ANTISOCIAL BEHAVIOR AND DEPRESSIVE SYMPTOMS: LONGITUDINAL AND CONCURRENT RELATIONS

Alessio Vieno, Jeff Kiesner, Massimiliano Pastore, and Massimo Santinello

ABSTRACT

The relations between antisocial behavior and depressive symptoms were examined both longitudinally and concurrently in a sample of Italian early-adolescents. Structural equation modelling was applied to 10-month longitudinal data from a sample of 107 youths (54 girls; mean age at baseline = M = 12.5). Early adolescents completed a questionnaire in which they reported antisocial behaviors and depressive symptoms. Results show temporal stability for both constructs. Moreover, results show a significant longitudinal relation between depression at t1 and antisocial behavior at t2. This relation dropped to not significant when controlling for concurrent relations between these two measures of psychosocial adjustment at t2. A multigroup comparison suggests that these findings are similar across gender. Implications of the results for theory and intervention are discussed.

INTRODUCTION

The existing base of empirical evidence has established that both depressive symptoms (Gutman & Sameroff, 2004; Lewinsohn, Rohde, Seeley, & Fischer, 1993) and antisocial behavior (Barnow, Lucht, & Freyberger, 2005; Moffitt, 1993) show a significant increase in both prevalence and incidence during early adolescence. Moreover, various studies have indicated that antisocial behavior and depressive symptoms co-occur frequently (Ge, Best, Conger, & Simons, 1996; Huizinga & Jakob-Chien, 1998; Lewinsohn, Hops, Roberts, Seeley, &

This study was supported by a grant from the Italian University Ministry (MIUR, Protocol n° 2003111478).

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Andrews, 1993; Loeber & Keenan, 1994; Overbeek, Biesecker, Kerr, Stattin, Meeus, & Engels, 2006). To explain comorbidity Caron and Rutter (1991) have proposed three possibilities. The first suggests that two separate disorders may share the same risk factors; the second, that the comorbid occurrence may represent a distinct syndrome; and the third, that one disorder may increase the risk for the second disorder.

In relation to the third model, of particular interest in the present study, research has provided empirical support for depressive symptoms leading to antisocial behavior (Beyers & Loeber, 2003; Curran & Bollen, 2001; Loeber, Russo, Stouthamer-Loeber, & Lahey, 1994) as well as antisocial behavior leading to depressive symptoms (Capaldi & Stoolmiller, 1999; Feehan, McGee, & Williams, 1993; MacPhee & Andrews, 2006; Overbeek, Vollebergh, Meeus, Engels, & Luijpers, 2001; Patterson, Reid, & Dishion, 1992). Because this existing literature provides inconsistent and contradictory results, the present study examined the longitudinal relations between depressive symptoms and antisocial behavior by modeling their impact on one another in a sample of early adolescents.

Explaining the Co-occurrence of Antisocial Behavior and Depression

The explanation that either antisocial behavior or depression plays a causal role in the development of the other (Caron & Rutter, 1991) has received a great deal of attention at both the theoretical and empirical levels. One of the most influential models proposed in the literature, called the "failure model" (Patterson & Capaldi, 1990), predicts that antisocial behavior elicits predictable reactions from the social environment (e.g., family and peers), and that this "failure" then leads to depressive symptoms. Research that has tested this model has provided contradictory support for the hypothesis (Capaldi, 1992; Kiesner, 2002; Panak & Garber, 1992; Feehan et al., 1993). On the other hand, research has suggested that the relation between sub-clinical conduct problems and later depression may be limited to early adolescence (Capaldi & Stoolmiller, 1999).

