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Developmental Links Between Externalizing Behavior and Student–Teacher Interactions in Male Adolescents With Psychiatric Disabilities

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Abstract. Students exhibiting challenging externalizing behaviors may benefit from supportive interactions with teachers. However, if students show high levels of externalizing behaviors, this may negatively impact on student–teacher interactions, and vice versa. We therefore examined bidirectional developmental links between student–teacher interactions and externalizing behavior of male adolescents placed in special education because of psychiatric disabilities. Participants were 584 adolescents (M_{age} = 15.0 years, SD = 1.7) and their teachers from 14 Dutch special education schools. At 3 time points, student-reports of student–teacher interactions and teacher-reports of adolescents' externalizing behavior were collected. Using autoregressive cross-lagged models, results indicate that externalizing behavior predicted decreases in supportive interactions ($\beta = -.09$, $p = .02$), but not in negative interactions. Student–teacher interactions did not show a significant influence on externalizing behavior. Our results highlight externalizing behavior as an important target for interventions intended to improve student–teacher interactions.

Keywords: student–teacher relationships, special education procedures

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Supportive and close interactions with teachers have a direct and significant impact on students' behavioral problems (e.g., Cornelius-White, 2007). However, it may be challenging for teachers to promote supportive interactions when students exhibit high levels of externalizing behaviors (e.g., Henricsson & Rydell, 2004). Although the conditions under which student–teacher interactions may blossom or deteriorate are often examined among young children, less is known about bidirectional links between student–teacher interactions and adolescent students' behavioral problems, let alone among adolescents who exhibit very challenging behaviors. As there is some evidence that, also during adolescence, students may benefit from supportive interactions with their teachers and suffer from negative interactions (e.g., Al-Yagon, 2012; Roorda, Koomen, Spilt, & Oort, 2011; Wang, Brinkworth, & Eccles, 2013), it is important to examine such links among adolescent students. Therefore, this study presents an overview of the challenges teachers and students encounter in schools that are specialized in educating students with high levels of behavioral problems and findings of earlier research on developmental links between student–teacher interactions and students' behavioral problems, mostly during childhood and some during adolescence. This study also extends existing work on developmental links by testing the possible bidirectional links between student–teacher interactions and male adolescent students' externalizing behaviors and addresses consequences of its findings for practice and research.

Students exhibiting behavioral problems often have special educational needs. Across various Western countries, 1–6% of adolescents are placed in a separate special education settings (Meijer, Soriano, & Watkins, 2003; U.S. Department of Education, 2002). Many of them have psychiatric disabilities, including attention deficit hyperactivity disorder and autism spectrum disorder, often in combination with emotional and behavioral disabilities (Meijer et al., 2003). This type of special education differs from general and inclusive education in that students who are referred to the specialized schools all have severe psychiatric disabilities (Meijer et al., 2003). Given the problems by which their psychiatric disabilities are characterized, they are at increased risk for adverse outcomes, such as substance abuse and any psychiatric diagnoses in adulthood, specifically disruptive disorders (Hofstra, van der Ende, & Verhulst, 2002). As a result of their special educational needs, students may be placed out of general education and receive services that are specified to their needs in separate settings. In fact, with higher symptom severity, these students are more likely to be placed in specialized schools relative to receiving special education services in general and inclusive education (Stoutjesdijk, Scholte, & Swaab, 2012). These schools are self-contained; class sizes are small; teachers have generally received special training; and additional resources are available, such as the assistance of paraprofessionals or school psychologist (Albrecht, Johns, Mounsteven, & Olorunda, 2009).

Despite their referral, their future prognosis for improving their behavior and social skills remains poor (Heijmens Visser, van der Ende, Koot, & Verhulst, 2003). As further efforts are needed to improve their outcomes, key elements should be identified that may optimize their educational settings. Positive interactions between young people and their teachers may be such an element (for a review on this well-examined link, see Cornelius-White, 2007), especially during adolescence, when young people's interactions with parents may temporarily deteriorate (De Goede, Branje, & Meeus, 2009). However, interactions between teachers and students with psychiatric disabilities are also likely to deteriorate; their interactions may suffer from the high levels of externalizing behaviors (e.g., Henricsson & Rydell, 2004) that are characteristic of students' referral to this type of special education (Drost & Bijstra, 2008). Although crucial when developing effective school interventions in secondary special education, research on developmental links between these interactions and young people's externalizing behavior is, to our knowledge, scarce. This study tests such links in 584 adolescents with psychiatric disabilities in the Netherlands.

Several studies examined the link between features of student–teacher interactions, such as teacher preference, closeness or conflict, and young people's behavioral development, and highlighted its importance (for a review of the many studies, including several conducted by Pianta and colleagues, see Roorda et al., 2011). Supportive interactions between teachers and older students are also related to low levels of problem behavior (Wang et al., 2013), whereas negative interactions predict increases in such behaviors (Al-Yagon, 2012; Silver, Measelle, Armstrong, & Essex, 2005). Most of these studies tested the predictive value of interactions on behavioral trajectories, whereas challenging behaviors displayed by these students may hinder teachers to establish supportive interactions or they may even elicit negative responses. As these studies did not conduct parallel assessments of the development of both constructs, they did not reveal the possible direction of effect over time (Masten & Cicchetti, 2010). Given the bidirectionality of influences, it is important to study such relations from a transactional point of view (Sutherland & Oswald, 2005).

