investigated invariance of autoregressions, within-time correlations, and cross-lagged parameters using the Satorra-Bentler scaled  $\chi^2$  difference test (Satorra & Bentler, 2001). A significant decline in model fit suggests that effects across time among measured variables are not equal, and that parameters should be freed. Where results yielded non-significant differences, parameter constraints were imposed in a final model (Model 5).

This final model was used to test whether narcissism, Machiavellianism, and bullying had significant carry-over effects and moment-to-moment stability (Hypothesis 3), as well as whether the Dark Triad and bullying perpetration shared significant positive within-time associations (Hypothesis 4). The final model was also used to test for disposition-driven pathways for the predicted cross-lagged relations between each Dark Triad characteristic with bullying perpetration one year later (e.g., Grade 10 Machiavellianism  $\rightarrow$  Grade 11 bullying; Hypothesis 5). Evidence for perpetration-driven (e.g., Grade 10 bullying  $\rightarrow$  Grade 11 Machiavellianism) as well as transactional (i.e., reciprocal) pathways were also explored. If evidence in favor of both pathways emerged, we further explored if each was contributing significantly to the final model. This was accomplished by constraining either perpetration-driven (Model 6) or disposition-driven paths (Model 7) to zero and comparing model fit to the final model (Model 5) via the Satorra-Bentler scaled  $\chi^2$  difference test. The Mplus syntax used for each model can be found in the Supplemental Materials (Appendix A).

### 3. Results

Descriptive statistics were calculated for each measured variable across time points (see Table 1). Skewness ( $-0.30$  to  $0.53, SE = 0.15$ – $0.18$ ) and kurtosis ( $-0.29$  to  $0.67, SE = 0.23$ – $0.24$ ) values for the NPQC-R, KMS, and APSD-SR fell within acceptable ranges (skewness  $< \pm 3$  and kurtosis  $< \pm 10$ ; Kline, 2016). However, the distributions for bullying perpetration were positively skewed ( $2.47$ – $4.00, SE = 0.11$ – $0.12$ ) and leptokurtic ( $9.11$ – $30.13, SE = 0.22$ – $0.23$ ). Like others studying bullying perpetration (e.g., Farrell & Vaillancourt, 2020; Volk et al., 2021), extreme scores ( $M \geq 1.60; n = 7$ ) were winsorized, which remedied issues with skewness ( $2.07$ – $2.30, SE = 0.12$ ) and kurtosis ( $4.94$ – $6.23, SE = 0.22$ – $0.23$ ).

Paired samples *t* tests were conducted to examine age-related differences and independent samples *t* tests were calculated to assess sex differences. Only one significant age-related difference was found; bullying was higher at Grade 10 in comparison to Grade 12,  $t(394) = 2.27, p = .024$ . Across time points, boys tended to report higher levels of narcissism and Machiavellianism in comparison to girls (see Table 1). Boys also reported higher levels of psychopathy at Grade 11. No sex differences were found for bullying perpetration.

Machiavellianism, psychopathy, and bullying were positively inter-correlated at each time point, whereas narcissism at Grade 10 and 11 was inconsistently related to the other two Dark Triad dimensions and bullying perpetration (see Table 2). At Grade 10, the correlation between narcissism and bullying was significantly lower than the association for Machiavellianism and bullying, as well as that for psychopathy and bullying (see Table 3; Hypothesis 1). The correlation for psychopathy and bullying was significantly higher than that for

**Table 1**  
Descriptive Statistics and *t*-tests for all Measures for Each Time Point.

Measures	Total				Girls		Boys		<i>t</i>	<i>p</i>
	Min.	Max.	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
NPQC-R										
Grade 10	0.10	4.00	2.09	0.69	1.99	0.72	2.23	0.63	3.73	<0.001
Grade 11	0.00	3.90	2.10	0.67	2.02	0.70	2.20	0.61	2.89	0.004
Grade 12	0.20	4.00	2.13	0.65	2.04	0.67	2.24	0.61	3.20	0.001
KMS										
Grade 10	1.40	3.90	2.53	0.45	2.48	0.43	2.59	0.47	2.64	0.009
Grade 11	1.45	4.25	2.55	0.47	2.50	0.45	2.62	0.49	2.68	0.008
Grade 12	1.30	4.25	2.55	0.49	2.50	0.46	2.62	0.52	2.49	0.013
APSD-SR										
Grade 10	0.00	1.46	0.60	0.30	0.58	0.31	0.62	0.29	1.48	0.141
Grade 11	0.00	1.69	0.60	0.28	0.57	0.28	0.63	0.27	2.22	0.027
Grade 12	0.00	1.62	0.62	0.29	0.60	0.29	0.65	0.28	1.80	0.073
Bullying										
Grade 10	0.00	1.60	0.18	0.30	0.18	0.32	0.17	0.27	-0.29	0.769
Grade 11	0.00	1.60	0.16	0.29	0.17	0.30	0.15	0.27	-0.44	0.661
Grade 12	0.00	1.60	0.15	0.27	0.15	0.27	0.15	0.27	0.16	0.874

Note. NPQC-R = Narcissistic Personality Questionnaire for Children-Revised; KMS = Self-Report Kiddie-Mach Scale; APSD-SR = Antisocial Personality Screening Device-Self-Report.