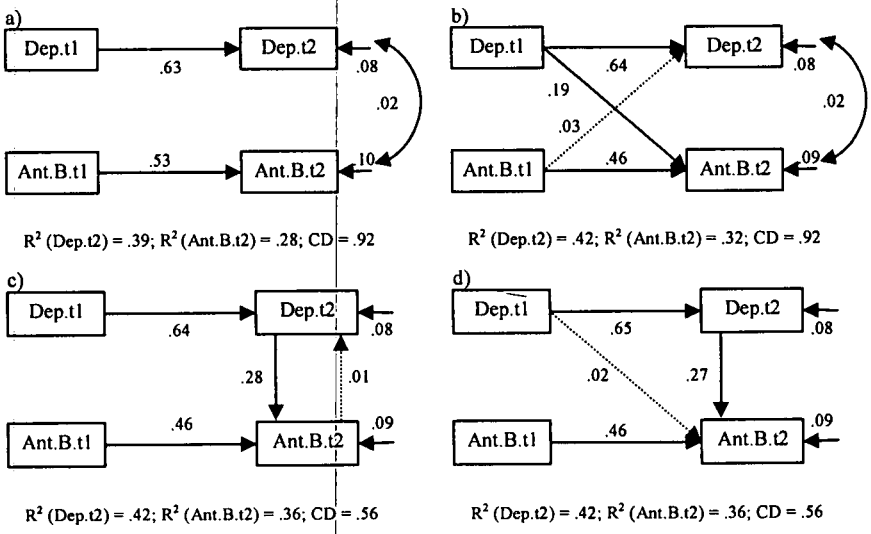
In the model proposed by Patterson et al. (1992), depressed mood that results from earlier antisocial behavior, is also expected to lead to increases in antisocial behavior (Beyers & Loeber, 2003). Thus, this model actually hypothesizes reciprocal effects between antisocial behavior and depression. Consistent with this notion, several studies (Capaldi, 1992; Kovacs, Paulauskas, Gatsonis, & Richards, 1988) confirmed that stable depressed mood was associated with boys' escalation to higher levels of delinquent behavior. On the other hand, Capaldi

and Stoolmiller (1999) found that depressive symptoms (across grades 6, 7, and 8) did not predict increases in conduct problems (at grade 12).

In the present study we examined concurrent and longitudinal relations between antisocial behavior and depression. Because both antisocial behavior and depression were measured at two time points, this study is well suited to address questions about directionality of the relations between these constructs. We therefore controlled for stability in each measure, and then tested for direct cross-lag effects as well as indirect effects of each time-one measure on the time-two measure of the other construct.

To address these issues, we tested the following four models: (1) a simple stability model allowing for temporal stability for both antisocial behavior and depressive symptoms (see Fig. 1a); (2) a mutual cross-lag model to verify cross-lag paths going from t1 antisocial behavior to t2 depression and from t1 depression to t2 antisocial behavior (see Fig. 1b); (3) a mutual indirect effects model testing whether t1 antisocial behavior has an indirect effect on t2 depression via t2 antisocial behavior, and whether t1 depression has an indirect effect on t2 antisocial behavior via t2 depression (see Fig. 1c); (4) a combined cross-lag and indirect effects model, in which all significant cross-lag and indirect effect paths (from the previous model) are included (see Fig. 1d).

Figure 1. Concurrent and longitudinal relations between antisocial behavior and depression (standardized solutions). CD = Coefficient of Determination.



The last two models were tested because a cross-lag effect could either be a true cross-lag effect, or it could be the result of an indirect effect passing through the stability of the causal variable. Without controlling for t2 concurrent relations, an observed cross-lag effect could not be unambiguously interpreted as such.

Most of the studies cited above included only males, and thus were unable to test for gender differences. Because early adolescence is a period in which important changes occur in all aspects of life, and because these changes have different meanings for males and females, gender may play an important role in interacting with youth socialization (Jacobson & Crockett, 2000; Smith, 2005) and with the co-occurrence of problem behavior and depression. Therefore, possible gender differences should be considered as an important and understudied factor in the relations between antisocial behavior and depression. Thus, multigroup analyses were conducted to test for gender differences in these relations.

METHOD

Participants

The present data from a 10-month longitudinal study conducted in the Veneto region (northeast) of Italy. Parents of all sixth- and seventh-grade students from three middle schools (9 classrooms) were asked for permission to allow their child to participate in the study. Permission was obtained for 150 students (98% of total sample; 68 girls, 82 boys; and 69 sixth-, 81 seventh-grades). Of these 150, 139 (93% also participated during the second administration (10 months later). There were no differences in attrition rate between boys and girls, or between the two grade levels.

