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Dark Personality Traits and Impulsivity Among Adolescents: Differential Links to Problem Behaviors and Family Relations

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Research on how dark personality traits develop and relate to risky behaviors and family relations during adolescence is scarce. This study used a person-oriented approach to examine (a) whether distinct groups of adolescents could be identified based on their developmental profiles of callous-unemotional (CU), grandiose manipulative (GM), and dysfunctional impulsivity (DI) traits and (b) whether these groups differ in their problem behaviors and parent–adolescent relationship quality. Latent class growth analyses on 4-wave data of 1,131 Dutch adolescents revealed 3 personality profiles: (1) a dark impulsive group (13.9%), with high scores on all 3 traits (CU, GM, and DI) that were stable over time; (2) an impulsive group (26.1%), with high and increasing levels of impulsivity and relatively low scores on CU and GM; and (3) and a low risk group (60.0%), with relatively low levels on all 3 personality characteristics, with impulsivity decreasing over time. Compared with adolescents in the low risk group, adolescents in the dark impulsive and impulsive groups reported higher initial levels of substance use, sexual risk behaviors, permissive sexual attitudes, parent–adolescent conflict, and lower parent–adolescent satisfaction, as well as greater increases in sexual risk behavior over time. Compared with adolescents in the impulsive group, those in the dark impulsive group showed the highest levels of risk behaviors. Hence, dark personality traits coupled with impulsivity may be indicative of an earlier and more severe trajectory of problem behaviors that may differ from the trajectory of youth who are only impulsive.

General Scientific Summary

This study identified 2 subgroups of adolescents that are at higher risk of engaging in risk behaviors on the basis of their self-reported psychopathic personality traits and impulsivity. The first group (high on callous-unemotional, grandiose-manipulative, and impulsivity) show early and escalating levels of substance use and sexual risk behaviors, whereas the second group (high on impulsivity only) also shows higher but less severe levels for substance use and sexual risk behaviors. Including measures of psychopathy such as callous-unemotional, or grandiose-manipulative traits, in addition to impulsivity, to community studies would help identify adolescents at greatest risk for early and severe risk taking behaviors.

Keywords: grandiose manipulative, callous-unemotional, impulsivity, adolescence, latent class growth analyses

Although it is widely recognized that children and adolescents with psychopathic (dark) personality traits are at increased risk for exhibiting antisocial behavior, conduct problems, delinquency and/or (sexual) aggression, and substance use disorders (e.g., Chabrol, van Leeuwen, Rodgers, & Sejourne, 2009; Frick, Cornell, Barry, Bodin, & Dane, 2003; McMahon, Witkiewitz, Kotler, & the Conduct Problems Prevention Research Group, 2010), there is relatively little research on how these traits develop and whether they relate to the development of problem behaviors such as substance use or sexual risk behaviors before

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Data for the present study were collected as part of a larger longitudinal study conducted in the Netherlands titled "Project STARS" (i.e., Studies on Trajectories of Adolescent Relationships and Sexuality), which was funded by the Dutch Organization for Scientific Research (NWO) and the Fund for Scientific Research of Sexuality (FWOS; NWO Grant 431-99-018). Portions of this research have been presented as a poster at the 2017 Biennial Meeting of the Society for Research in Child Development, Austin, Texas.

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they escalate into clinical disorders. This lacuna is surprising given the strong body of research that shows that dark personality traits have been associated with a number of negative outcomes among young adults such as binge drinking (Luhtanen & Crocker, 2005), general substance use (Buelow & Brunell, 2014), participation in high risk sports (Buelow & Brunell, 2014), aggressive driving (Malta, Blanchard, & Freidenberg, 2005), sexual drive (Baughman, Jonason, Veselka, & Vernon, 2014), and risky sexual behaviors (Martin, Benotsch, & Lance, 2013). Moreover, most research on children and adolescents focuses on either callous unemotional traits or impulsivity, with only a limited number of studies including multiple dark personality traits at once. The present research focuses on callous-unemotional (CU), grandiose manipulative (GM), and dysfunctional impulsivity (DI) traits, as these characteristics have been used to reflect the core dimensions of psychopathy (e.g., Cooke & Michie, 2001; Frick, Bodin, & Barry, 2000; van Baardewijk et al., 2010). We investigated whether a school-based sample of adolescents followed across four measurement waves could be classified into subgroups based on the beginning levels and change profiles of these three personality traits and to what extent these groups differed in substance use, sexual risk behaviors, and family relationship qualities.

The present research takes a person-oriented perspective to account for the fact that although distinct, these traits are often modestly correlated (Jonason & Tost, 2010; Jones & Paulhus, 2011; O'Connor, Humayun, Briskman, & Scott, 2016). A person-oriented approach attempts to identify how constellations of traits within individuals are organized and groups of individuals are identified who have similar personality profiles. In this way, a person-oriented approach takes into account how traits conjointly operate within the same individual (Egan, Chan, & Shorter, 2014). A variable-centered approach, in contrast, focuses on differences among individuals on a given personality trait and examines how these traits are related to problem behaviors. Correlations among the traits can lead to issues of collinearity when used simultaneously as predictors in the same regression analysis; moreover, even when two or more variables are correlated with an outcome behavior, it is not certain whether these associations operate similarly for all individuals within the sample. That is, a variable-centered approach assumes that any association found between variables applies similarly to everyone in the sample, whereas a person-oriented approach does not. CU traits refer to an affective style that is characterized by low levels of empathy or guilt for wrong doing and restricted or shallow affect (Frick, Ray, Thornton, & Kahn, 2014), whereas GM traits reflect an interpersonal style characterized by arrogance, manipulation, lying, and superficial charm (Orue, Calvete, & Gamez-Guadix, 2016). Finally, dysfunctional impulsivity reflects a behavioral style that is characterized by making decisions or taking actions with little or no consideration of the consequences, particularly when the consequences are detrimental (Dickman, 1990). Impulsivity has often been associated with many of the problem behaviors that increase during adolescence (Dir, Coskunpinar, & Cyders, 2014; Stautz & Cooper, 2013), and most research that focuses on this trait among community samples does not simultaneously investigate other dark personality characteristics.

Three previous cross-sectional studies have attempted to identify subtypes of adolescents on the basis of these three personality dimensions, representing a Swedish community sample (Andershed, Kerr, Stattin, & Levander, 2002), incarcerated German male offenders (Andershed, Köhler, Eno Louden, & Hinrichs, 2008), and Dutch adolescents in residential care for behavioral problems (Nijhof et al., 2011). Three common groups of adolescents were identified: a normative/low risk group (24% to 51% of the adolescents sampled) that scored low on all three characteristics; an impulsive group (17% to 38%) that scored high on impulsivity and moderate on CU traits and GM traits; and a psychopathic group (10% to 29%) that scored high on all three traits. Both the psychopathic and impulsive groups showed higher risks for externalizing problem behaviors, delinquency, conduct disorders (Andershed et al., 2002, 2008; Nijhof et al., 2011), and cannabis use compared with the low risk group (Andershed et al., 2008; Nijhof et al., 2011). In general, the psychopathic group showed higher levels of acting out problems compared with the impulsives (Andershed et al., 2002, 2008; Nijhof et al., 2011) and were more likely to report hard substance use or polysubstance use (Andershed et al., 2008), whereas the impulsive group showed a higher tendency for internalizing problems (Nijhof et al., 2011).