Only a few studies on the relation between students' problem behavior and student–teacher interactions have used parallel longitudinal assessments of these constructs and investigated the developmental links between these constructs while controlling for autoregressive effects and cross-sectional correlations. These studies provided inconclusive results and were conducted mostly among childhood samples in general education (Doumen et al., 2008; Leflot, van Lier, Verschueren, Onghena, & Colpin, 2011; Mercer & DeRosier, 2008), or including only two time-points (e.g., Ly & Zhou, 2016; Pakarinen et al., 2017; Zhang & Sun, 2011), which restricts our ability to make strong causal inferences. Studies focusing on supportive and emotionally close student–teacher interactions produce conflicting evidence. One study reported no impact of supportive interactions on externalizing behavior problems in young students (Ly & Zhou, 2016), and another study found that young students' problem behavior predicted subsequent

lower levels of teacher preference (Mercer & DeRosier, 2008). Similarly, their problem behavior predicted directly subsequent lower levels of teacher closeness (Ly & Zhou, 2016) or indirectly, via poor peer relationships, lower levels of teacher support (Leflot et al., 2011). However, in older schoolchildren (grades 4–6), no reciprocal relations were found between supportive interactions and students' problem behavior (Pakarinen et al., 2017). Regarding negative features of the student–teacher interactions, Ly and Zhou (2016) showed that teacher-reported conflict led to higher levels of externalizing behavior, but not the other way around. Other studies even found evidence for reciprocal relations between students' behavior and student–teacher conflict (Doumen et al., 2008; Zhang & Sun, 2011), suggesting that externalizing behavior predicted subsequent higher levels of conflict, and conflict in turn predicted subsequent problem behavior. However, such reciprocal relations were not found by Pakarinen et al. (2017). They only found that higher levels of externalizing behavior led to more student–teacher conflict, whereas conflict had no impact on the development of externalizing behavior.

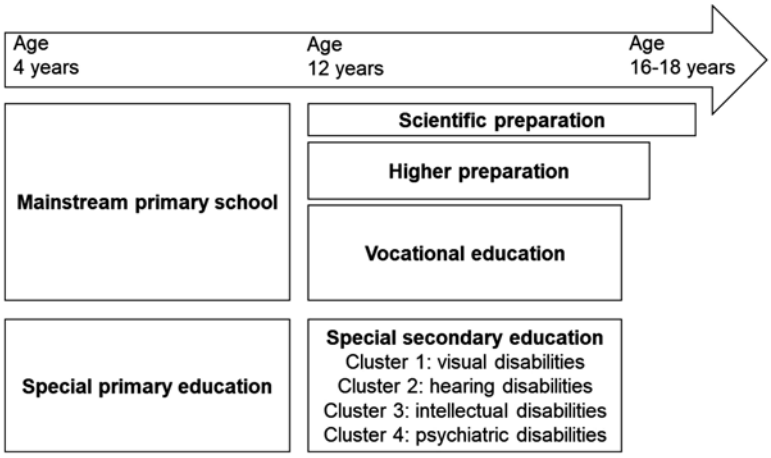
It is yet unclear if we can generalize these findings to a sample of adolescents with psychiatric disabilities for two reasons. First, there are indications that the links between young people's problem behavior and student–teacher interactions in childhood may be different in adolescence. Adolescence can be regarded as a distinct period, during which the nature of young people's interactions with adult authority figures becomes more egalitarian (De Goede et al., 2009). During adolescence, adverse outcomes may start to develop, suggesting that especially in this period, students may benefit from supportive interactions with their teacher (Al-Yagon, 2012; Wang et al., 2013), while negative interactions may be harmful to their behavioral adjustment (Al-Yagon, 2012). For instance, Wang et al. (2013) showed that teacher closeness and trust impacted students' depressive symptoms and conduct problems among a general sample of young people aged 13–18 years. The study conducted by Al-Yagon (2012) included students aged 15–17 years with learning disabilities; she showed that their teacher's rejection led to an increase of externalizing problems. In general education, associations were stronger between student outcomes and supportive features of their interactions with teachers during adolescence than childhood, while the opposite was found in negative features (Roorda et al., 2011).

It is important to note that, even in general education, bidirectional links between externalizing behavior and student–teacher interactions have been scarcely investigated among adolescents. To the best of our knowledge, we know of one study that included the bidirectional pathways between adolescents' disruptive behaviors and important aspects of interactions between students and teachers and used more than two time-points (De Laet et al., 2016). They found, among others, that adolescents' rule-breaking behaviors predicted increases in dissatisfaction with their teachers, which in turn led to increases in rule-breaking behaviors. In addition, rule-breaking behaviors predicted decreases in affiliation with their teachers, which in turn led to increases in dissatisfaction with their teachers. The results of this study underline the importance of examining such links; knowledge of the classroom processes may heighten teachers' awareness of the impact of problem behaviors and the quality of their interactions with students. However, as research on this topic is conducted far less frequently in secondary education than in primary education, it remains unclear how problem behaviors of adolescents and their interactions with teachers are intertwined in the classroom.

Perhaps these links have been less often examined than in elementary schools because in general secondary education, students are taught by various teachers, and therefore have fewer opportunities to interact frequently with one teacher. In this type of special secondary education, one of the students' teachers is also assigned to them as their tutor–teacher. Next to teaching one or more subjects, these tutor–teachers also monitor a group of students in their social–emotional development, by frequent contact moments and individual coaching on students' functioning. The tutor–teacher is therefore the teacher best known to the students, and vice versa (cf. homeroom teachers). Tutor–teachers may support students when they experience problems in their relationships with peers, other teachers, or friends and family at home. Because of the frequent contact moments, students' interactions with these tutor–teachers may thus have a significant impact on these adolescents' development.