**Table 2**  
Bivariate Correlations between Variables.

	NPQC-R			KMS			APSD-SR			Bullying		
	1	2	3	4	5	6	7	8	9	10	11	12
NPQC-R												
1. Grade 10	—											
2. Grade 11	0.71**	—										
3. Grade 12	0.66**	0.75**	—									
KMS												
4. Grade 10	0.08	0.11*	0.10*	—								
5. Grade 11	0.20**	0.20**	0.17**	0.69**	—							
6. Grade 12	0.11**	0.16**	0.18**	0.65**	0.69**	—						
APSD-SR												
7. Grade 10	0.07	0.06	0.11*	0.62**	0.50**	0.44**	—					
8. Grade 11	0.10	0.07	0.10*	0.53**	0.59**	0.46**	0.73**	—				
9. Grade 12	0.08	0.10*	0.12*	0.53**	0.48**	0.59**	0.67**	0.71**	—			
Bullying												
10. Grade 10	0.09	0.07	0.10*	0.30**	0.33**	0.22**	0.40**	0.38**	0.26**	—		
11. Grade 11	0.19**	0.21**	0.22**	0.33**	0.38**	0.30**	0.33**	0.40**	0.32**	0.57**	—	
12. Grade 12	0.05	0.07	0.12*	0.21**	0.23**	0.23**	0.28**	0.29**	0.33**	0.52**	0.53**	—
ICC		0.88**			0.87**			0.88**			0.78**	

Note. \**p* < .05 and \*\**p* < .01 (two-tailed) with pairwise deletion; NPQC-R = Narcissistic Personality Questionnaire for Children-Revised; KMS = Kiddie Mach Scale; APSD = Antisocial Process Screening Device-Self-Report. ICC = intraclass correlation.

**Table 3**  
Comparison of the Strength of Correlations between the Dark Triad and Bullying.

Between-Person Bivariate Correlations						
Grade 10			<i>z</i> <i>p</i>			
Narc. ↔ Bull.	<i>r</i> = 0.09	<	Mach. ↔ Bull.	<i>r</i> = 0.30	3.37	<0.001
Narc. ↔ Bull.	<i>r</i> = 0.09	<	Psych. ↔ Bull.	<i>r</i> = 0.40	5.07	<0.001
Mach ↔ Bull.	<i>r</i> = 0.30	<	Psych. ↔ Bull.	<i>r</i> = 0.40	2.63	0.004
Grade 11						
Narc. ↔ Bull.	<i>r</i> = 0.21	<	Mach. ↔ Bull.	<i>r</i> = 0.38	2.98	0.001
Narc. ↔ Bull.	<i>r</i> = 0.21	<	Psych. ↔ Bull.	<i>r</i> = 0.40	3.12	0.001
Mach ↔ Bull.	<i>r</i> = 0.38	<	Psych. ↔ Bull.	<i>r</i> = 0.40	0.51	0.306
Grade 12						
Narc. ↔ Bull.	<i>r</i> = 0.12	<	Mach. ↔ Bull.	<i>r</i> = 0.23	1.85	0.032
Narc. ↔ Bull.	<i>r</i> = 0.12	<	Psych. ↔ Bull.	<i>r</i> = 0.33	3.48	<0.001
Mach ↔ Bull.	<i>r</i> = 0.23	<	Psych. ↔ Bull.	<i>r</i> = 0.33	2.44	0.007

Note. *z* = Steiger's *z* for dependent correlations.

Machiavellianism and bullying perpetration. Similarly, at Grade 11 the correlation between narcissism and bullying was significantly lower than the associations for Machiavellianism and psychopathy with

bullying. At Grade 12 the relation between narcissism and bullying was significantly lower than that for Machiavellianism and psychopathy with bullying perpetration. The association between psychopathy and bullying was also significantly higher than that for Machiavellianism with bullying.

Intraclass correlations (ICCs) indicated that a substantial amount of the variance in constructs, particularly for the Dark Triad traits, was explained at the between person level (*r* = 0.78–0.88; see Table 2). This indicated that a much smaller amount of variance was available to examine within-person associations in narcissism (0.12), Machiavellianism (0.13), psychopathy (0.12), and bullying (0.22).