Although cross-sectional studies are useful for identifying subgroups of adolescents on the basis of their current personality characteristics, longitudinal studies are needed to determine the degree to which these personality subtypes remain the same across time or whether other subgroups representing change profiles are apparent. Early theorizing on adult psychopathic traits has often assumed that these characteristics are early emerging characteristics that, once developed, would be quite stable from childhood to adulthood (Salihovic, Özedemir, & Kerr, 2014). The only study to examine longitudinal trajectories of psychopathic traits using a person-oriented approach followed a community sample of Swedish 13 to 15 year olds four times annually (Salihovic et al., 2014). Four groups of adolescents were identified: a low-decreasing group (28%) that exhibited low initial levels of CU, GM, and impulsive traits that decreased across the four waves, a moderate-decreasing group (35%) that showed moderate levels of all traits that decreased across time (with higher levels of impulsivity relative to the other traits), a moderate-stable group (25%) that showed moderate levels of all traits that did not change across time (also with higher relative levels of impulsivity), and a high-decreasing group (12%) that showed the highest levels of all traits across all waves of the study with CU traits and impulsivity showing slight decreases over time. All four groups differed in their initial levels and degree of change in delinquency and parenting across time. The low decreasing and moderate decreasing groups showed low initial levels of delinquency and no change in delinquency across time; these groups also had parents who exhibited the high levels of positive parenting and the low and stable levels of negative parenting. The moderate stable and high decreasing groups showed the highest levels of delinquency with the moderate stable group increasing in delinquency across time. Moreover, these groups experienced more difficult relationships with their parents. In comparing the results from this longitudinal study to the 3 cross-sectional studies, the low-decreasing and moderate-decreasing groups are similar to the low risk groups found in the cross-sectional studies in terms of developmental outcomes, whereas the high-decreasing group is most similar to the

psychopathic group. The moderate stable group showed higher levels of delinquency that worsened over time and is most equivalent to the impulsive group. Thus, although promising more research is needed to determine whether three or four is the optimal number of personality profiles.

The current research extends prior research in several ways. First, with the exception of Salihovic et al. (2014), most studies that examined psychopathic profiles used a one-time assessment of the dark personality traits. Although high levels of stability of all three traits among school-age children have been found (Frick, Kimonis, Dandreaux, & Farell, 2003), there could be substantial interindividual variability in the developmental trajectories of these traits particularly during adolescence. Recent longitudinal studies have found an increase in impulsivity from ages 10 through 14 and a subsequent decrease (Littlefield, Stevens, Ellingson, King, & Jackson, 2016; Shulman, Harden, Chein, & Steinberg, 2015), particularly on measures that focus on premeditation or urgency; subgroups showing either declines or stability in impulsivity across adolescence (Harden & Tucker-Drob, 2011; Quinn & Harden, 2013; Salihovic et al., 2014) have also been found. Variability in trajectory analyses for callous/unemotional among children ranging from 7 to 12 years old has also been found (Fontaine, McCrory, Boivin, Moffitt, & Viding, 2011), and Salihovic et al.'s trajectory analyses found both stable and decreasing trajectories for both CU traits and GM traits. Thus, the current study draws from a 4-wave longitudinal study of a community sample of Dutch adolescents and attempts to identify whether the same stable subtypes of adolescents could be identified or whether different or additional subtypes could be identified on the basis of the levels and change profiles of CU, GM, and dysfunctional impulsivity (DI) traits.

Second, prior research focused primarily on externalizing problems, conduct problems and delinquency and more serious substance use issues (illegal drugs or substance use problems). This leaves open the question as to whether differences between these groups also exist for less problematic levels of substance use or other problem behaviors. In the current study, we focus on two developmentally relevant behaviors that most, if not all, adolescents are confronted with: substance use and sexual risk behaviors. Most research that examines the association between psychopathic traits and sexual behavior among adolescents has focused on male sexual offenders (e.g., Caputo, Frick, & Brodsky, 1999). Nevertheless, among community samples, all three traits were independently associated with adolescent sexual risk taking (McCauley, Shadur, Hoffman, MacPherson, & Lejuez, 2016; Rucević, 2010), but when combined in a regression analysis, only impulsivity remained as a significant predictor (Rucević, 2010). Moreover, impulsivity (but not CU nor GM) was found to correlate with adolescent boys' symptoms of compulsive use of sexually explicit Internet material (SEIM; Doornwaard, van den Eijnden, Baams, Vanwesenbeeck, & ter Bogt, 2016). In the current study we focused on three types of sexual risk behavior: permissive sexual attitudes, sexual risk behaviors that could lead to either a sexually transmitted infection or pregnancy, and compulsive SEIM use.

Third, in addition to examining the behavioral correlates of the personality profiles we also examined how parent–adolescent relationship quality relates to the personality profiles across the study period. As reviewed above, only the research by Salihovic and colleagues (2014) investigated whether adolescents with differing trajectories of pyschopathic traits also experienced differences in parental behavior. Other research also confirms the salient role of family risk factors in predicting changes in psychopathic traits across time and even bidirectional relationships between family functioning and personality traits (Kiff, Lengua, & Zalewski, 2011; Thomaes, Brummelman, Reintjes, & Bushman, 2013; Waller, Gardner, & Hyde, 2013). For example, children exposed to high levels of physical punishment have been found to exhibit increasing levels of CU traits over time (Fontaine et al., 2011; Lynam, Loeber, & Stouthamer-Loeber, 2008; Pardini, Lochman, & Powell, 2007), whereas exposure to higher levels of warmth and involvement predicted decreases in CU traits (Pardini et al., 2007). Among adolescents, parent hostility at age 12 predicted higher levels of manipulative traits at age 14 (Wetzel, & Robins, 2016). Impulsivity in middle childhood has been linked with greater family conflict in late childhood, which in turn predicted greater impulsivity in late adolescence (Elam et al., 2016). Together, these results suggest that the parent–child relationship affects and may be affected by whether the child exhibits dark personality traits.

Current Study

Using a four-wave, 6-month interval, longitudinal design, with a sample of 1,131 Dutch adolescents (11 to 18 years old) we address three aims. First, using latent class growth analyses we examined whether distinct groups of adolescents could be identified on the basis of the levels and change profiles of the three personality traits. Second, we examined whether these profile groups differed in their levels and change in problem behaviors, focusing on substance use and sexual behaviors (sexual risk behavior, permissive sexual attitudes and the compulsive use of SEIM). Third, we examined whether adolescents in these groups differ in parent-relationship quality, focusing on satisfaction and conflict.

