



Do Adolescents Engage in Delinquency to Cope with Depressive Symptoms? Revisiting the Longitudinal Link Between Delinquency and Depressive Symptoms While Considering Moderation by Ethnicity, Adolescent Phase, and Gender

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Abstract

The co-occurrence between delinquency and depression in adolescence is well-documented. However, Psychology (Failure model and Acting out Model) and Criminology (Strain Theory) theories are divided on the potential longitudinal link between these two behaviors and empirical studies show mixed findings. The present 3-wave longitudinal study tested these opposing theories, using cross-lagged panel modeling on an ethnically and socio-economically diverse sample (T1: $N=602$; $M_{age}=13.50$ ($SD=1.23$); 46.4% female). Furthermore, we investigated whether moderation by ethnicity (non-Western ethnic minority versus Western ethnic majority [i.e., ethnically Dutch]) or adolescent phase by gender (early adolescent girls versus mid-late adolescent girls versus early adolescent boys versus mid-late adolescent boys) were present. For the total sample, results showed that higher levels of delinquency predicted lower levels of depressive symptoms, consistent with Strain theory that suggests that adolescents may resort to delinquency to cope with depression. As for significant moderation links: (1) higher levels of delinquency predicted lower levels of depressive symptoms (Strain theory), especially in mid-late adolescent girls, (2) higher levels of delinquency predicted higher levels of depressive symptoms (Failure model) for early adolescent girls, and (3) higher levels of depressive symptoms predicted higher levels of delinquency (Acting out model and Strain theory) for mid-late adolescent boys. Although no ethnicity moderation effects were found, consistent with strain theories, ethnic minority adolescents reported significantly more depressive symptoms (T1 and T3) but not higher delinquency levels than ethnic majority adolescents. Thus, the mixed findings found in previous studies for the link between delinquency and depression could be because gender-by-adolescent-phase moderation effects were overlooked. Implications for the Acting out model, Failure model, and Strain theories are discussed.

Keywords Delinquency · Depressive symptoms · Ethnicity · Adolescence · Gender

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Both delinquency and depression show a dramatic increase during adolescence. Such internalizing problems and externalizing problems differ particularly in the way they are expressed, such that to the outside world, delinquency problems are typically more apparent than depressive symptoms. However, despite their symptomatic dissimilarities, in non-referred and clinic-referred adolescent samples, these two problem behaviors co-occur at alarming high rates (Capaldi & Kim, 2014; Wolff & Ollendick, 2006). The relatively high co-occurrence of delinquency and depressive symptoms is worrisome; as such co-occurrence within the same individual is associated with poorer treatment response and prognosis (Wolff & Ollendick, 2006). Moreover, when delinquency and depressive symptoms co-occur, the chance becomes even greater that depressive symptoms might go unnoticed, as it is likely that the expression of delinquency might overpower the expression of depressive symptoms, at least to the outside world. In addition to the established co-occurrence between delinquency and depressive symptoms, a critical (unresolved) question for successful prevention/intervention programs is: what is the longitudinal sequence of these problem behaviors? Interestingly, not all studies find a longitudinal link between depressive symptoms and delinquency, and the directionality of the link (temporal order) and even the nature (i.e., negative or positive statistical association) differ across studies. Perhaps these inconsistent findings could be explained by characteristics of the adolescent that moderate these associations. However, studies investigating the longitudinal link between adolescent depressive symptoms and delinquency rarely investigate whether the temporal ordering and the nature of the link differs across common moderators such as adolescent phase, gender, and ethnic background. Hence, the current 3-wave longitudinal study aims to tackle these questions in a sample of ethnically and socio-economically diverse Dutch adolescents.