A second reason why developmental links found in general population samples may not generalize this population is that adolescents placed in special education may be impacted differently by supportive or negative interactions with their teachers than students without psychiatric disabilities. In general education, negative student–teacher interactions has most influence on students who belong to at-risk groups in terms of their behavior (Silver et al., 2005). In the Netherlands, various self-contained special schools are specialized to provide education to students with psychiatric disabilities. Although a new education policy is currently in place intending to decrease the number of students referred to these schools and promote inclusive education by the Inclusive Education Act that went into effect in 2014 (Ministry of Education, Culture and Science, 2012), over recent decades, students have been referred to these special education schools when they (a) met criteria of one or more *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition) diagnoses (American Psychiatric Association, 2000), or received mental health care for at least 6 months without their maladjusted behaviors showing any progress; (b) displayed social, emotional, and/or behavioral problems both at school and at home and/or during recreational activities; (c) were involved in the care of mental health care organizations; (d) were obstructed in attending general education because of their psychiatric disabilities; and (e) attended a mainstream school that provided adequate care of the students' needs, but ceased care because of lack of impact (Meijer et al., 2003). Core problems in these students may vary from mild intellectual disabilities to social impairments, from internalizing disorders to externalizing disorders, and combinations of these problems. However, externalizing problems are the most prevalent (Drost & Bijstra, 2008), and

Figure 1. Educational Routes in the Netherlands



students with more severe and diagnosed intellectual disabilities have been referred to other specialized schools (Meijer et al., 2003; see also Figure 1). Criteria used in the Dutch educational system to refer students to special education may differ from other systems across Western societies (for an overview of different approaches to provide education to students with psychiatric disabilities and common problems across these various approaches, please see Meijer et al., 2003).

Although in special education, teachers are provided with extra support (Albrecht et al., 2009), teachers' interactions with students may be impacted by the severe levels of problem behavior that students in these specialized schools exhibit (e.g., Scott, Alter, & Hirn, 2011). Indeed, Ladd, Birch, and Buhs (1999) found that young children who displayed high levels of problem behavior were more prone to develop a negative relationship with their teachers than their peers who showed low levels of problem behavior. Thus, in special education, students' externalizing behavior may be of such severity that it threatens the development of supportive interactions and predicts negative interactions.

It is also unknown if, in this population, developmental links of externalizing behavior with positive, supportive interactions differ in strength from links with negative, admonishing interactions. Most studies included only positive or negative features of student–teacher interactions (e.g., Doumen et al., 2008; Leflot et al., 2011; Mercer & DeRosier, 2008). However, when negative interactions decrease, it does not necessarily suggest that positive interactions increase; teachers can limit their negative interaction while maintaining their initial level of support. Thus, when examining links between student–teacher interactions and externalizing behavior, the influence of both negative and supportive interactions should be accounted for. On a related note, previous findings are based generally on teachers' perspectives on interactions (Doumen et al., 2008; Leflot et al., 2011; Mercer & DeRosier, 2008; Pakarinen et al., 2017; Zhang & Sun, 2011). However, their perspective on the interaction is correlated highly with their judgment of students' behavioral problems (Doumen et al., 2008), which raises questions on the use of teachers as a valid informant on this matter. As students' perceptions of teachers are related to increasingly better performance on their achievements, when intending to examine reciprocal relationships between interaction styles and students' behavioral development, it is important to focus on students' perceptions of teachers' interactions with them (Wubbels, Brekelmans, den Brok, & van Tartwijk, 2006).

The Present Study

This study is part of a larger research project; approximately half of the sample received a preventive intervention program intending to optimize classroom structure by offering teachers the Dutch adaptation of the Good Behavior Game (Barrish, Saunders, & Wolf, 1969; Dutch revision by van der Sar & Goudswaard, 2001, 2002, and van der Sar & van Wermerskerken, 2007). In the present study, we investigated developmental links between externalizing behavior and student–teacher interactions in male adolescents placed in special secondary education due to psychiatric disabilities. Only males were included as the etiology, prevalence, and development of externalizing behavior in males differ from females (American Psychiatric Association, 2000; Crick & Zahn-Waxler, 2003). Also, the overrepresentation of males in special education (Coutinho & Oswald, 2005) impedes adequate testing for sex-differences. Based on previous studies in general primary education, we expected that (a) externalizing behavior would predict a decrease in positive, supportive student–teacher interactions and that (b) externalizing problems would predict an increase in negative, admonishing interactions. Although adolescents seem more focused on their relationships with peers than with adults, considering that their relationships with their teachers have also predictive value on important outcome variables (Al-Yagon, 2012; Wang et al., 2013), and that they have an increased need of feeling close to others (Roorda et al., 2011), we expected that in addition to effects of externalizing on the teacher–child relationship, (c) supportive student–teacher interactions would predict decreases in subsequent levels of externalizing

behavior. Given the relative smaller impact of negative student–teacher interactions on adolescent students' functioning than on younger children as found in previous studies (Roorda et al., 2011), we did not expect (d) any predictive value of admonishing interactions on externalizing behavior.

METHOD

Fourteen secondary schools for self-contained special education for adolescents with psychiatric disabilities participated in this study between September 2010 and June 2011. These schools were located in rural to urban communities in the Netherlands, populations of the communities ranging from 11,000 to 600,000. The study was approved by the Dutch Medical Ethics Committee for Mental Health Care.

Participants

Both students and their teachers were approached to participate in this study. They received information leaflets and consent forms. Also, research assistants were available at the participating schools to answer questions and provide more information if necessary.

Students

At the start of the school year, 859 male adolescents were eligible for participation in this study. Written informed consent was obtained for 584 male adolescents (68%). Among the students who did not participate, 190 (69%) refused to take part in the study and 85 boys (31%) did not have parental consent. Students who participated in the study were significantly younger ($M = 15.0$ years) than those who did not ($M = 16.0$ years) $F(1, 850) = 77.97$, $p < .001$. Referral criteria for placement in the schools were evaluated by certified mental health professionals such as psychiatrists and clinical psychologists, who were not affiliated with the research team. Students had to meet criteria of one or more *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition) diagnoses and display such severe social, emotional, or behavioral problems that they were unable to attend general education. Out of the 584 male adolescents participating in this study, 160 students and their parents did not provide additional consent for examining the students' school file and obtaining the students' specific psychiatric diagnoses. In total, 424 school files were examined, out of which three files contained invalid diagnoses. The main psychiatric disorders obtained out of 421 students' school files included pervasive developmental disorders ($n = 254$), externalizing disorders ($n = 116$; e.g., attention deficit hyperactivity disorder, oppositional defiant disorder, conduct disorder), and internalizing disorders ($n = 17$; e.g., anxiety or mood disorders). It is important to note that 115 students dealt with comorbid psychiatric diagnoses, making it difficult to assign students to different diagnostic groups. Also, please note that psychiatric diagnosis information is missing for 163 students and that it is therefore important to interpret the available data on the students' psychiatric diagnoses with caution.