Hypotheses

On the basis of prior findings of the modest correlations among CU, DI, and GM (Fontaine et al., 2011; Harden & Tucker-Drob, 2011; Quinn & Harden, 2013) and the latent class/cluster analyses using similar scales (Andershed et al., 2002, 2008; Nijhof et al., 2011; Salihovic et al., 2014), we expected that a minimum of 3 classes would be identified but that additional groups might be identified on the basis of how the personality characteristics changed across time. That is, we expected to find at least 3 (relatively stable) groups, specifically: a group of individuals who would show high scores on all 3 characteristics across the four waves of measurements, a group of adolescents who would show relatively high scores on impulsivity and moderate or low scores on CU and GM, and a low risk group who would show low scores on all three traits. Other groups are also possible, but we do not make predictions about outcomes.

On the basis of prior findings that have used either a person-oriented or dimensional perspective to examine how dark personality traits are related to risk behaviors, we expected to find differences in problem behaviors and parent–adolescent relationship quality across the three a priori hypothesized profiles. Specifically, we expected that individuals who score high on all three

personality dimensions to show the highest level of substance use and the poorest relationship quality with parents (low satisfaction and high conflict), compared with any other group. We expect that adolescents who are stably high on all three personality traits and those who are stably high on impulsivity to show similar elevated levels of sexual risk behavior (permissive attitudes, risky sexual behavior, and compulsive use of sexually explicit Internet material), and these levels would be higher than the group that are low on all traits.

Method

Sample and Participants

The present study used data from Project STARS (Studies on Trajectories of Adolescent Relationships and Sexuality), a longitudinal study of 1,297 adolescents attending regular education in the Netherlands (Reitz et al., 2015). Starting from the Fall of 2011, four waves of data were collected at 6-month intervals. Participants were recruited from the last year of elementary school (6th grade) through the 10th grade of secondary school. Given that several outcome variables (e.g., sexual behaviors and drug use) were only assessed among the secondary school students, data from the elementary school students were excluded from the current analyses. This resulted in a final sample of 1,131 adolescents who ranged in age from 11 to 18 years ($M = 13.95$, $SD = 1.18$) at Wave 1. Fifty-three percent of the sample consisted of boys. Fifty-six percent of the participating adolescents followed the high education track (i.e., senior general education or preuniversity education) and 37.8% followed the low education track (i.e., prevocational education). The majority of the sample had a Dutch (79.2%) or other Western (11.0%) ethnic background. Nineteen percent of the adolescents reported that their parents were divorced at the first wave.

Bias checks. A total of 815 (72.0%) participants had complete data (four waves); 190 (16.8%) had data on three waves, 91 (8.0%) had data on two waves, and 35 (3.2%) had data on one wave. To investigate potential bias in the current analyses, we compared those adolescents who provided responses at Wave 4 with those who did not participate at Wave 4 on all key variables used here. Adolescents who missed participation in Wave 4 were older ($B = .37$, $p < .001$) and more likely to binge drink ($B = .25$, $p = .001$) at Wave 1. There were no differences in gender, personality traits, other substance use, parent–adolescent relationship, sexual risk behavior, permissive sexual attitudes, and compulsive SEIM use ($ps > .05$).

Procedure

Participants were recruited from four secondary schools in large cities and small municipalities in different areas of the Netherlands. Before the first measurement, eligible adolescents and their parents received information describing the aims of the study, confidentiality safeguards and procedures for declining or ending participation. Of the approached adolescents, fewer than 7% decided not to participate or were not allowed by their parents to take part in the study. At each wave, adolescents completed a computer-based, Dutch questionnaire at school during regular school hours. Researchers and trained research assistants were present to supervise the data collection (i.e., introduce the project and the procedure, answer questions, and ensure maximum privacy from teachers and other students). Adolescents received book gift certificates of increasing values after each completed questionnaire. An ethical protocol was developed should participants have any problems of questions concerning issues in this study. This study was approved by the ethics board of the Faculty of Social and Behavioral Sciences of Utrecht University.

Measures

To curb the length of the online questionnaire, and to minimize potential data loss due to weariness, we limited the number of items for some scales (psychopathic traits, impulsivity, permissive sexual attitudes, and compulsive SEIM use) by using a planned missingness design (Graham, Taylor, Olchowski, & Cumsille, 2006) at the outset of the study. In this design, participants were randomly assigned to one of three groups, which completed a different combination of three or four items from the original scale. As the study progressed, adolescents became more proficient and faster at completing the questionnaires and therefore it was decided that for T3 and T4, full versions of the questionnaires would be used. Planned missing T1 and T2 items were subsequently imputed using expectation-maximization estimation (Dempster, Laird, & Rubin, 1977) in SPSS Version 23 (IBM Corp., 2015).

Psychopathic traits. CU and GM traits were assessed using the respective subscales from the Youth Psychopathic Traits Inventory–Short Version (Van Baardewijk et al., 2010). The Callous-Unemotional subscale consists of six statements reflecting remorseless, unemotional, or callousness beliefs (e.g., "If other people have problems, it usually is their own fault and therefore you should not help them"). The Grandiose-Manipulative subscale consists of six items reflecting dishonest charm, manipulative, and grandiose beliefs and behaviors (e.g., "I have the ability to con people by using my charm and smile"). Adolescents were asked to indicate how well each statement reflects what they generally think or feel using a 4-point scale (1 = *does not apply at all*, 4 = *applies very well*). CU and GM traits scores showed good internal consistency (range $\alpha = .74–.87$). A planned missingness design at Time 1 (T1) and Time 2 (T2) was used in which adolescents completed a set of three of the six items.

Impulsivity. Adolescents' level of impulsivity was assessed with the five-item Eysenck Impulsiveness Scale (Eysenck & Eysenck, 1978; Vitaro, Arseneault, & Tremblay, 1997). Adolescents rated on a 5-point scale (1 = *completely disagree,* 5 = *completely agree*) the extent to which they agreed with statement about themselves (e.g., "I usually do and say things without thinking about it"; range $\alpha = .74–.88$). A planned missingness design at T1 and T2 was used in which adolescents completed a set of three of the five items.