### 3.1. RI-CLPM analyses

A RI-CLPM model was first estimated, which included the random intercepts for the Dark Triad dimensions and bullying, along with the autoregressive paths, within-time correlations, and cross-lagged effects, as well as parental education and sex as covariates. This model (Model 1) had excellent fit to the data (see Table 4). Each subsequent model was compared to Model 1 using the Satorra-Bentler scaled  $\chi^2$  difference test. No significant difference was found between Model 1 and a model where

**Table 4**  
Summary of Model Fit Statistics for the RI-CLPM Analyses.

Mod.	$\chi^2(df)$	<i>p</i>	CFI	TLI	RMSEA (90% CI)	SRMR	Comp.	$\Delta\chi^2_{sb}(\Delta df)$	<i>p</i>
1.	14.782(22)	0.871	1.000	1.004	0.000 (0.000–0.019)	0.011	–	–	–
2.	16.936(26)	0.911	1.000	1.010	0.000 (0.000–0.014)	0.014	M2 vs. M1	2.290(4)	0.683
3.	23.931(28)	0.685	1.000	1.006	0.000 (0.000–0.027)	0.016	M3 vs. M1	9.564(6)	0.144
4.	38.151(34)	0.286	0.998	0.995	0.015 (0.000–0.037)	0.023	M4 vs. M1	24.147(12)	0.019
5.	<b>25.125(32)</b>	<b>0.801</b>	<b>1.000</b>	<b>1.008</b>	<b>0.000 (0.000–0.022)</b>	<b>0.018</b>	<b>M5 vs. M1</b>	<b>10.003(10)</b>	<b>0.440</b>
6.	40.849(38)	0.346	0.999	0.997	0.012 (0.000–0.034)	0.023	M6 vs. M5	13.431(6)	0.037
7.	40.623(38)	0.356	0.999	0.997	0.012 (0.000–0.034)	0.026	M7 vs. M5	13.359(6)	0.038

Note. Mod. = model;  $\chi^2$  = Chi-square; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; Comp. = model comparison;  $\Delta\chi^2_{sb}$  = Satorra-Bentler scaled Chi-square difference test. Model 1 = base model; Model 2 = autoregressive paths constrained; Model 3 = within-time correlations at Grades 11 and 12 constrained; Model 4 = cross-lagged paths constrained; Model 5 = Final model (autoregressions across time points and within-time correlations at Grades 11 and 12 constrained to be equal); Model 6 = perpetration-driven pathways constrained to zero; Model 7 = disposition-driven pathways constrained to zero.

the autoregressions were constrained to be equal (Model 2). Constraining the residual within-time correlations at Grades 11 and 12 to be equal did not significantly influence model fit (Model 3). In contrast, imposing equality constraints on the cross-lagged paths resulted in a significant deterioration in model fit (Model 4). Given these results, a final model was built (Model 5) where the autoregressive paths and within-time associations at Grades 11 and 12 were constrained, but the cross-lagged paths were free to vary across time.

For the between-person part of the model, unstandardized path estimates indicated that both the random intercept factors for Machiavellianism ( $cov = 0.22$ ,  $SE = 0.01$ ,  $p < .001$ ) and psychopathy correlated significantly with bullying ( $cov = 0.21$ ,  $SE = 0.01$ ,  $p < .001$ ; Hypothesis 2). Significant standardized estimates can be seen in Fig. 1. In contrast, the random intercept for narcissism did not correlate with bullying. Of note, the intercept for narcissism did not correlate with either of the intercepts for Machiavellianism or psychopathy, whereas the random intercepts for Machiavellianism and psychopathy were positively correlated with one another ( $cov = 0.06$ ,  $SE = 0.01$ ,  $p < .001$ ).

Regarding covariates, parental education positively predicted the random intercept for narcissism ( $b = 0.07$ ,  $SE = 0.03$ ,  $p = .007$ ), as well as negatively predicted the intercepts for Machiavellianism ( $b = -0.04$ ,  $SE = 0.02$ ,  $p = .035$ ) and psychopathy ( $b = -0.03$ ,  $SE = 0.01$ ,  $p = .007$ ; see Fig. 1 for standardized estimates). Sex predicted the random intercepts for narcissism ( $b = -0.20$ ,  $SE = 0.05$ ,  $p < .001$ ), Machiavellianism ( $b = -0.13$ ,  $SE = 0.04$ ,  $p = .001$ ), and psychopathy ( $b = -0.05$ ,  $SE = 0.02$ ,  $p = .028$ ), indicating that on average boys scored higher in each dark trait across time. Covariates did not significantly predict the random intercept for bullying.

For the within-person portion of the model, significant positive autoregressive paths were found for narcissism from Grade 10 to Grade 11, as well as from Grade 11 to 12 ( $b = 0.31$ ,  $SE = 0.10$ ,  $p = .002$ ; estimates for autoregressions from Grades 10–11 and 11–12 are the same because they were constrained to be equal; Hypothesis 3). Significant standardized path estimates are found in Fig. 2. The positive autoregression for Machiavellianism from Grade 10 to 11 was significant ( $b = 0.25$ ,  $SE = 0.13$ ,  $p = .046$ ), but the pathway from Grade 11 to 12 was only significant for the unstandardized and not the standardized parameter estimate ( $\beta = 0.25$ ,  $p = .056$ ). In contrast, the autoregressive paths for psychopathy and bullying were not significant.