Most students had Dutch nationality (83%). As an indication of socioeconomic status, their parents' occupational classification was used (Centraal bureau voor de statistiek, 2010). Their classification was rated as elementary (e.g., courier, painter; 46%), medium (e.g., harbor master, pharmacy assistant; 32%), or scientific (e.g., accountant, psychologist; 22%).

Of the 584 males, data were completed across the three assessments for 438 adolescents (75%). Adolescents had missing data because of leaving school ($n = 29$ students), refusing to participate at a specific assessment wave ($n = 75$ students), having a teacher who dropped out of the study ($n = 29$ students), or attending a school of which management decided to pause participation temporarily in the present study ($n = 7$ students). Also, six students were taught by a different tutor–teacher at one of the assessments. As we aimed to use data from stable student–teacher dyads only, these data on the student–teacher interactions were not used in the model testing and were considered missing. Adolescents with missing data had higher externalizing behavior scores at baseline than adolescents with complete data, $F(1, 530) = 9.49$, $p < .01$. Missing data were not related to baseline supportive interaction scores, $F(1, 557) = .07$, $p = .80$, baseline admonishing interaction scores, $F(1, 556) = .19$, $p = .66$, at baseline, their socioeconomic status, $\chi^2(2, N = 318) = 2.50$, $p = .29$, or ethnic background, $\chi^2(1, N = 361) = .02$, $p = .89$. However, adolescents with missing data were older, $F(1, 582) = 6.96$, $p < .01$.

As approximately half of the sample received a preventive intervention program intending to optimize classroom structure by offering teachers universal strategies using the Dutch adaptation of the Good Behavior Game (van der Sar & Goudswaard, 2001, 2002, and van der Sar & van Wermerskerken, 2007), we made sure that students assigned to both the control group and the intervention group could be included into the same model. We therefore tested if path estimates differed between the control condition and the intervention condition (see Results section). The content of the program and its impact on teacher outcomes are described elsewhere (Hopman, Tick, et al., 2018). Results of analyses on its impact on student outcomes are described elsewhere (Hopman, van Lier, et al., 2018).

Teachers

To assess our male students' levels of externalizing behaviors, we included only teachers who were assigned by their school management team to students being their tutor–teachers. Tutor–teachers have additional tasks compared to other teachers in special education. Besides teaching students in one or more subjects like their colleagues, tutor–teachers also guide a group of students in social–emotional development. One group usually consists of one tutor–teacher and 10 to 12 students. Interactions between students and tutor–teachers differ from interactions between students and other teachers in that they have more frequent contact, and they may share more information about students' personal matters. Other conditions, such as rules (e.g., "when someone talks, you are quiet") and structure (e.g., contact moments

are divided into instructional moments, free activities, and students working on tasks), are equal to the interactions between students and other teachers. A total of 100 teachers completed the questionnaires about students' externalizing behavior. Participating tutor–teachers (M = 38.0 years of age, SD = 11.0 years, range = 22.9–62.1; 39% male) had on average 5.3 years of experience in teaching students with psychiatric disabilities (SD = 4.8, range = 0–39).

In this study, teachers rated on average 5.8 students (SD = 2.5, range = 1–12). Levels of supportive interactions and admonishing interactions were assessed asking students to rate interactions with the tutor-teacher who rated their levels of externalizing behavior.

Measures

Our study variables were assessed at three assessment occasions during the 2010–2011 school year: in October/November (Time 0), in February/March (Time 1), and in June (Time 2). Trained research assistants administered the assessments; they were present during the data collection to answer participants' questions and to check completed questionnaires on missing data.

Students' externalizing behaviors were assessed using the Problem Behavior in School Inventory (PBSI; Erasmus MC, 2000). Teachers rated each student's externalizing problems on a 5-point Likert scale ranging from 0 (*never*) to 4 (*very often*). The PBSI consists of five different scales, each focusing on symptoms of a different type of problem (i.e., Symptoms of Conduct Disorder, Oppositional Defiant Disorder, Attention Deficit Hyperactivity Disorder, Symptoms of Anxiety Disorder, and Depression). The oppositional defiant disorder and conduct disorder scale were used. The Oppositional Defiant Disorder scale contained seven items (e.g., "Does not comply with school rules"), and the Conduct Disorder scale contained 12 items (e.g., "Gets into many fights"). Cronbach's alphas ranged from .91 to .92 for the Oppositional Defiant Disorder scale, and from .91 to .93 for the Conduct Disorder scale. The interrater reliability (70 children were rated by multiple tutors) was r = .52. The correlations were high between the externalizing scale of the PBSI with similar scales of validated measures (r = .75; Witvliet, van Lier, Cuijpers, & Koot, 2010). To compute an overall externalizing behavior score, the items of the Oppositional Defiant Disorder scale and the Conduct Disorder scale (rs were .81 at each assessment) were added and divided by the number of items included in the scale.

Student–teacher interactions were rated by students using two subscales of the Questionnaire on Teacher Interaction (QTI; e.g., Wubbels et al., 2006) on a 5-point Likert scale ranging from 0 (*never*) to 4 (*always*). The original version contains eight subscales, each linked to a type of interpersonal teacher behavior toward the student (i.e., leading, helping, understanding, giving freedom, uncertain, dissatisfied, admonishing, strict). As our study is framed around the developmental links between externalizing behavior and the proximity between teachers and students, only the two subscales that refer to this proximity were used. Supportive interactions were measured using the helping scale (e.g., "This teacher is friendly toward students"), and negative interactions were measured using the admonishing scale (e.g., "This teacher threatens with punishment"). Both scales contained seven items. The content of the QTI items used in this study are online available in the Appendix. Cronbach's alphas ranged from .87 to .89 for the helping scale, and from .64 to .68 for the admonishing scale. The QTI is considered a reliable measure of assessing student–teacher interaction (Wubbels & Levy, 1991). Additionally, the factor structure of this questionnaire has been confirmed (Maulana, Opdenakker, den Brok, & Bosker, 2012).