Substance use. Adolescents were asked about their use of different substances with four items adapted from Malmberg and colleagues (2010, 2013). For alcohol use, adolescents were asked to indicate which answer best described their experience: 0 = *I've never drank alcohol, not even a sip*; 1 = *I have drunk alcohol once or twice*; 2 = *I drink alcohol once or twice a month*; 3 = *I drink alcohol once or twice a week*; 4 = *I drink alcohol daily*. If participants reported having ever had alcohol, they were presented with the following item concerning binge drinking: "How many

times in the last month did you drink five or more alcoholic drinks in a row? For example, at a party or during one night." Answer categories ranged from 0 = *never* to 6 = *nine times or more*. Adolescents were also asked to indicate their experience with smoking tobacco and smoking marijuana. Answer categories were as follows: 0 = *I have never smoked/smoked marijuana, not even a puff*; 1 = *I smoked/smoked marijuana once or twice*; 2 = *I smoke/smoke marijuana once or twice a month*; 3 = *I smoke/smoke marijuana once or twice a week*; 4 = *I smoke at least once a day*. All use scores were dichotomized (0 = never used/never binged, 1 = ever used/binged) and then summed for each measurement wave (minimum = 0, maximum = 4).

Risky sexual behavior. The level of sexual risk behavior was assessed with three items. First, adolescents were asked about whether they had ever engaged in sexual behavior: "Have you ever had sex with another person? With sex we mean everything from touching or caressing to intercourse." (0 = *no*, 1 = *yes*). If adolescents indicated having had sex, they were presented with two additional items about preventing sexually transmitted infections (STIs) and pregnancy: (1) When I have sex, I use a condom to prevent STIs; (2) When I have sex, I use contraception (girls)/protection (boys) to prevent pregnancy. Response categories for these additional items ranged from 1 = *never*, 5 = *always or almost always*, to 6 = *not applicable*. Participants who reported "not applicable," were recoded as missing. All other scores were reverse-coded. A composite risk score was created by summing the two items about preventing pregnancy and STIs, and when adolescents had not had sex, they received a score of 0 (no sexual risk behavior).

Permissive sexual attitudes. The endorsement of permissive sexual attitudes was assessed with an adapted version of the Brief Sexual Attitudes Scale (Hendrick, Hendrick, & Reich, 2006). A sample item is "I don't need to be in a relationship to have sex with someone." Answer categories ranged from 1 = *completely disagree*, 6 = *completely agree* (range α = .73–.83. A planned missingness design at T1 and T2 was used in which adolescents completed a set of three of the five items.

Compulsive SEIM use. Compulsive use of sexually explicit Internet use was assessed with six items from the Compulsive Internet Use Scale (Meerkerk et al., 2009), which were modified to assess symptoms of compulsive searching for and viewing of pornography on the Internet, instead of general compulsive Internet use symptoms. A sample item is "How often do you get too little sleep as a result of searching for or viewing pornography on the internet?" Adolescents rated each item in terms of frequency on a 6-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *regularly*, 4 = *often*, 5 = *very often*). A mean score was constructed by averaging the scores on the items. A planned missingness design at T1 and T2 was used in which adolescents completed a set of four of the six items. Because of the low frequency of compulsive SEIM use, the reliabilities of the (imputed) scores at T1 (α = .52) and T2 (α = .36) were quite low, compared with high reliabilities at T3 (α = .91) and T4 (α = .93).

Parent–adolescent relationship quality. The quality of adolescents' relationship with parents was assessed with the satisfaction and conflict subscales of the Network of Relationships Inventory (NRI; Furman & Buhrmester, 2009). Each subscale consisted of three items. A sample item for the satisfaction subscale was "How satisfied are you with the relationship with your mother (father)?" and for the conflict subscale "How much do you and your mother (father) argue with each other?" (1 = *little or none*, 6 = *the most*). Adolescents could choose to respond about either their mother or father, based on which parent was most involved in their care and with whom they spent the most time. Most adolescents reported on the mother–adolescent relationships (81.5% at T1) but reports about the father–adolescent relationship were also included; hence, responses were treated together as the parent–adolescent relationship. Mean scores across the three items were used (range α = .93–.95 for satisfaction and .77–.95 for conflict.

Data Analysis

Using latent class growth analyses (LCGA), we extracted classes of adolescents on the basis of their beginning levels of dark personality characteristics (intercepts) and their change over time (linear slopes). These analyses were conducted in Mplus (Version 7.4; Muthén & Muthén, 2014).[1] Six fit statistics and substantive interpretation and/or practical considerations were used to determine the optimal number of latent classes in personality traits (impulsivity, CU, and GM). First, the Vuong-Lo-Mendell-Rubin (VLMR; Lo, Mendell, & Rubin, 2001) test in which a nonsignificant *p* value indicates that a model with one less class would fit better. Second, the Bayesian information criterion (BIC), with lower values indicating a better fit. Third, the bootstrapped likelihood ratio test in which a significant values indicates the fit could be improved by adding another class (Nylund, Asparouhov, & Muthén, 2007). Fourth, we used the adjusted Lo-Mendell-Rubin (LMR; Lo et al., 2001) to test whether decreasing the number of classes by one would improve model fit. If the adjusted LMR is significant, this indicates that the model has a better fit than a model with one less class. Fifth, average latent profiles posterior probabilities which assess the probability that cases were consistently placed in each profile, with a value of .7 being acceptable with values closer to 1 suggesting better reliability of classification. Sixth, for *entropy*, which refers to the accuracy of the classification of individuals in latent classes, values of .8 or higher indicate a good classification (Celeux & Soromenho, 1996). Previous studies have identified three (Andershed et al., 2002, 2008; Nijhof et al., 2011) or four dark personality types (Salihovic et al., 2014); therefore, our latent class solutions were tested against three- and four-class solutions, although we began with a one class model with classes added iteratively until the addition of a class did not improve or detracted from the model. At each stage, we considered the theoretical meaningfulness of the classes, interpretability, previous findings and the practical constraint that class size should be no smaller than 5% of the sample. There is no consensus as to which indicator is the best overall measure of goodness of fit (Nylund et al., 2007). Once the number of classes was determined, we tested whether the personality types differed from one another on the personality characteristics in terms of the initial levels (intercept) and change (slope) using multigroup models in Mplus and follow-up Wald tests of parameter constraints to compare estimates of intercepts and slopes between personality types.

[1] It should be noted that LCGA sets the variance of the intercepts and slopes within each class to zero, imposing homogeneity within each class. This approach assumes homogeneity within classes. GMMs (not constraining intercepts and slopes) did not converge.

To examine whether the identified personality types differed in their levels and change in problem behaviors, data were analyzed in two ways. First, a series of latent growth curve models were conducted in Mplus in which we examined the level and change of risk behaviors and parent–adolescent relationship quality over time. Maximum likelihood estimation for robust standard errors was used as the estimator and full information maximum likelihood was used to handle missing data. Second, we assessed whether the personality types differed from one another in terms of level (intercept) and change (linear slope) with multigroup models in Mplus and follow-up Wald tests.