Most of the within-time correlations were statistically significant in a positive direction at each time point (Hypothesis 4). Of note, Machiavellianism and psychopathy shared significant within-time correlations at Grade 10 ( $cov = 0.02$ ,  $SE = 0.01$ ,  $p = .001$ ), as well as at Grades 11 and 12 ( $cov = 0.02$ ,  $SE = 0.00$ ,  $p < .001$ ; repeated paths at Grades 11 and 12 are the same because they were constrained to be equal). In contrast, narcissism did not correlate significantly with Machiavellianism at Grade 10 and was uncorrelated with psychopathy at each time point. Narcissism was positively related to Machiavellianism at Grades 11 and 12 ( $cov = 0.03$ ,  $SE = 0.01$ ,  $p = .001$ ). Bullying was related to narcissism at Grade 11 and 12 ( $cov = 0.01$ ,  $SE = 0.01$ ,  $p = .009$ ), but not at Grade

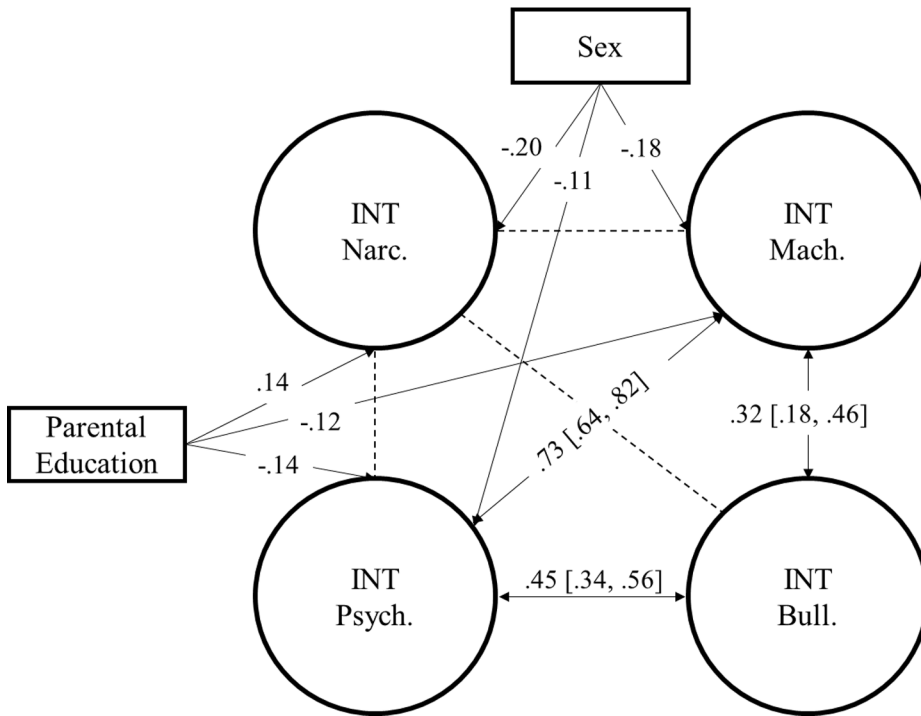
10. Bullying perpetration correlated with Machiavellianism at Grade 11 and 12 ( $cov = 0.01$ ,  $SE = 0.00$ ,  $p = .002$ ), but the within-time correlation at Grade 10 was only significant for the standardized ( $p = .022$ ) and not the unstandardized path estimate ( $cov = 0.02$ ,  $SE = 0.01$ ,  $p = .064$ ). Bullying correlated with psychopathy at each time point (Grade 10:  $cov = 0.01$ ,  $SE = 0.01$ ,  $p = .021$ ; Grades 11 and 12:  $cov = 0.01$ ,  $SE = 0.00$ ,  $p = .005$ ).

Several statistically significant cross-lagged effects emerged, some of which supported predicted disposition-driven pathways (Hypothesis 5). Narcissism at Grade 10 predicted bullying perpetration at Grade 11 ( $b = 0.24$ ,  $SE = 0.09$ ,  $p = .005$ ), as did Machiavellianism ( $b = 0.26$ ,  $SE = 0.11$ ,  $p = .021$ ). Other cross-lagged effects describing perpetration-driven pathways also emerged. Bullying at Grade 10 predicted Machiavellianism at Grade 11 ( $b = 0.20$ ,  $SE = 0.09$ ,  $p = .017$ ) and bullying at Grade 11 predicted narcissism at Grade 12, but only for the unstandardized ( $b = 0.34$ ,  $SE = 0.17$ ,  $p = .045$ ) and not the standardized parameter estimate ( $\beta = 0.16$ ,  $p = .051$ ). Of note, narcissism at Grade 10 was also found to predict Machiavellianism at Grade 11 ( $b = 0.23$ ,  $SE = 0.09$ ,  $p = .011$ ).