Student's age was dummy coded (0 = aged younger than 15.0 years, 1 = aged 15.0 years or older). Data on students' age were collected from students' self-reports by filling out the date of the measurement occasion and their day of birth.

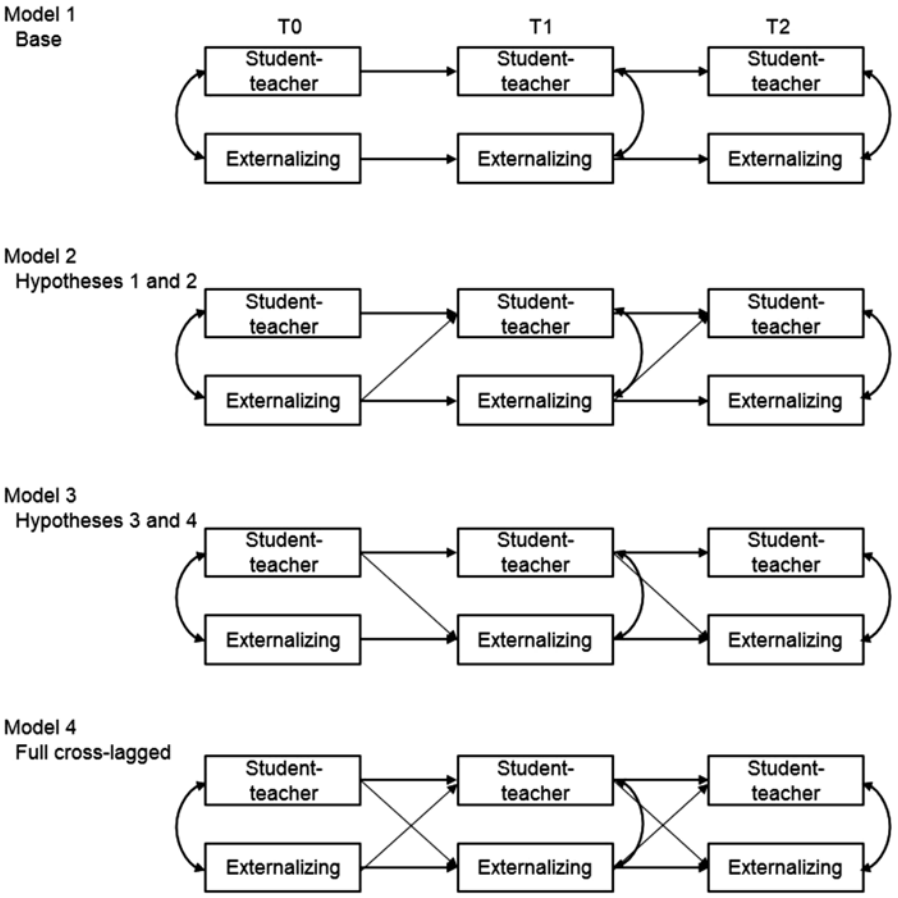
Students' duration of contact with teachers was also dummy coded (0 = less than 15 hr per week, 1 = 15 hr per week or more). The duration of contact was determined using data gathered from students' school timetables provided to us by the schools.

Data Analysis

The developmental links between externalizing behavior and student–teacher interactions across the year were analyzed using autoregressive cross-lagged models (Jöreskog, 1970). All path estimates were controlled for students' age, their group status, and duration of contact between student and teacher. Following a stepwise approach alike the previous studies (Doumen et al., 2008; Leflot et al., 2011; Mercer & DeRosier, 2008; Zhang & Sun, 2011), series of nested models were fitted (see Figure 2).

First, a model was specified containing only autoregressive paths and cross-sectional correlations. This model served as our base model. Second, to test for directional links as proposed by the first two hypotheses of our study, we allowed for the paths from externalizing behavior to future student–teacher interactions, in addition to the autoregressive paths and cross-sectional correlations. Third, a model was fitted to test our latter two hypotheses of the study, allowing for additional reverse paths, from student–teacher interactions to future externalizing behavior in addition to the autoregressive paths and cross-sectional correlations. The full transactional model contained all cross-lagged paths between externalizing behavior and student–teacher interactions, autoregressive paths and cross-sectional correlations. The four models were fitted separately for supportive and admonishing interactions. The Satorra–Bentler scaled chi-square difference test (Satorra & Bentler, 2001) was used for comparison of nested models. Model fits to the data were considered adequate when the comparative fit index (CFI) was above .95, the root mean squared error of approximation (RMSEA) under .06, and the standardized root mean square residual (SRMR) under .08 (Hu & Bentler, 1999).

Figure 2. Tested Models of Developmental Associations Between Adolescents' Externalizing Behavior and Student–Teacher Interactions Across the Three Assessment Occasions



Models were fitted in Mplus Version 5.1 (Muthén & Muthén, 1998–2007). We took account of nesting of the data in classrooms; standard errors were adjusted for classroom level variation of the study variables. An MLR estimator (maximum likelihood with robust standard errors) was used to control for possible nonnormality of the data. Full-information maximum likelihood, which uses all data that are available to estimate the parameters of the models, was used to account for missing data. To ensure that possible intervention effects did not impact our findings, we conducted multigroup analyses and tested if findings were different between adolescents assigned to the control condition versus intervention condition. A model was specified in which the cross-lagged paths were estimated freely and was compared with a model in which these paths were held equal across both conditions.

RESULTS

Table 1 displays raw means and standard deviations of the study variables across the measurement waves. It shows significant stability correlations within constructs over time and significant cross-sectional correlations between externalizing behavior and student–teacher interactions. More important for our study hypotheses, cross-time correlations were significant between externalizing behavior and subsequent admonishing and supportive student–teacher interactions.