The present analyses were based on participants who participated during both questionnaire administrations. Because of missing values, in all, 107 participants (54 girls, 53 boys) were used for the present analyses. The mean age of these students at the time of the first data collection was 12.5 years (SD = .60). The level of father education for this sample was as follows: 10.1% completed only elementary school; 53.8% completed middle school; 28% completed secondary school; and 0.6% had a university degree.

Those who participated at both measurements did not differ from those who participated only at t1 on the two major variables, depression ($t_{(133)}$ = .56, p = .58) and antisocial behavior ($t_{(138)}$ = −.15, p= .88).

Measures

Depression. The Italian version of the CES-D Scale (Raldoff, 1977) was used to assess the adolescents' level of self-reported depressive symptoms. Three items ("I felt alone"; "I felt that people disliked me"; "I enjoyed life") were removed because, according to preliminary principal component analyses, these items did not load well with the other 17 items. All questions required a response using a 4-point Likert scale, ranging from "Never, or Almost Never" to "Frequently or Always" and participants were asked to think of the past 7 days when responding. Cronbach's alpha for this scale was .79 (t1) and .75 (t2).

Antisocial behavior. An adapted version of the self-report measure of antisocial behavior (Kiesner, 2002) was to measure youth antisocial behavior. The scale was composed of 11 items (e.g., "How many times did you take money from your parents without their permission?") to which participants were asked to respond by considering the past 30 days. All questions required a response using a 6-point ordinal scale, ranging from "Never" to "More than 20 times." Cronbach's alpha for this scale was .82 (t1) and .84 (t2).

Procedure

Questionnaires were administered to the students in the classroom during normal school hours. One research assistant was present during the administrations, which lasted approximately one hour.

RESULTS

Descriptive Statistics

The mans and standard deviations for variables, as well as correlations among them are presented in Table 1. Particularly relevant are the correlations between depression and antisocial behavior at the two time points: $r = .38$, $p < .01$ at t1, and $r = .51$, $p < .01$ at t2.

STRUCTURAL EQUATION MODELS TESTING THE LONGITUDINAL RELATION BETWEEN DEPRESSION AND ANTISOCIAL BEHAVIOR

To test for the relation between depression and antisocial behavior, four models were examined. For the first model (Fig. 1a), which tested for stability in the two constructs, t1 depression explained 39% of variance in t2 depression and t1 antisocial behavior explained 28% of variance in t2 antisocial behavior. We also calculated the total coefficient of determination (CD; Bollen, 1989, p. 118), that represent a measure

Table 1. Means, standard deviations, and correlations among variables.

	1	2	3	4	M (DS)
1. Depression t1	-				1.59 (.51)
2. Antisoc. Beh. t1	.38**	-			1.38 (.48)
3. Depression t2	.68**	.33**	-		1.57 (.42)
4. Antisoc. Beh. t2	.43**	.61**	.51**		1.38 (.47)
Males	1.61 (.53)	1.49 (.61)	1.59 (.47)	1.50 (.59)	
Females	1.57 (.48)	1.24 (.20)	1.57 (.37)	1.23 (.19)	

** $p < .01$

of the strength of the relationship between the predicted variable and model of the predictors in a regression model. The CD for this model was .92.

For the second model (cross-lag model; Fig. 1b), which tested whether t1 depression predicted t2 antisocial behavior, after controlling for stability in antisocial behavior, and whether t1 antisocial behavior predicted t2 depression, after controlling for stability in depression, the squared multiple correlations for depression and antisocial were respectively: $R^2 = .42$, and $R^2 = .32$. The CD for this model was .92. The cross-lag relation between t1 depression and t2 antisocial behavior was significant, whereas the cross-lag relation between antisocial behavior and t2 depression was not significant.