The Satorra-Bentler scaled  $\chi^2$  difference test indicated that a model where the disposition-driven paths were constrained to zero (Model 6) differed significantly from the final model (Model 5; see Table 4). Similarly, a model where the disposition-driven paths were fixed to zero (Model 7) differed significantly from the final model. These results suggested that both perpetration- and disposition-driven pathways made a unique contribution to the overall model.

### 3.2. Exploratory analyses

In previous longitudinal work, some researchers have directly compared traditional CLPM with RI-CLPM in the same study to contrast model fit and parameter estimates. In comparison to RI-CLPM, traditional CLPM tends to result in poorer fit to the data, more consistent cross-lagged effects, and stronger autoregressive path estimates (e.g., Orth et al., 2021). Following these researchers, a traditional CLPM was estimated for the Dark Triad and bullying perpetration, which included one-year autoregressive pathways, within-time correlations, and cross-lagged paths. Measured variables at Grades 10, 11, and 12 were regressed onto sex and parental education to statistically control for their influence. The same procedures used for the RI-CLPM were followed for constraining the autoregressions, within-time associations, and cross-lagged parameters and to compare model fit using the Satorra-Bentler scaled  $\chi^2$  difference test. In accordance with other authors (e.g., Orth et al., 2021) and in line with the critiques of traditional CLPM (Hamaker, Kuiper, & Grasman, 2015; Mulder & Hamaker, 2021), we found that, compared to the final RI-CLPM, the CLPM had poorer fit to the data. Furthermore, each construct had high between-person temporal stability in the CLPM that differed meaningfully from the within-person carry-over effects that were only observed for narcissism and Machiavellianism in the RI-CLPM. Moreover, compared to the traditional CLPM, fewer within-person cross-lagged effects were observed



**Fig. 1.** Between-Person Random Intercept Correlations for Dark Triad and Bullying from Grades 10 to 12. Note. Random intercept correlations for Dark Triad and bullying. Random intercepts were regressed onto sex (coded 0 = boys and 1 = girls) and parental education to statistically control for their influence. INT = random intercept. Values represent standardized correlations ( $r$ ) and regression coefficients ( $\beta$ ). Dotted lines indicate non-significant paths. Values in square brackets are 95% confidence intervals.

with the RI-CLPM analysis. These results can be seen in Table S1 and Figure S1 in the Supplemental Materials.

#### 4. Discussion

An issue that continues to stymie research on the Dark Triad is the reliance on cross-sectional data with convenience samples of young adults (Miller et al., 2019; Muris et al., 2017; Vize et al., 2018). Therefore, the developmental unfolding of Dark Triad traits in adolescence has not received much empirical attention. Several researchers have conducted important longitudinal work on the Dark Triad in youth and adults (e.g., Sijtsema et al., 2019). Nonetheless, the analytic approaches used in these studies (e.g., traditional CLPM), have not allowed researchers to distinguish between- from within-person variability in the Dark Triad dimensions and different kinds of antisocial behavior over time. To this end, it is sensible to leverage longitudinal analyses that do not conflate between-person stability with within-person change, such as RI-CLPM (Hamaker et al., 2015; Mulder & Hamaker, 2021).