Results

Longitudinal Personality Profiles

Using LCGA, and assessing the fit statistics (see Table 1), there was no overall consensus as to whether the two-, three- or four-class solution was the best fitting solution, although most indicators supported the three-class model. The VLMR and adjusted LMR both indicated that the three-class solution was the best fitting solution and both the Average posterior probability and entropy measures also indicated that this was a good model. The BIC continued to improve with each added class although the largest drop in BIC occurred between the second and third class. Given these results and the match between the classes that were found and the cross-sectional studies, the three-profile solution was retained. These classes were characterized by examining the distribution of Impulsivity, CU, and GM intercept and slope means (see Table 2; Figure 1). The first group (the dark impulsive profile) consisted of 157 adolescents (13.9%) who had high scores on all three traits (impulsivity, CU, and GM) that showed no significant change across time. The second group (the impulsive profile) consisted of 296 adolescents (26.1%) who had relatively high levels of impulsivity at Wave 1 that significantly increased across time, with relatively low, stable scores on CU and GM. The third group (the low risk profile) consisted of 678 adolescents (60.0%) who showed low levels on all three personality characteristics, with impulsivity significantly decreasing across time. We tested for quadratic effects in the slopes as well but these were not significant. An analysis of variance comparing the three profile groups on age $F(2, 1128) = 7.87$, $p < .001$ revealed that adolescents in the dark impulsive group were slightly older (14.28, $SE = .09$) than those in the impulsive ($M = 13.96$, $SE = .07$), or low risk ($M = 13.87$, $SE = .05$) group at Wave 1. Therefore, age was used as a covariate in subsequent analyses.

Table 1
Fit Statistics for Latent Class Growth Analysis Solutions (N = 1,131)

Class	VLMR p	BIC	BLRT p	Adjusted LMR	AvePP	Entropy
2	<.001	32,252.59	<.001	**<.001**	**.95**	**.86**
3	**.168**	31,685.78	<.001	.173	**.90**	.80
4	.506	**31,300.67**	<.001	.510	.87	.78

Note. Values in boldface type represent indices showing best fit for a specific number of classes. VLMR = Vuong-Lo-Mendell-Rubin likelihood ratio test; BIC = Bayesian information criterion; BLRT = bootstrapped likelihood ratio test; Adjusted LMR = Lo-Mendell-Rubin adjusted likelihood ratio test; AvePP = average of the posterior probabilities.

Dark Personality Types in Relation to Problem Behavior and Parent–Adolescent Relationship Quality

Unconditional intercept and slope estimates from the LGMs for the risk behaviors and parent–adolescent relationship are presented in Table 3. Results of the multigroup LGMs assessing differences between personality groups on intercept and slope estimates for substance use, sexual risk and parent–adolescent relationship quality are also presented in Table 3. The estimated means of risk behaviors and parent–adolescent relationship quality over time per personality profile are illustrated in Figure 2.

Substance use and sexual risk behavior. The multigroup LGM on substance use (Figure 2a) revealed that all three profile groups significantly differed from each other on initial levels of substance use with adolescents in the dark impulsive profile showing the highest initial level of substance use, followed by those in the Impulsive profile, with those in the low risk profile showing the lowest levels. These differences across the three groups were maintained across the four waves, although all three groups showed an increase in substance use over the course of the study. Concerning sexual risk, adolescents in both the dark impulsive and impulsive profiles showed a higher initial level of sexual risk behavior, compared with those in the low risk profile, as well as a stronger increase of sexual risk behavior over time (Figure 2b). All three groups differed from each other on permissive sexual attitudes, with adolescents in the dark impulsive profile showing the most permissive attitudes, followed by those in the impulsive profile, with those in the low risk profile showing the least permissive sexual attitudes. Moreover, those in the dark impulsive profile also showed a stronger increase in permissiveness compared with those in the impulsive and low risk profiles (Figure 2c). Finally, no significant differences among the profile groups on either initial levels or degree of change in compulsive SEIM use among boys were found (Figure 2d). Girls' levels of compulsive SEIM use were too low and did not change over time.

Parent–adolescent relationship quality. The multigroup LGMs on parent–adolescent relationship quality (satisfaction and conflict) showed that adolescents in the dark impulsive and impulsive profiles had lower initial levels of satisfaction compared with those in the low risk profile, and these differences were maintained over time. That is, adolescents in the three profiles did not differ in terms of degree of change although all groups experienced a decrease in satisfaction in their relationship across the study (Figure 2e). Finally, all three groups differed from each other on parent–adolescent conflict, with adolescents in the dark impulsive profile showing the highest initial level of conflict, followed by those in the Impulsive profile, with those in the low risk profile showing the lowest level of conflict. Adolescents did not differ in change of conflict over time, with conflict levels remaining stable across the four waves (Figure 2f).

Discussion

Drawing from a normative sample of Dutch high school students, the current study examined whether distinct groups of adolescents could be identified based on the levels and change

Table 2
Mean and Standard Errors of Intercepts and Slopes of Impulsivity, Callous–Unemotional (CU), and Grandiose–Manipulative (GM), for the Three-Class Solution

Trajectory classes	*n* (%)	Intercept impulsivity (*SE*)	Slope impulsivity (*SE*)	Intercept CU (*SE*)	Slope CU (*SE*)	Intercept GM (*SE*)	Slope GM (*SE*)
Dark impulsive	157 (13.9)	$.81\ (.15)^{***}{}_{a}$	$.02\ (.04)_{ab}$	$.88\ (.13)^{***}{}_{a}$	$.08\ (.08)_{ab}$	$1.38\ (.32)^{***}{}_{a}$	$.02\ (.07)_{a}$
Impulsive	296 (26.1)	$.64\ (.12)^{***}{}_{a}$	$.08\ (.03)^{*}{}_{a}$	$-.17\ (.16)_{b}$	$.08\ (.05)_{a}$	$-.09\ (.08)_{b}$	$.04\ (.04)_{a}$
Low risks	678 (60.0)	$.43\ (.05)^{***}{}_{b}$	$-.04\ (.01)^{**}{}_{b}$	$-.21\ (.04)^{***}{}_{b}$	$-.02\ (.01)_{b}$	$-.28\ (.04)^{***}{}_{c}$	$-.01\ (.01)_{a}$

Note. Different subscript letters indicate a significant ($p < .05$) difference between groups using Wald tests.
$^{*}p < .05$. $^{**}p < .005$. $^{***}p < .001$.

profiles of CU, GM, and impulsive personality characteristics. Three subgroups of adolescents were identified which we labeled as low risks, dark impulsives, and impulsives. Most of the adolescents in our sample (60%) exhibited low levels on all three personality traits (low risk profile) with decreases in impulsivity across time. Adolescents in this group also exhibited low levels of problem behaviors and had the highest quality parent–child relationship (high satisfaction and low conflict). The second most common subgroup was the impulsive profile (26%). Adolescents with this profile had relatively high levels of impulsivity that increased across time and moderate and stable levels of CU and GM. Compared with the low risk group, these adolescents reported higher levels of sexual risk behavior, and poorer satisfaction and more conflict in their relationship with their parents. Moreover, this group also showed more increases in substance use and risky sexual behavior. Adolescents in the third subgroup (dark impulsive profile; 14%) exhibited relatively higher levels of all three personality traits that remained stable across the study. Compared with low risks, they exhibited higher initial levels on all problem behaviors and also showed greater increases in risky sexual behavior and permissive sexual attitudes over time. They also showed lower initial levels of satisfaction in their relationship with their parents compared with adolescents in the low risk group. This group also showed higher initial levels of substance use and more permissive sexual attitudes compared with the impulsive group and these differences were maintained across the 2 years of the study.