Developmental Links Between Externalizing Behavior and Student–Teacher Interactions

Table 2 shows the tests of model fit of the four tested models regarding externalizing behavior and supportive student–teacher interactions. With regard to our first hypothesis, allowing for the links from externalizing behavior to supportive student–teacher interactions (model 2) improved significantly model fit over the autoregressive model (model 1). When testing for reverse paths (hypothesis 3), allowing for paths from supportive interactions to externalizing behavior (model 3) did not improve model fit over model 2. The final model, allowing for full cross-lagged links between student–teacher interactions and externalizing behavior (model 4) did not improve model fit over model 2. Therefore, model 2 was considered the optimal model. Before interpreting this model, we ran a multigroup analysis to test if path estimates of the cross-lagged paths differed between control and intervention children. This was not the case, Satorra–Bentler $\chi^2(4) = 3.21$, $p > .05$.

Results from model 2 (CFI = .97, RMSEA = .04, SRMR = .04) are depicted in part A of Figure 3. In this

Table 1. Means, Standard Deviations, and Pearson Correlations of Adolescents' Externalizing Behavior and Student–Teacher Interactions in Special Secondary Education

	(*n* = 584)									
Measures	*M*	*SD*	1	2	3	4	5	6	7	8
1. Externalizing Behavior T0	1.21	.75								
2. Externalizing Behavior T1	1.23	.78	.84							
3. Externalizing Behavior T2	1.19	.77	.78	.88						
4. Supportive Interactions T0	2.92	.74	–.14	*–.08*	*–.05*					
5. Supportive Interactions T1	2.90	.74	*–.04*	–.12	*–.05*	.58				
6. Supportive Interactions T2	2.85	.74	*–.09*	–.18	–.12	.51	.64			
7. Admonishing Interactions T0	1.87	.61	.23	.22	.18	–.36	–.24	–.26		
8. Admonishing Interactions T1	1.89	.57	.14	.17	.13	–.18	–.36	–.23	.48	
9. Admonishing Interactions T2	1.87	.57	*.10*	.13	.13	–.18	–.25	–.35	.43	.56

Note. T = Time.
$p < .05$; nonsignificant correlations are presented in italic.

model, in addition to significant autoregressive paths in supportive student–teacher interactions and in externalizing behavior, a significant and negative path emerged from T1 externalizing behavior to T2 student–teacher interactions. This indicates that externalizing behavior halfway during the school year predicted decreases in supportive student–teacher interactions by the end of the school year. Although full-information maximum likelihood was used to account for missing data, missing data were not missing completely at random. To test for a possible impact of missing data on this developmental link, we reran this model including only participants with complete data. The developmental link from Time 1 externalizing behavior to Time 2 student–teacher interactions remained significant ($\beta = -.10$, $p = .02$) and no additional links were found.

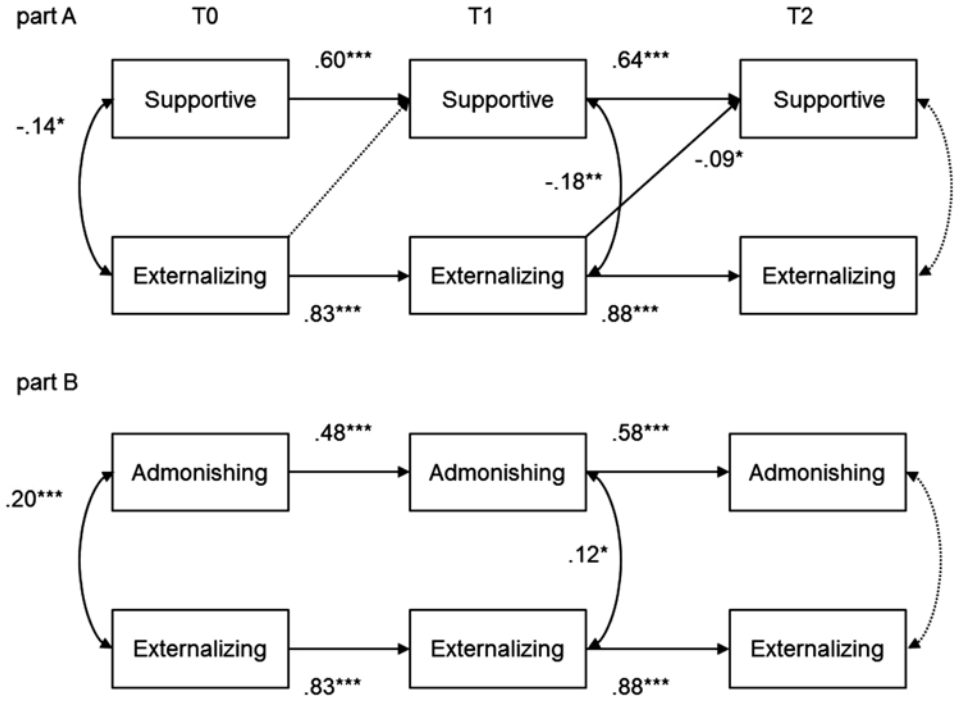
The tests of relative model fit of externalizing behavior and admonishing student–teacher interactions (see Table 2, lower portion) indicate that the model with only autoregressive pathways and cross-sectional correlations presented an adequate fit to the data (model 1; CFI = .98, RMSEA = .04, SRMR = .06). Also, allowing for cross-lagged path between externalizing behavior and admonishing behavior (hypothesis

Table 2. Fit Statistics for Models Testing the Developmental Links Between Adolescents' Externalizing Behavior and Student–Teacher Interactions in Special Secondary Education