##### 4.1. Bivariate associations between bullying and the dark triad

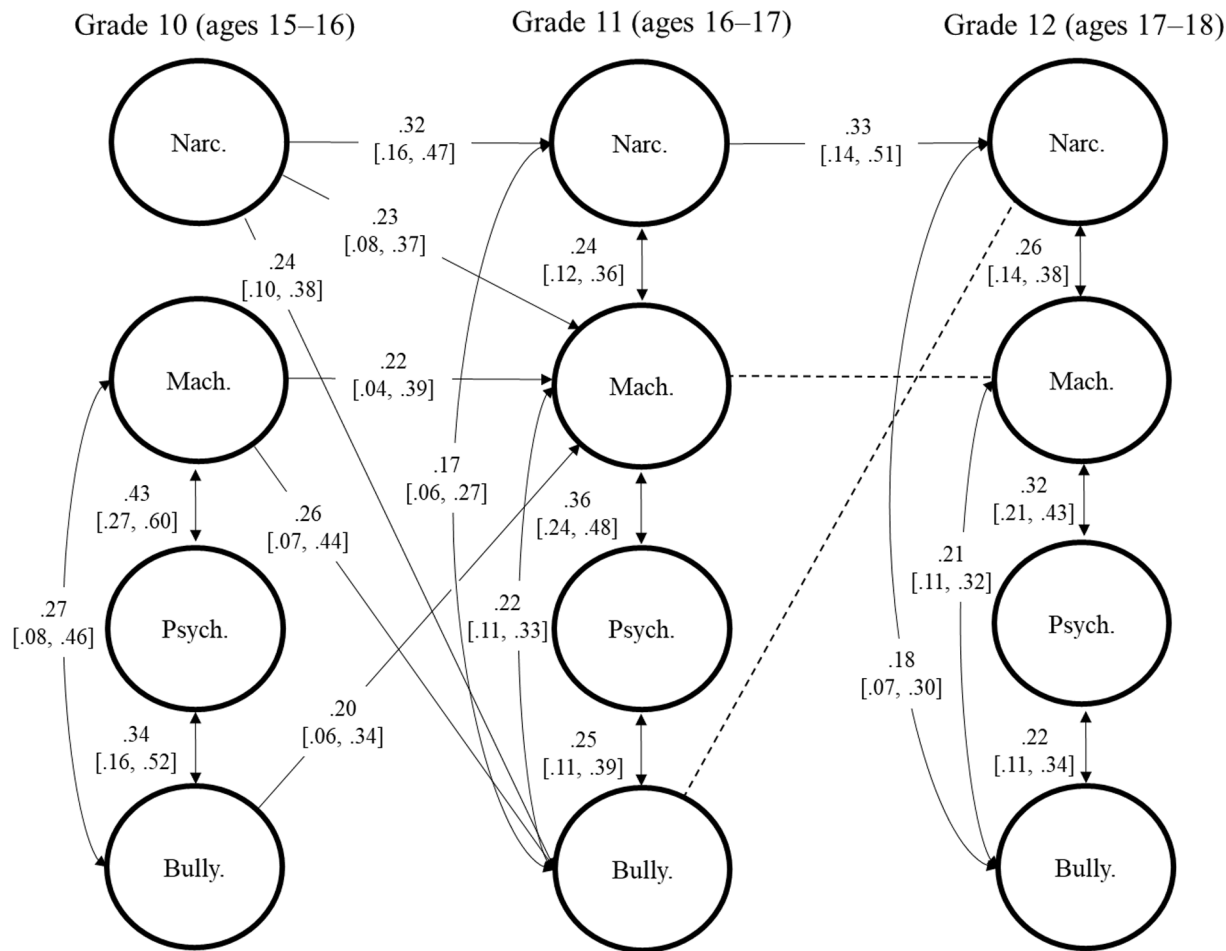
Consistent with previous cross-sectional research on adolescents (e.g., Sehar & Fatima, 2016; van Geel, Goemans et al., 2017) at the bivariate level Machiavellianism and psychopathy correlated with bullying perpetration at each time point. However, narcissism did not consistently correlate with bullying. We examined whether the bivariate relations among the Dark Triad dimensions with bullying perpetration were significantly different from one another (Hypothesis 1; Miller et al., 2019). Psychopathy and Machiavellianism were found to share significantly stronger associations with bullying at each time point, in comparison to the relations between narcissism and bullying. These findings accord with previous research and provide further evidence for the primacy of psychopathy in the associations between the Dark Triad and bullying perpetration among adolescents (e.g., Safaria et al., 2020; Sehar & Fatima, 2016; van Geel, Goemans et al., 2017).

##### 4.2. Random intercept cross-lagged panel model findings

In contrast to previous longitudinal research, RI-CLPM was used to separate between-person stability in the Dark Triad and bullying (captured by the random intercepts) from the within-person change in constructs across time. Controlling for sex and parental education, the random intercepts for Machiavellianism and psychopathy were highly correlated; however, neither correlated with the random intercept for narcissism (Hypothesis 2). The intercepts for Machiavellianism and psychopathy also shared significant associations with the intercept for bullying perpetration. These findings suggest that, in general, adolescents higher on Machiavellianism and psychopathy, but not necessarily narcissism, are expected to engage in more bullying.

Controlling for between-person stability, the autoregressive pathways were significant for narcissism and Machiavellianism from Grade 10 to 11 and Grade 11 to 12, but not for psychopathy or bullying perpetration (Hypothesis 3). This result suggests that there are significant carry-over effects (i.e., inertia) in narcissism and Machiavellianism in older adolescents that is distinct from the trait-level means and stability captured by the random intercepts. Stated differently, adolescents scoring above their expected means in narcissism and Machiavellianism at one measurement occasion were likely to score above their expected means at subsequent occasions (Hamaker et al., 2015; Mulder & Hamaker, 2021; Mund & Nestler, 2019). Although, the autoregression for Machiavellianism from Grade 11 to 12 was only significant for the unstandardized estimate. In contrast, psychopathy and bullying scores appeared to lack this moment-to-moment stability over and above the between-person stability accounted for by the random intercepts. Regarding bullying perpetration, this is consistent with some previous work with RI-CLPM wherein autoregressive pathways for bullying in adolescents were either small or non-significant (Filippini et al., 2020). This could signal meaningful intra-personal change in psychopathy and bullying during adolescence, which could be examined via more rigorous longitudinal analytic procedures that involve estimating and