Three Competing Theories

With regard to the co-occurrence of multiple psychological problems, although common risk factors might also be at play (such as low socio-economic status), Caron and Rutter (1991) explained that one problem might lay the groundwork for another to develop. Indeed, studies that have controlled for common risk factors have shown a robust concurrent and longitudinal bidirectional associations between depressive symptoms and delinquency (see, e.g., Beyers & Loeber, 2003; for reviews, see Wolff & Ollendick, 2006; Ozkan, 2017). The Acting out model (Carlson & Cantwell, 1980) and the Failure model (Capaldi, 1992) are among the two prominent models within the psychological sciences that aim to explain the co-occurrence and temporal ordering of internalizing problems (e.g., depressive symptoms) and externalizing problems (e.g., delinquency) in adolescence, whereas the Strain theory (Agnew, 1992; Agnew & White, 1992; Brezina, 1996, 2000) has been chiefly cited in criminology to address a potential longitudinal link between delinquency and depression more specifically. Both the Acting out and Failure models posit that higher levels of one behavior subsequently predict the occurrence of the higher levels of the other behavior (i.e., positive statistical association). However, the fundamental difference between these two models is their opposing views on the temporal order of which

behavior is the cause and which is the consequence. Specifically, the Acting out model posits that depression precedes delinquency because youth who fail to cope with their depressive symptoms, such as irritability, subsequently begin to act out behaviors in the form of conduct problems, which “masks” their depression (Carlson & Cantwell, 1980; Wolff & Ollendick, 2006; Ozkan, 2017). In other words, they eventually externalize their internalizing problems.

In contrast to the Acting out model, the Failure model postulates that delinquency precedes depression because significant others (and society more generally) disapprove of delinquency, and thus adolescents who engage in delinquency may encounter relationship problems with their social environment and such developmental failures trigger depressive symptoms (Capaldi, 1992). It should be noted that although the Failure model has received more empirical support compared to the Acting out model (see Defoe et al., 2013; Van der Giessen et al., 2013; Wolff & Ollendick, 2006), the findings remain mixed. For example, some studies only found support for the Acting out model (e.g., Reynolds & Crea, 2015), while other studies have simultaneously found support for both models (e.g., Ozkan et al., 2019).

Unlike the Failure model and Acting out model, the criminological perspective, *Strain theory*, suggests that an existing link from delinquency to depression would have a *negative* statistical association, at least in the short term (Brezina, 1996). Namely, Strain theories suggest that delinquency can be used as a coping mechanism for emotional strains (e.g., depression), and as such is in sharp contrast to the hypothesis that delinquency leads to depression (i.e., Failure model) (cf. De Coster & Heimer, 2001). Extrapolating from Strain theories, one would expect that higher levels of delinquency would predict lower levels of depression in the short term, but later on (e.g., in adulthood) if delinquency does not prove to be an effective coping strategy, it can result in depression (Brezina, 1996; 2000). Initially, adolescents might choose to respond to any existing strain with delinquency to avoid or alleviate subsequent negative affect such as depression which is caused by strain (Brezina, 1996). For example, adolescents might steal money to buy something they desire, thus to feel good, which could subsequently lower levels of distress (e.g., depression) (Agnew, 2001).

In essence, Strain theory builds on the idea that adolescence can be experienced as a stressful period with multiple strains (see Agnew & White, 1992), and considering that both depression and some forms of delinquency peak in adolescence, adolescents perhaps increase their delinquency to cope with their depression, that is, to mask depression, or even to lower depression. While the Strain theory is in sharp contrast with the Failure model, it does have some similarities with the Acting out model, in that it suggests that depression (caused by strain) would predict higher levels of delinquency. However, unlike the Acting out model, it can further be extrapolated from the Strain theory that higher levels of delinquency would in turn lead to lower levels of depression in the short term. The above-described negative link from delinquency to depression as extrapolated from the Strain theory has rarely been explored (cf. Jang et al., 2016). Nevertheless, we located one study that found that when adolescents use delinquency to respond to strain, they experience fewer depressive symptoms compared to their non-delinquent counterparts (Brezina, 1996). Of note, delinquency did not entirely eliminate depression-related

consequences associated with strain in that study; however, delinquency did appear to be associated with some modest relief from strain's deleterious effects on depression (Brezina, 1996).

For intervention and prevention purposes, it is important to disentangle the temporal order of a potential longitudinal link between depression and delinquency. For example, in the case of co-occurrence of these behaviors, information on which theory is most applicable would help determine which behavior should be reduced to bring about reductions in the other. Moreover, when co-occurrence does not (yet) exist, such information on temporal ordering is helpful to prevent one behavior (e.g., depression) from forming if its risk factor (e.g., delinquency) is present.