The third model (Fig. 1c) tested for indirect effects of antisocial behavior on t2 depression, passing through t2 antisocial behavior, and t1 depression on t2 antisocial behavior passing through t2 depression. Because in model 2 (Fig. 1b) only the cross-lag effect for t1 depression on t2 antisocial behavior was significant, it was expected that only the indirect effect of depression on antisocial behavior could be significant.

The model explained 42% of variance in t2 depression and 36% of variance in t2 antisocial behavior and the CD for this model was .56. These results suggest that the cross-lag effect of depression on antisocial behavior may actually be an indirect effect of t1 depression, passing through t2 depression.

The fourth model (Fig. 1d) simultaneously tested for both direct and indirect effects of t1 depression on t2 antisocial behavior. This model represents a combination of the second (Fig. 1b) and third (Fig. 1c) model, removing nonsignificant relations. The variance explained in depression and antisocial behavior were: $R^2 = .42$ and $R^2 = .36$, respectively. The CD for this model was .56.

The direct cross-lag effect of t1 depression on t2 antisocial behavior dropped to nonsignificant, and near zero, whereas both legs of the indirect effect remained significant and of unchanged magnitude. These results further suggest that the cross-lag effect of depression on antisocial behavior may actually be an indirect effect passing through stability in depression.

Because the cross-lag effects could also be dependent on the concurrent relation between depression and antisocial behavior at T1, we also ran these analyses allowing the t1 constructs to be correlated (treating all measures as latent constructs and fixing the residuals to 15% in order to save degrees of freedom). Results were consistent with the presented model and led to the same conclusions.

Multigroup comparisons were used to examine the extent to which the fourth model (Fig. 1d) is consistent across gender, in terms of covariance matrices and structural coefficients (gamma and beta). Although differences were found across the covariance matrices ($\chi^2 = 65.37$, $df = 10$, $p < .01$), no differences were found for the structural coefficients. Specifically, analyses supported the assumptions of invariance of form ($\chi^2 = 9.18$, $df = 8$, $p = .33$), invariance of gammas ($\chi^2 = 10.34$, $df = 11$, $p = .50$), and invariance of betas ($\chi^2 = 9.36$, $df = 9$, $p = .40$).

DISCUSSION

The primary goal of the present study was to test for concurrent and longitudinal relations between antisocial behavior and depression, and to try to clarify the directionality of possible causal links during early adolescence. The present study shows that depressive symptoms predict increases in antisocial behavior but that antisocial behavior does not predict changes in depression. These results are consistent with part of the failure model and several previous studies (Capaldi, 1992; Beyers & Loeber, 2003; Curran & Bollen, 2001; Loeber et al., 1994) in which depressed mood was found to predict increases in antisocial behavior.

On the other hand, the nonsignificant effect of antisocial behavior on later depressive symptoms is inconsistent with other studies (Capaldi & Stoolmiller, 1999; Feehan et al., 1993; Patterson et al., 1992). According to Beyers and Loeber (2003), these results may be related to the early stage of the development of subjects in our study (Mean age = 12.5 at t1). In fact, these authors (Beyers & Loeber, 2003) provide general support for the applicability of this pattern (from antisocial behavior to depressive symptoms) to mid- or late-adolescence,

when possible mediators between delinquency and later depressed mood (e.g., failure in romantic relationships, and low employability) may intervene in exacerbating this escalation.

A second explanation as to why antisocial behavior does not predict changes in depression is that moderate level of norm-violating or delinquent behavior is a part of normal development and, as such, not predictive of depressive symptoms (Overbeek et al., 2001; Silbereisen & Noack, 1988). In this sense, it is plausible that only more serious or high levels of externalizing behaviors are linked to depression (Huizinga & Jakob-Chien, 1998).