The three dark personality subgroups we identified were consistent with groups found in prior cross-sectional studies (Andershed et al., 2002, 2008; Nijhof et al., 2011) with the exception being that two of our groups showed changes in impulsivity over time. Contrary to prior research that found either stability or decreases in impulsivity among middle adolescents (Harden & Tucker-Drob, 2011; Quinn & Harden, 2013; Salihovic et al., 2014), adolescents with an impulsive profile showed an increase in impulsivity, whereas adolescents in the low risk profile decreased and those in the dark impulsive profile remained stable and high. Moreover, across all three subgroups both CU and GM traits were stable. These findings are in contrast to the longitudinal profiles identified by Salihovic et al. (2014) in which three of their four groups showed decreases on most traits across the four waves (3 years) of their study but are consistent with other studies that focused on CU traits (e.g., Pardini & Loeber, 2008) or a composite measure of psychopathic traits (Lynam et al., 2008). One potential reason for the discrepancy of our results with Salihovic et al. is the shorter time interval used in our study both between assessments (6 months as opposed to 1 year) and the overall time interval (1.5 years between the first and fourth assessment compared with 3 years). Such a time interval might account for why we found less change but our finding concerning an increase in impulsivity among adolescents in the impulsive profile is striking. A potential reason for this discrepancy is that our impulsivity measure focused on a general impulsivity measure that taps the subcomponents of lack of premeditation and urgency, both of which have been found to first increase during early adolescence and then decrease during middle adolescence. In contrast, the impulsivity measure used in prior person-centered analyses derived from the Youth Psychopathic Traits Inventory (van Baardewijk et al., 2010), which includes subcomponents reflecting thrill seeking, irresponsibility (reflecting a disregard for rules), as well as a general lack of

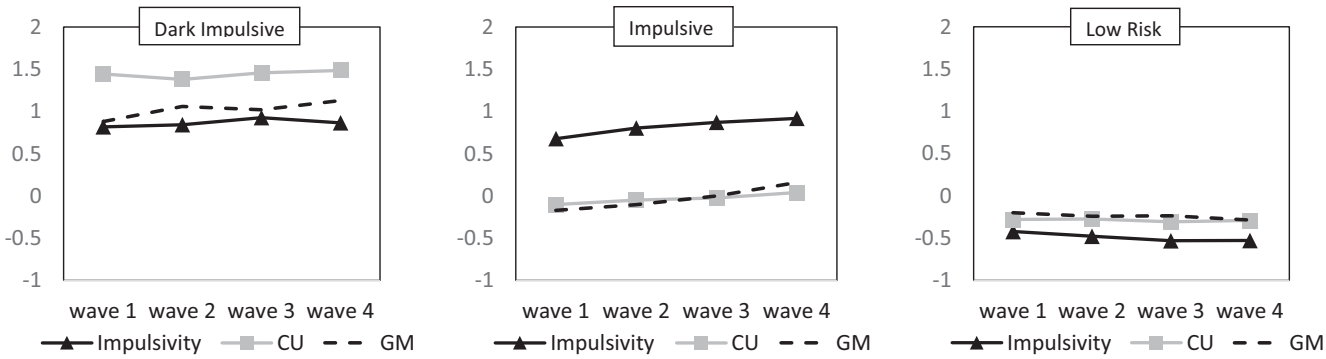

Figure 1. Standardized mean levels of personality traits across four measurement waves for three personality types (dark impulsive, impulsive, low risk). CU = Callous–Unemotional; GM = Grandiose–Manipulative.

Table 3
Unconditional and Multigroup Latent Growth Curve Models for Risk Behaviors and Parent–Adolescent Relationship for Dark Personality Types (Standard Error)

Risk behavior	Intercept *M*	Intercept variance	Slope *M*	Slope variance
		Unconditional models		
Substance use	1.30 (.04)***	1.29 (.07)***	.13 (.01)***	.05 (.01)***
Sexual risk behavior	.27 (.03)***	.69 (.06)***	.13 (.02)***	.12 (.02)***
Permissive sexual attitudes	2.39 (.03)***	.37 (.04)***	−.02 (.01)	.05 (.01)***
Compulsive SEIM use[a]	1.18 (.11)***	.19 (.38)	.08 (.05)	.09 (.09)
Parent–adolescent satisfaction	4.94 (.03)***	.51 (.04)***	−.08 (.01)***	.03 (.01)***
Parent–adolescent conflict	2.69 (.02)***	.34 (.03)***	.01 (.01)	.04 (.01)***
		Multigroup models		
		Dark impulsives		
Substance use	2.20 (.11)$^{***}_{a}$	1.59 (.23)***	.11 (.03)$^{**}_{a}$	.04 (.02)
Sexual risk behavior	.53 (.10)$^{***}_{a}$	1.24 (.26)***	.31 (.06)$^{***}_{a}$	.28 (.09)**
Permissive sexual attitudes	2.76 (.08)$^{***}_{a}$	.46 (.08)	.17 (.04)$^{***}_{a}$	—[b]
Compulsive SEIM use[a]	1.37 (.27)$^{***}_{a}$	—[b]	.09 (.12)$_{a}$	.08 (.02)**
Parent–adolescent satisfaction	4.67 (.08)$^{***}_{a}$	.61 (.12)***	−.08 (.03)$^{*}_{a}$	.03 (.02)
Parent–adolescent conflict	3.09 (.08)$^{***}_{a}$	.46 (.13)**	.02 (.04)$_{a}$	.09 (.03)*
		Impulsives		
Substance use	1.56 (.07)$^{***}_{b}$	1.18 (.13)***	.16 (.02)$^{***}_{a}$	.03 (.02)*
Sexual risk behavior	.33 (.07)$^{***}_{a}$	.91 (.16)***	.20 (.04)$^{***}_{a}$	.21 (.05)***
Permissive sexual attitudes	2.52 (.06)$^{***}_{b}$	.48 (.09)***	−.02 (.03)$_{b}$	.08 (.02)***
Compulsive SEIM use[a]	1.33 (.23)$^{***}_{a}$	1.52 (1.09)	−.04 (.08)$_{a}$	.18 (.13)
Parent–adolescent satisfaction	4.77 (.06)$^{***}_{a}$	.70 (.08)***	−.07 (.02)$^{**}_{a}$	.06 (.02)***
Parent–adolescent conflict	2.81 (.05)$^{***}_{b}$	.44 (.07)***	.01 (.02)$_{a}$	.05 (.02)**
		Low risks		
Substance use	.97 (.04)$^{***}_{c}$	.95 (.07)***	.13 (.01)$^{***}_{a}$	.05 (.01)***
Sexual risk behavior	.17 (.03)$^{***}_{b}$	.39 (.05)***	.07 (.02)$^{***}_{b}$	.05 (.01)***
Permissive sexual attitudes	2.24 (.03)$^{***}_{c}$	.29 (.05)***	−.06 (.01)$^{***}_{b}$	.03 (.01)**
Compulsive SEIM use[a]	1.12 (.10)$_{a}$	—[b]	.05 (.04)$_{a}$	.02 (.00)***
Parent–adolescent satisfaction	5.08 (.03)$^{***}_{b}$	.35 (.04)***	−.08 (.01)$^{***}_{a}$	.02 (.01)**
Parent–adolescent conflict	2.54 (.03)$^{***}_{c}$	.20 (.03)***	.00 (.01)$_{a}$	.02 (.01)*