Considered together, although the co-occurrence between delinquency and depressive symptoms has been demonstrated in several longitudinal studies, there are other studies that have failed to find *longitudinal* associations (see, e.g., Akse et al., 2007; Jennings et al., 2019; Overbeek et al., 2001) as well as studies that are not consistent with respect to the direction (positive versus negative) of the association and the temporal order of a *longitudinal* link between these two behaviors. This suggests that other factors might play a role in these inconsistent results. Hence, in the current study, we investigated whether three common individual characteristics that differentiate adolescents from each other (gender, adolescent phase, and ethnic background) could serve as moderators in this hypothesized longitudinal link, as an attempt to help clarify some of the above-described inconsistent findings.

The Moderating Role of Adolescent Phase and Gender

As noted earlier, the rise in both depressive symptoms and delinquency occur in adolescence; however, adolescence is a heterogeneous period with distinct developmental phases. Studies suggest that the median age for the onset of behavioral problems is 11 years, whereas the median age of onset for mood disorders such as depression is 13 years (Merikangas et al., 2010). These statistics might provide an explanation as to why in most studies externalizing problems predict internalizing problems (and not vice versa), in support of the Failure model. Thus, considering the different ages for the peaks across these behaviors, the Failure model might be more meaningful for explaining a positive link from delinquency to depression during early adolescence (11–14 years). However, the Stain theory suggests that a negative link is also possible, especially in the short term. Extrapolating from Strain theory, especially in the early phases of adolescence, higher levels of delinquency might predict lower levels of depression, although in the longer-term this might no longer be the case.

Furthermore, depressive problems tend to peak during mid-adolescence, whereas delinquency tends to peak in mid-late adolescence (which partially overlaps with emerging adulthood), with the co-occurrence of these behaviors being the strongest during mid-adolescence (Wolff & Ollendick, 2006). Hence, perhaps from mid-adolescence to emerging adulthood, the Acting Out model which suggests a positive link from depressive symptoms to delinquency might be more applicable. We are aware of only one study that investigated whether the co-occurrence and longitudinal

link between psychological stress/depressive problems and delinquency differed among early, middle, and late adolescents; however, this study did not find such a link for any of these group (Overbeek et al., 2001). Of note is that Overbeek et al. (2001) did not specifically investigate depression, instead a broad-band construct labeled “emotional disturbance” which included items on depression, but also on general wellbeing, suicidal thoughts, and psychological distress was used. Clearly, more studies that investigate the possibility of an adolescent phase moderation effect in the longitudinal link between specifically depressive problems and delinquency are needed before firm conclusions can be drawn.

As for gender, there are profound gender differences in the prevalence rates of both delinquency and depression. Whereas prevalence rates of depression are higher in girls than for boys, delinquency is higher in boys than in girls (Ozkan, 2017). There is evidence that the co-occurrence between delinquency and depressive symptoms is stronger in females than males while other studies find no association in males (Knox et al., 2003; Overbeek et al., 2001). As for the temporal ordering, both bi-directional (Wiesner, 2003) and unidirectional (Ritakallio et al., 2008) positive links from depressive symptoms to delinquency (consistent with the Acting out model) have been reported in girls, whereas at least one study reported that an unidirectional positive link from delinquency to depressive symptoms (consistent with the Failure model) existed only in boys (Wiesner, 2003; however, the latter link was only found at the last of three measurement intervals, namely from approximately 16.5 to 17 years). In contrast, gender moderation effects were absent in a 4-year longitudinal cross-lagged panel study that reported unidirectional positive links from externalizing problems to internalizing problems (consistent with the failure model) for both adolescent boys and girls (Van der Giessen et al., 2013). Finally, as for gender moderation for the link suggested by Strain theory, at least one study reported that engaging in delinquency reduced the deleterious effects of strain on depression more in males (versus females)—which the authors interpreted as delinquency being able to make some adolescents feel better over time (Jang et al., 2016), while another study hinted that this theory might be more relevant for females (Liu, 2004). Thus, findings are still inconclusive with respect to gender as a moderator in a longitudinal link between depression and delinquency. Nevertheless, extrapolating from the above-described literature, there appears to be more evidence to substantiate that the Acting out model is applicable to girls (versus boys), whereas the Failure model and Strain theory are likely more applicable to boys (versus girls). This is perhaps because since depression is more prevalent in girls, some girls might begin to externalize their symptoms that could take the form of delinquent acts (consistent with the Acting out model). Considering delinquency is more prevalent in boys and may occur earlier, boys may be more likely to become depressed following delinquency (consistent with the Failure model), or to engage in more delinquency to prevent internalizing problems such as depression (consistent with the Strain theory).