Model	CFI	RMSEA	SRMR	*N* par	Comparison	*TRd*	Δ*df*	*p*
Adolescents' Externalizing Behavior and Supportive Student–Teacher Interactions								
1. Autoregressive	.97	.05	.04	20				
2. EXT to Supportive	.97	.04	.04	22	2 vs. 1	6.66	2	.036
3. Supportive to EXT	.97	.05	.04	22	3 vs. 1	3.58	2	.167
4. Full Cross-Lagged	.98	.05	.04	24	4 vs. 2	3.59	2	.166
Adolescents' Externalizing Behavior and Admonishing Student–Teacher Interactions								
1. Autoregressive	.98	.04	.06	20				
2. EXT to Admonishing	.98	.04	.06	22	2 vs. 1	1.64	2	.440
3. Admonishing to EXT	.97	.05	.06	22	3 vs. 1	.75	2	.687
4. Full Cross-Lagged	.97	.05	.05	24	4 vs. 1	2.19	4	.701

Note. CFI = comparative fit index, RMSEA = root mean squared error of approximation; SRMR = standardized root mean square residual; *N* par = number of free parameters; *TRd* = Satorra–Bentler scaled chi-squared difference statistic; EXT = externalizing behavior; Supportive = supportive student–teacher interactions; Admonishing = admonishing student–teacher interactions.

Figure 3. Final Models of Developmental Associations Between Adolescents' Externalizing Behavior and Student–Teacher Interactions, Both Supportive (Part A) and Admonishing (Part B)



Note. Results of the final models are represented with path coefficients as standardized regression weights and nonsignificant pathways depicted as gray dotted lines.

2, model 2) or paths from admonishing to externalizing (hypotheses 4, model 3) did not improve model fit. Thus, the results suggest no developmental links between externalizing behavior and admonishing student–teacher interactions. Again, we ran multigroup analyses to test if path estimates of the cross-lagged paths differed between control and intervention adolescents. This was not the case, Satorra–Bentler $\chi^2(4) = 2.31$, $p > .05$. The final model is depicted in part B of Figure 3.

DISCUSSION

To our knowledge, this study was the first to examine developmental links between externalizing behavior and student–teacher interactions among male adolescents with psychiatric disabilities. Our results were partially in line with our hypotheses based on findings of the previous studies that included primary schoolchildren, conducted in general education and that examined these links using similar cross-lagged models as specified in our study (Doumen et al., 2008; Leflot et al., 2011; Ly & Zhou, 2016; Mercer & DeRosier, 2008; Pakarinen et al., 2017; Zhang & Sun, 2011).

Three main findings of our study should be addressed. First, in this specific population characterized by severe levels of emotional and behavioral problems, we found no support for a predictive link of student–teacher interactions, either supportively or negatively, on the development of students' externalizing behavior. This was in line with our hypotheses, as we did not expect negative interactions to predict high levels of externalizing behavior, and with the study conducted among older elementary schoolchildren (Pakarinen et al., 2017), but in contrast with findings of other studies that found developmental links from student–teacher interactions to students' externalizing behavior (Doumen et al., 2008; Leflot et al., 2011; Ly & Zhou, 2016; Mercer & DeRosier, 2008; Zhang & Sun, 2011). Second, with regard to the reverse path, it was less likely that teachers would interact supportively with their male students if externalizing behavior had persisted into the second half of the school year. This was in line with our hypotheses and results of previous studies that found that students' externalizing behavior was related to subsequent lower levels of supportive student–teacher interactions (Leflot et al., 2011; Ly & Zhou, 2016; Mercer & DeRosier, 2008). However, this finding was in contrast with results of the study conducted by Pakarinen et al. (2017), who found no reciprocal relations between closeness and externalizing behavior across two time-points. Third, in contrast with our hypothesis and earlier findings (Doumen et al., 2008; Pakarinen et al., 2017; Zhang & Sun, 2011), externalizing behavior did not increase the likelihood that teachers would interact with their students in a negative manner. This result was, however, in line with the study conducted by Ly and Zhou (2016).

There may be several reasons why in our sample, student–teacher interactions did not influence adolescents' externalizing behavior. It may be due partly to the gender and age of the population under investigation, but more so to the complexity of their psychiatric disabilities. First, because research has indicated that girls may benefit more from supportive

student–teacher interactions than boys (Roorda et al., 2011), we may not have found links from supportive student–teacher interactions to externalizing behavior in our male population.

Second, their psychiatric diagnoses and additional academic, social and behavioral difficulties are often accompanied by problems with peers or family (Shanahan, Copeland, Costello, & Angold, 2008). As such problems accumulate in various areas of their lives, this may preserve their high levels of problem behavior (Trudeau, Mason, Randall, Spoth, & Ralston, 2012). Possible negative influences of peers and family may prevent teachers' interactions from contributing significantly to adolescents' behavioral development. This seems in line with previous trials testing effects of universal interventions on problematic behavior in children who belong to at-risk groups; they found little beneficial change in the targeted behavior (Visser, Bijstra, & Kunnen, 2005) or moderate sized effects (Wilson, Gottfredson, & Najaka, 2001). Nevertheless, the consistent levels of externalizing behavior were not only found in our male adolescent population, but also in a population of more typically developing adolescents (De Laet et al., 2016) and in younger populations (Doumen et al., 2008; Leflot et al., 2011; Ly & Zhou, 2016; Mercer & DeRosier, 2008; Pakarinen et al., 2017; Zhang & Sun, 2011). Therefore, these constructs seem largely defined by the start of the school year in general.

This study extended previous research by identifying externalizing behavior as predictive for the levels of support that teachers provide. Because young people with problem behavior already have fewer positive relationships with peers than typically developing children (Bagwell, Molina, Pelham, & Hoza, 2001), our finding that teachers in special education reduced their supportive interactions with male adolescents as a function of externalizing behavior seems potentially troublesome. However, some nuance is warranted with regard to the extent that their interactions are developmentally influenced by students' behavior. First, teachers responded to externalizing behavior only with decreases in support and not with increases in negative, admonishing interactions. Moreover, their response took place only by the end of the school year. This suggests that, overall, teachers responded with decreased support only when the male adolescents consistently showed externalizing problems across the school year. This contrasts with the finding among general education students that supportive interactions suffered from students' externalizing behavior at an earlier stage during the school year (Mercer & DeRosier, 2008). Thus, although in special education, male students' externalizing behavior had some impact on supportive student–teacher interactions, by and large, their teachers seemed quite well equipped to cope with their students' behavioral difficulties in that these difficulties had no impact on their admonishing interactions.