In trying to clarify the relation between antisocial behavior and depressive symptoms Patterson et al. (1992) proposed that early signals of deviant behavior lead to different forms of rejection by family and peers (e.g., more conflicts, less support), which in turn lead to depression. The lack of a relation between antisocial behavior and depressive symptoms seems to be inconsistent with this model and in trying to understand these contrasting results, cultural differences between this Italian sample and North American samples should be considered. For instance, Claes, Lacourse, Bouchard, and Perucchini (2003) reported that, as compared to North American youth, Italian youth report higher levels of conflicts but also stronger relationships with their parents. The strong relationships maintained within Italian families, even in the presence of high conflict, may protect Italian youth from depressive symptoms linked to antisocial behavior and high levels of parent-child conflict. However, recent research has also shown that, among Italian adolescents, negative and conflictural parent-child relations mediate the possible effect of antisocial behavior on depressive symptoms, whereas peer-relations problems did not (Kiesner, Carnaghi, Lasorella, & Pastore, under review). Clearly, more research is needed to clarify those differences.

One very important contribution of the present study was to show that depressive symptoms at t1 may not directly affect antisocial behavior at t2, but indirectly through t2 depression.These results are consistent with data presented by Beyers and Loeber (2003) which showed that concurrent relations between delinquency variety and depressed mood were consistently stronger across the 5-year period analyzed than were lagged relations between variables over time. These results suggest that depressed mood and delinquency variety are more likely to co-occur during the same year than across years.

The indirect relation between depressive symptoms and antisocial behavior seems to support the *acting out perspective* (Carlson & Cantwell, 1980). According to this perspective, the conduct problems are

often part of an internalizing problem that is "acted out." Therefore, the depressive feeling of early adolescents are supposed to be masked by disruptive behavior and other symptoms that fit into the broader category of externalizing behaviors. In more general terms, this theoretical perspective assumes that internalizing problems not only predate, but also predict antisocial behavior (e.g., Gold, Mattlin, & Osgood, 1989).

The indirect effect of depression on antisocial behavior suggests that it may be necessary to consider mechanisms that occur over relatively short time frames (Beyers & Loeber, 2003). Thus, it may be that depression has only a concurrent/immediate effect on antisocial behavior, and longitudinal effects are found only because concurrent effects are not adequately controlled for. This suggests that our theories may need to pay more attention to different mechanisms of effect when considering longitudinal effects vs. concurrent effects, and specify better what the expected time frame would be for the proposed effects.

Limitation and Strengths

A couple of limitations of the present study need to be mentioned. First, because the sample was fairly homogeneous with regard to racial/ethnic characteristics, it will be important to assess whether comparable results emerge when considering more heterogeneous samples.

Second, the present study covered only a limited temporal window, and some evidence suggests that the most significant rise, for example in depressive symptoms, can be observed between mid- and late-adolescence (e.g., Hankin, Abramson, Moffit, Silva, McGee, & Angell, 1998). Future studies should extend the time frame from childhood through late adolescence to provide a complete picture of the co-occurrence of depression and antisocial behavior across this time period.

Finally, the data in this study are entirely self-report and therefore are likely influenced by common method variance that may inflate the observed relations. Using multiple informants will strengthen the measurement and confidence in the results.

Two important strengths also need to be emphasized. First, the use of SEM and the inclusion of both direct and indirect longitudinal effects provides new insights into whether the longitudinal effects are truly longitudinal or confounded with t2 concurrent relations among these variables. Our results suggest the latter.

Previous research has generally not examined possible gender differences (Overbeek et al., 2001) concentrating in particular on males. A

second important strength is the use of multigroup comparisons that allowed us to test the applicability of this model for both males and females. The present study seems to suggests that the mechanism that connects depressive symptoms at t1 indirectly (through t2 depression) to antisocial behavior at t2, is similar for both males and females.

Implications for Intervention

The relative stability of antisocial behavior and depressive symptoms suggests that prevention programs should take place as soon as possible. Children who have high levels of problematic symptoms (both internalizing and externalizing) relatively early in life, run a risk of developing relatively higher levels of these same problems or more severe outcomes into adolescence (Reid & Eddy, 2002).

Moreover, many efforts to prevent delinquency consist of targeting youth who manifest aggressive and antisocial behavior (Wasserman & Miller, 1998). Results from the present study, according to the programs implemented by Hops and colleagues (see for example Davis, Sheeber, and Hops, 2002) suggest that it may make sense to target youth who manifest symptoms of depression—a possible risk factor for antisocial behavior.

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