**Fig. 2.** Final RI-CLPM for Dark Triad and Bullying from Grades 10 to 12 (Model 5). *Note.* Final RI-CLPM (Model 5) includes autoregressions (constrained to be equal), cross-lagged effects, within-time correlations (constrained to be equal at Grades 11 and 12), and the covariates sex and parental education. Only statistically significant ( $p < .05$ ) paths are shown. Values represent standardized correlations ( $r$ ) and regression coefficients ( $\beta$ ). Dotted lines describe significant paths with non-standardized, but not standardized, estimates. Values in square brackets represent 95% confidence intervals.

modeling slope factors, such as autoregressive latent trajectory modeling with structured residuals (ALT-SR; Curran et al., 2014).<sup>2</sup> However, four waves of data are recommended when using ALT-SR (Mund & Nestler, 2019), which we did not have access to in the present study.

Accounting for the between-person correlations among random intercept factors, the residual within-time correlations were similar to the bivariate correlations discussed earlier. Within-individuals, Machiavellianism and psychopathy were positively correlated at each time point (Hypothesis 4). That is, adolescents reporting higher Machiavellianism scores than their expected person-specific mean also exhibited concurrent higher psychopathy scores than they usually do (Mund & Nestler, 2019). The same relation was found for narcissism and Machiavellianism; however, narcissism shared no significant within-person links with psychopathy. Also complementing the bivariate analyses, the within-time correlations between narcissism and bullying were either small or non-significant. In contrast, the within-time links

between Machiavellianism and psychopathy with bullying were significant at each time point. Although, the within-time correlation between Machiavellianism and bullying at Grade 10 was only significant for the standardized pathway. Therefore, at both the between- and within-person level among adolescents, the Dark Triad do not appear to be equally associated with the perpetration of antisocial and aggressive behavior within specific time points.

Again, accounting for the trait-like time-invariant stability of the Dark Triad and bullying, several of the residual within-person cross-lagged effects were significant. In line with the idea that dark personality traits give rise to bullying perpetration (i.e., disposition-driven pathways), both narcissism and Machiavellianism at Grade 10 positively predicted bullying at Grade 11 (Hypothesis 5). These cross-lagged effects indicate that increases above the person-specific means for these Dark Triad dimensions at an earlier time point were related to higher-than-expected subsequent deviations for the person-specific means of bullying (Mund & Nestler, 2019). These findings align with those reported by Fanti & Henrich, 2015 for narcissism, as well as Geng et al. (2017) for Machiavellianism. However, these paths were not replicated from Grade 11 to 12. Furthermore, in accordance with the notion that antisocial behavior may promote more malevolent dispositions (i.e., perpetration-driven pathways), bullying at Grade 10 positively predicted Machiavellianism at Grade 11. This finding aligns with the longitudinal results by Sijtsema et al. (2019), but not with those found by Geng et al. (2017). In contrast to some previous results (e.g., Fanti & Henrich, 2015; Sijtsema et al., 2019), bullying at Grade 11 also

<sup>2</sup> We explored slope means and slope variances for each construct across time points to gather some insight into growth trajectories. Slope means for narcissism ( $p = .342$ ), Machiavellianism ( $p = .287$ ), and psychopathy ( $p = .613$ ) were not significant. However, the slope means for bullying were significant ( $-0.02$ ,  $p = .017$ ). The slope variances for narcissism were significant ( $p = .032$ ), but not those for Machiavellianism ( $p = .073$ ), psychopathy ( $p = .441$ ) or bullying ( $p = .675$ ).



positively predicted narcissism at Grade 12, although this pathway was only significant for the unstandardized estimate. We found that disposition- and perpetration-driven pathways were making significant and unique contributions to the final model. These results draw attention to the sentiment advanced by Sijtsema et al. (2019) that researchers should be careful to not assume that dark personality traits always precede involvement in aggressive and antisocial behavior.

#### 4.3. Limitations

Despite several strengths of the present work (e.g., relatively large sample, longitudinal data, and within- and between-person analyses), there are important limitations to consider. Although data across the Dark Triad dimensions and bullying were missing at random, girls and those with educated parents were more likely to be included in the analytic sample. This limits the generalizability of the findings. Some research also indicates that psychopathy may be the strongest correlate of direct forms of aggression (e.g., verbal and physical aggression), while Machiavellianism and narcissism may share stronger positive links with indirect aggression (e.g., malicious gossip and social exclusion; Klimstra et al., 2014). This pattern, however, is not always supported across studies (e.g., Baughman et al., 2012). In the current study, with only one item devoted to each kind of bullying perpetration, we did not feel confident in examining bullying subtypes, which might be fruitful for future researchers to explore. Nonetheless, previous work indicates that bullying severity takes precedence over type (e.g., Haltigan & Vaillancourt, 2018).