The fact that no link was found from student–teacher interactions to future externalizing behavior does not mean that teachers had no impact on male students. Previous studies showed that other aspects of their interactions have a direct effect on adolescents' social–emotional and behavioral problems; teachers' trust impacts students' depressive symptoms and conduct problems (Wang et al., 2013), and their rejection levels of externalizing problems (Al-Yagon, 2012). Moreover, the student–teacher relationship is related to other important factors such as students' social skills (Berry & O'Connor, 2010) and academic achievement (Baker, Grant, & Morlock, 2008).

Limitations and Recommendations

Several limitations of this study may guide future research. First, as the classroom context impacts student–teacher interactions (Baker et al., 2008), the generalizability of our results may be limited to adolescents placed in separate special education. However, as most young people with special educational needs spend at least a part of their school career in general educational settings (Meijer et al., 2003), our results may also partially apply beyond the specific context of a separate setting. Second, as the special educational system differs between countries with regard to admission criteria and consequently the number of students who are placed in special education (Meijer et al., 2003), our findings should be replicated in other countries with different policies. Third, as we included only male students, our results may not generalize to female students. Therefore, our findings should be replicated in a large enough sample of female students who display severe levels of problem behavior.

Fourth, although we examined possible developmental links between student–teacher interactions and externalizing behavior in a sizeable sample, statistical power of our sample may account for the lack of effects of student–teacher interactions on externalizing behavior. Two studies (De Laet et al., 2016; Mercer & DeRosier, 2008) included more than 1,100 students and successfully identified independent contributions of student–teacher interactions on externalizing behavior. Therefore, it is recommended to replicate our results among a larger number of students. Fifth, using different measures that are related to the same constructs, our results should be replicated, especially because the internal consistency of one of our measures was quite low (i.e., admonishing subscale). For instance, teachers' perception of their interactions with students could be examined, or observers could rate the quality of interactions. Including both perspectives on student–teacher interactions may also shed more light on the possibility that the student's perspective may be biased. We chose to include students' perspectives because including teacher-reports of student–teacher interactions and teacher-reports of students' externalizing behaviors may complicate interpreting bidirectional links; the association between the two constructs may reflect a single negative attitude toward the student (e.g., Doumen et al., 2008). To validate the student perspective on interactions between students and teachers, it is important to include students' perspectives and teachers' perspectives when examining developmental links between student–teacher interactions and students' externalizing behaviors. Moreover, as the type of measurement we used to capture

student–teacher interactions may reflect individual students' perspectives on teacher behaviors toward the class as a whole, future research may include measures that refer to teachers' interactions with individual students.

Finally, although 68% of students attending the participating schools provided informed consent on participating in the study by filling out self-report questionnaires, a vast proportion of these students and their parents (51%) did not allow us to obtain information about their psychiatric diagnoses from school records. Also, when examining the available data on psychiatric diagnoses for which we did obtain informed consent, we could not reliably compare students' diagnostics, as diagnostic classifications were done by different professionals, at different time points within students' school career, using different methods. We recommend to test if similar findings will be obtained for different diagnostic clusters because of the variety of psychiatric disabilities that these students may have. For instance, due to the social difficulties that are part of their autism spectrum disorder, adolescents with pervasive developmental disabilities may interact differently with teachers than typically developing adolescents do. Distinguishing between various types of psychiatric disabilities may add to our understanding and improvement of social and developmental processes that take place in special education. It should be noted however that given the severity of their problems, many students referred to these self-contained schools deal with high comorbidity rates, which may complicate a valid assignment to different diagnostic groups.

With regard to directions for practice, our results point to male adolescents' externalizing behavior as an important target for interventions intended to build and maintain supportive interactions with teachers in high-risk settings. Teachers in special education should also be made aware of how externalizing behavior may reduce their support toward students. When students consistently display levels of problematic behaviors, teachers need alternative strategies to cope; instead of lowering their support, teachers may focus on students' positive behavior (Hester, Hendrickson, & Gable, 2009; Sutherland, Wehby, & Copeland, 2000). School interventions developed specifically for secondary education may support teachers in altering their potentially adverse interactions with challenging students into more beneficial interactions. In addition, as we assessed students' levels of externalizing behaviors by asking teachers to rate the behaviors, teachers' mental representations of individual students may also be an appropriate target for interventions. By supporting teachers to reflect on their interactions with students who show consistently challenging behaviors, it is possible to improve the quality of teachers' interactions with students (Spilt, Koomen, Thijs, & van der Leij, 2012). However, given the stability of the levels of externalizing behavior that we found, interventions should preferably target children at a young age, or at the start of students' placement in special education. Within the boundaries of young people's psychiatric impairments, early screening on externalizing behaviors in children will thereby enable teachers to create the proper preconditions for vulnerable young people toward a mentally healthy and independent future.

APPENDIX. STUDENT–TEACHER INTERACTIONS MEASURED BY THE QTI (E.G., WUBBELS ET AL., 2006)

Answers are rated on a five-point Likert scale (0 = *occurs never*, 1 = *occurs seldom*, 2 = *occurs sometimes*, 3 = *occurs often*, 4 = *occurs always*)

1. This teacher has a sense of humor.
2. This teacher is quick to correct students when breaking a rule.
3. This teacher helps us with our work.
4. This teacher forbids things.
5. This teacher trusts students.
6. When this teacher is angry, you can see it.
7. This teacher lets us fool around in class.
8. This teacher threatens with punishment.
9. This teacher can take a joke.
10. This teacher can get angry quickly.
11. This teacher's class is pleasant.
12. This teacher has a bad temper.
13. This teacher is friendly toward students.
14. It is easy to pick a fight with this teacher.

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