Note. Age is included in each model. Different subscript letters indicate a significant ($p < .05$) difference between groups using Wald tests. SEIM = sexually explicit Internet material.
[a] SEIM is among boys ($n = 304$). [b] Constrained to zero because of convergence issues due to small cell sizes and low prevalence of behavior.
$^{*}p < .05$. $^{**}p < .005$. $^{***}p < .001$.

impulse control may show sharper changes. There is a growing consensus that the multidimensional structure of impulsivity should not be ignored (Cyders & Coskunipar, 2011; Whiteside & Lynam, 2001) and that clear, unidimensional constructs related to impulsive action is one way that inconsistencies across studies could be better understood and avoided (Cyders, 2015). These contrasting results indicate that the question of whether psychopathic traits should be characterized as highly stable at any given developmental period is still not answered and may be sample, subsample, and construct specific. Therefore, the question of whether psychopathy measures should be used to inform decisions that will have long-term consequences for youthful offenders (Cauffman, Skeem, Dmitrieva, & Cavanaugh, 2016) is also in need of subsequent longitudinal research.

The finding of three (and not four) profile groups in our study of Dutch high school students is consistent with previous cross-sectional studies, supporting the existence of the same three subtypes among different populations: male and female Dutch adolescents admitted to compulsory residential treatment (Nijhof et al., 2011), a Swedish community sample of adolescents (Andershed et al., 2002), and incarcerated German youth (Andershed et al., 2008). Although samples drawn from other populations might still find additional profiles, our findings support the idea that at the very least these three profiles are likely to be found and that in particular adolescents who are high on all three traits are likely to be involved in more problem behaviors (particularly initiation of substance use and sexual risk) and to begin this involvement at an earlier age.

On the basis of prior findings that have used either a person-oriented or dimensional perspective to examine how dark personality traits are related to risk behaviors, we expected to find differences in problem behaviors and parent–adolescent relationship quality across the three a priori hypothesized profiles. Specifically, we expected that individuals who scored high on all three personality dimensions (dark impulsives) to show the highest level of substance use and the poorest relationship quality with parents compared with any other group. The results confirmed our expectations with respect to substance use (Andershed et al., 2008). The

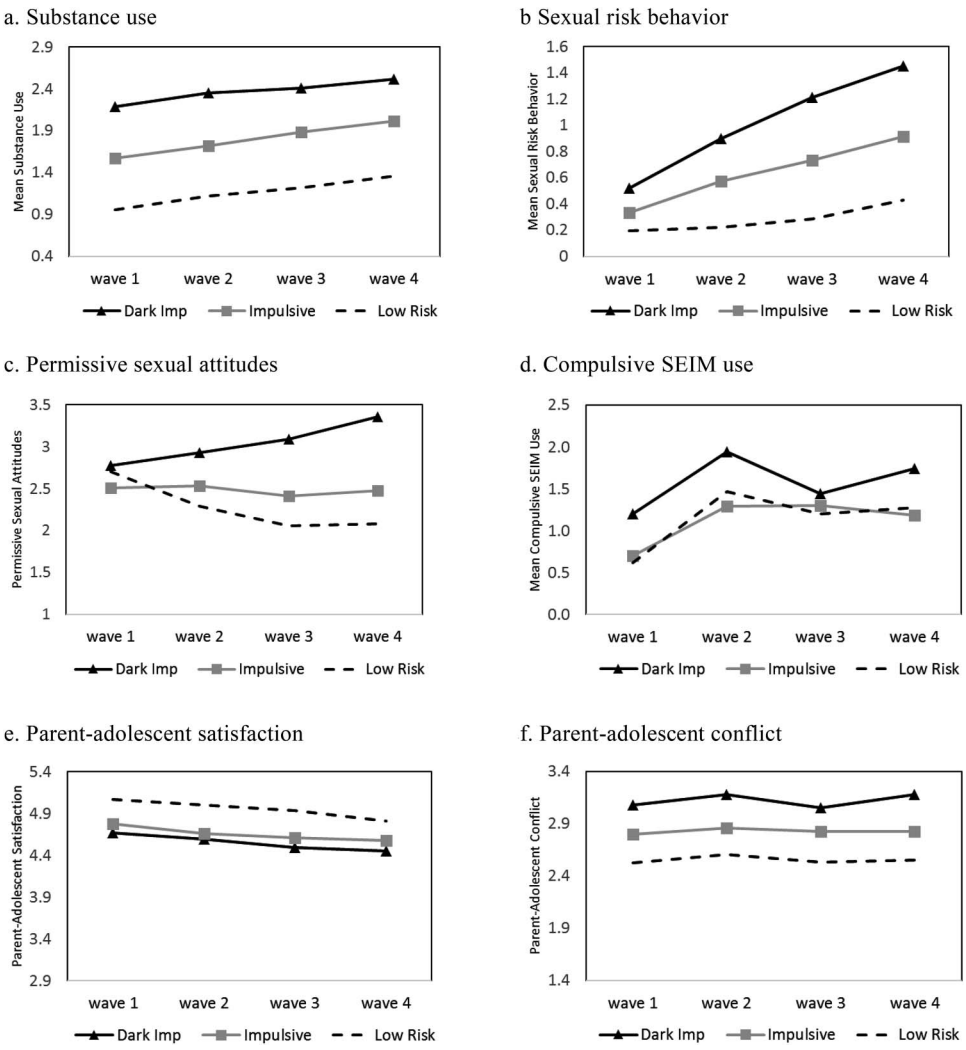

Figure 2. Estimated means of risk behaviors and parent–adolescent satisfaction and conflict for three personality types, across four measurement waves. SEIM = sexually explicit Internet material.

finding that the dark impulsives are at the start of the study already showing comparatively high levels of substance use (and other problem behaviors) suggest that research on the joint contribution of all three traits should even be conducted with younger adolescents and even elementary aged children. Wymbs et al. (2012) found that high levels of callous-unemotional traits at 6th grade prospectively predicted alcohol and marijuana onset and use at 9th grade.