Narcissism, Machiavellianism, and psychopathy are also multi-dimensional personality traits, each with lower-order facets (Miller et al., 2019). It is possible that these facets may themselves differentially relate to bullying perpetration. For example, with the NPQC-R (Ang & Raine, 2009), Ang et al. (2010) found that the exploitativeness facet of narcissism correlated positively with bullying. Using the Kiddie Mac Scale (Christie & Geis, 1970), Andreou (2004) found that the manipulation facet of Machiavellianism predicted bullying for girls, whereas for boys a lack of faith in human nature predicted perpetration. Using the APSD-SR (Frick & Hare, 2001), Stellwagen and Kerig (2013) found that the positive correlations between “ringleader bullying” with impulsivity and callous-unemotional traits in youth were similar in strength. Relatedly, the dimensionality of the APSD-SR, which was used in the present research, seems to be a matter of ongoing debate (Collins et al., 2014; Zhang et al., 2019). Therefore, it would be prudent for future researchers to delve into these facets in more depth. Nonetheless, it is advantageous to first assess how the Dark Triad dimensions relate to bullying over time within individuals prior to taking this next step.

It is possible that there was insufficient statistical power to detect some effects in the final RI-CLPM (Model 5). To examine our ability to identify minimum observed effects across parameters given a sample size of  $N = 514$  with missing data for each variable, a Monte Carlo simulation (10000 simulated samples) was run (see Table S2 in Supplemental Materials).

For the between-person portion of the model, a sample size of 514 will not likely provide researchers with sufficient power ( $\geq 0.80$ ) to detect very small effects ( $r < 0.10$ ), but it will be adequate for the detection of medium to large effects ( $r \geq 0.30$ ; see Masselink et al., 2018 for discussion of effect sizes with RI-CLPM). For the within-person analyses, a sample size of 514 is likely adequate for detecting medium carry-over effects ( $\beta \sim 0.30$ ), but not small within-time correlations ( $r \sim 0.10$ ). This sample size can also be used to detect medium within-time correlation effects ( $r \sim 0.30$ ), as well as medium to large cross-lagged effects ( $\beta \geq 0.30$ ). Therefore, despite having a sample size that is consistent with previous research with RI-CLPM (e.g., Boer et al., 2020), we were likely underpowered to detect very small to small effects across between- and within-person parameters. This is important given that previous research indicates that carry-over effects for bullying perpetration tend to be quite small ( $\beta = 0.10\text{--}0.19$ ; Filipponi et al., 2020;

Romera et al., 2021). Evidence indicates that RI-CLPM is a large sample technique, and that to have sufficient power may require over 1000 participants to detect small effects (Masselink et al., 2018).

## 5. Conclusion

We assessed, for the first time, the between- and within-person relations among the Dark Triad traits and bullying perpetration in a randomly selected sample of Canadian adolescents from ages 15–18 using RI-CLPM (Hamaker et al., 2015). This investigation helps to address the call for more empirical work on the Dark Triad in youth recruited via non-convenience sampling techniques with longitudinal data (Muris et al., 2017; Vize et al., 2018). At the between-person level, we found that the Dark Triad dimensions were differentially related to bullying, with psychopathy sharing the strongest links with perpetration. Controlling for sex and parental education, both the random intercepts for Machiavellianism and psychopathy correlated with the intercept for bullying perpetration. At the within-person level, when accounting for the between-person stability of constructs (i.e., the random intercepts), narcissism and Machiavellianism were found to have significant moment-to-moment stability. Residual within-time correlations were similar to the bivariate associations, indicating that only Machiavellianism and psychopathy shared consistent links with bullying. Cross-lagged effects emerged in support of both disposition- and perpetration-driven pathways. These findings are of critical importance to researchers, educators, and clinicians, because they suggest that bullying can be reduced by targeting particular “dark” dispositions, and that the expression of some malevolent personality traits can be diminished via bullying interventions. Our findings also suggest that it may be crucial to tailor bullying interventions “to the individual” in line with their specific personality characteristics, which honours heterogeneity in both the Dark Triad and bullying in youth (Farrell & Vaillancourt, 2020).

## 6. Author Note

A de-identified dataset with the variables used for the analyses in the current study are available upon request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions. The Mplus syntax used to build Models 1–7, as well as the output for each model described in the current study are available on the Open Science Framework (<https://osf.io/kgch5/>). The Mplus syntax used to generate each model are also available in the online Supplemental Materials.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Author Contributions

Adam C. Davis conducted the analyses and wrote the manuscript

draft, and Ann H. Farrell helped with the syntax for the random-intercept cross-lagged panel model (RI-CLPM). Tracy Vaillancourt designed the larger study from which the current research is a part of (i.e., the McMaster Teen Study), and Heather Brittain, Amanda Krygsman, and Tracy Vaillancourt collected the survey data. Steven Arnocky helped with editing the manuscript, as did the other co-authors.

## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jrp.2021.104178>.

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