Although we did not expect adolescents in the dark impulsive and impulsive groups to differ from each other on sexual risk behaviors, we did find that adolescents in these groups showed higher initial levels of sexual risk behavior and greater increases in sexual risk and permissive sexual attitudes over time compared with adolescents with a low risk personality profile. Moreover, adolescents in the dark impulsive group showed the strongest increase in permissive sexual attitudes. These results confirm and extend previous variable-centered research that has found that GM and CU and impulsive personality characteristics are associated with adolescent sexual risk taking (McCauley et al., 2016; Rucević, 2010) but that when considered together only impulsivity was a significant predictor (Rucević, 2010). Our person-centered approach shows that for a subgroup of adolescents it is the combination of all three traits that is associated with the highest levels of sexual risk taking and permissive sexual attitudes, whereas for another subgroup it is predominantly impulsivity that is associated with sexual risk taking. Thus, a person-centered analysis may find different results compared with a variable-centered approach particularly when interactions among personality constructs are not considered. Thus, latent class analysis can also serve to identify potential personality characteristics that may potentiate each other when found at high levels within the same individual. These finding highlight the importance of considering not just the independent effects of these traits but their interaction. Although the current study focused on psychopathic traits other dark personality traits (such as Machiavellianism or narcissism) could also be included in future studies. Whether and how these early signs of sexual risk taking also map onto sexual coercion

or other forms of sexual violence is an important area for future research given dark personality traits have been linked to sexual offending (Caputo et al., 1999). The fact that we did not find that the groups differed on compulsive use of sexually explicit Internet material may be because of the age of the sample or the fact that we are measuring compulsive use rather than just degree of sexual media use or the content of that media such as violent or nonviolent sexual media (Baer, Kohut, & Fisher, 2015).

Finally, consistent with the results of Salihovic and colleagues (2014) as well as other research that used a variable-centered approach, we found that adolescents with the highest psychopathic traits and those with high levels of impulsivity reported poorer relationships with their parents compared with the low risks and these differences were maintained across time. It is not clear whether it is the personality traits, the problem behaviors or a combination of both that is driving these results. Prior research using cross-lagged panel designs to tease apart direction of effects has found that parental behavior is more a reaction rather than a predictor of psychopathic traits (e.g., Salihovic, Kerr, Özdemir, & Pakalniskiene, 2012). Given the relatively high stability of psychopathic personality traits found in our sample, our results also are suggestive of a reactive effect but whether this is a reaction to the traits or the problem behaviors is still not clear. Nonetheless, additional research is needed such as a randomized-controlled trial of an intervention targeted at either parental behaviors or adolescent personality traits would be needed to tease apart a stronger causal relation and direction of effects. Most research that finds stronger predictive links for parenting behavior in relation to psychopathic traits finds these associations among younger adolescents and school-age children (e.g., Fontaine et al., 2011; and see Frick et al., 2014 for a review).

The current study has some limitations that should be considered. First, we used adolescent self-reports on their own personality traits and behaviors as well as their reports on their relationships with their parents which increases the likelihood of shared-method variance. Although self-reports have the advantage of giving insight into how adolescents subjectively perceive themselves and their relationships, adolescent personality characteristics may be related to how adolescents perceive their parents. Multi-informant designs on adolescent behaviors, traits and relationships or observational designs to capture adolescents' relationship with their parents would be able to tease apart shared method variance effects from other effects. Second, the sampled adolescents responded based on their relationship with either their mother or father; however, relationships with fathers and mothers are sometimes suggested to have different functions (Duchesne & Ratelle, 2014; Rubin et al., 2004), although the quality of these relationships are often highly correlated (e.g., Salihovic et al., 2014). Future studies that collect data about adolescents' relationship with both parents could make meaningful comparisons between effects of these two relationships, or between same-sex and other-sex parent–child dyads. A third issue is that we only followed the sample across 2 academic years with approximately 18 months in between the first and last wave of measurement. This means that for our youngest participants the apex of their risk behaviors probably has not yet been attained and such activities such as risky sexual activities or substance use may show even stronger effects in older samples or among those followed over longer periods of time. It could very well be that adolescents in our Impulsive profile group represent individuals whose impulse control is still immature but that over time it will improve and risky behaviors will subside. That is, longer term follow-up studies are needed to examine whether this subgroup of adolescents represent those individuals who show adolescence-limited risk taking whereas those adolescents who show high and stable levels of all three traits represent those who individuals who will carry their problem behaviors into adulthood. Fourth, our results are based on a convenience sample of relatively homogeneous group of Dutch adolescents recruited through high schools. It may be that youth with more severe forms of personality characteristics or problem behaviors were underrepresented in our sample because of their higher likelihood of having school problems or disliking school. Fifth, results concerning compulsive SEIM use needs to be interpreted with caution, given the low reliabilities of the scale for the first two waves of the study. These low reliabilities could have contributed to the lack of variance at the initial measurement wave but could also be reflective of the low frequency of this behavior in our sample. Finally, the nature of our design, although longitudinal, is still correlational and therefore the direction of effects or causal relationships cannot be established.

Conclusion

Despite these limitations, the present study has a number of strengths that deserve acknowledgment. First, although previous studies have examined the stability and correlates of individual psychopathic traits in adolescence the majority of studies have examined the stability of various measures of CU (Obradović, Pardini, Long, & Loeber, 2007; Pardini & Loeber, 2008) or impulsive traits individually (Steinberg et al., 2008). The current study studied the joint development of CU, GM, and impulsive traits among a large longitudinal community sample of Dutch high school students followed over four measurement waves. Moreover, we examined whether adolescents with different combinations of these traits also differed on two developmentally relevant behaviors: substance use initiation and sexual (risk) behaviors rather than measures of deviancy. We identified three longitudinal personality profiles that were highly consistent with subgroups identified in previous cross-sectional studies (Andershed et al., 2008; Nijhof et al., 2011). Second, our results confirm the stability of CU and GM traits during adolescence and the malleability of impulsivity. Third, our results suggest that adolescents who have high levels of CU and GM traits that are already coupled with high levels of impulsivity may be at risk of an earlier and more severe trajectory of problem behaviors that may differ from the trajectory of risky behaviors that characterize youth who are only impulsive. Most community studies of adolescent risk taking that include personality assessments primarily focus on impulsivity or other measures of self-regulation. The current study highlights the importance of including other dark personality traits in these studies to identify youth who are most at risk.

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