It should be noted that although the results of the above-described gender moderation studies are inconsistent, their samples differed with regard to adolescent developmental phase. That is, Van der Giessen et al. (2013) included early adolescents, Ritakallio et al. (2008) included mid-adolescents, and Jang et al. (2016) and Wiesner (2003) included mid-late adolescents. Thus, even though the results of these studies

do not overlap, overall conclusions drawn should be done with caution, as these studies are not directly comparable due to their samples' differences in adolescent phase. These inconsistent findings provoke the hypothesis that a gender by adolescent phase moderation effect (i.e., early adolescent girls vs. mid-late adolescent girls vs. early adolescent boys vs. mid-late adolescent boys) is likely to exist. Hence, we consider all these possible moderation effects in the current study when examining the hypothesized longitudinal link between depressive symptoms and delinquency.

The Moderating Role of Ethnicity: Ethnic Minority Versus Ethnic Majority Youth

Although more scientific research on ethnic differences is still needed, cultural differences are often ubiquitous in the sciences that deal with human behavior (e.g., criminology and psychology), as human behavior is strongly affected by ethnic/cultural values. For example, the current sample consists of Dutch youth; however, although the Netherlands is a multicultural society with a substantial number of foreign migrants (25.8%, Statistics Netherlands, n.d.), Dutch scientific articles rarely include a substantial amount of ethnic minority Dutch youth to allow for the testing of possible ethnicity moderation effects in behavior. The majority of the ethnic minority youth in the Netherlands are 2nd-generation immigrants from Turkey, Morocco, and Suriname, and to a lesser extent from the Dutch Caribbean islands (Aruba, Bonaire, Curacao, Saba, Sint Eustatius, and Sint Maarten) (Ftitache, 2015). Thus, the ethnic make-up of the Dutch society is quite different from other Western countries (e.g., the USA). For example, the largest portion of non-western ethnic minorities in The Netherlands consists of Dutch Moroccans and Dutch Turkish youth whose families originally came to the Netherlands as so-called *gastarbeiders* (guest workers). Although subgroups of non-western migrants (i.e., from the Dutch Caribbean, Morocco, Suriname, and Turkey) in the Netherlands differ to some extent in their immigration history and religious beliefs, they overlap greatly on psychological factors. Particularly, unlike the more individualistic Dutch culture where Western values of autonomy/independence of the individual often prevail, the non-western ethnic minority groups tend to place a higher value on interpersonal relations, collectivism, conformism, and social harmony (Janssens et al., 1999).

Another notable difference is that overall psychological adjustment might be lower in ethnic minority youth compared to ethnic majority Dutch youth (Ftitache, 2015). For example, in the Netherlands, ethnic minority youth are over-represented in the juvenile justice system (Boon, van Dorp, & de Boer, 2018). However, such differences in delinquency between ethnic majority youth and ethnic minority youth are not consistently found when self-reports or parent reports are used (see, e.g., Ftitache, 2015; Paalman et al., 2015; Stevens et al., 2003; Murad et al., 2003; Deković et al., 2004). As for internalizing problems, ethnic minority youth in the Netherlands appear not to be overrepresented; however, this might particularly be the case when teacher reports are used, but on self-report and parent measures, they sometimes score higher than their ethnic majority youth counterparts (see, e.g., Janssen et al.,

2004; Stevens et al., 2003; Vollebergh et al., 2005; for an overview, see Ftitache, 2015).

Nearly all of the existing studies on ethnic differences in internalizing and externalizing problems among Dutch youth are cross-sectional. Nevertheless, a recent 10-year study showed that non-western ethnic minority youth scored higher on conduct problems on all the five time points, but differences in emotional problems were negligible or small, with non-western ethnic minority youth scoring lower than their ethnic Dutch majority youth counterparts (Duijnhof et al., 2015). Then again, a recent longitudinal study with at-risk youth showed that over 4 years ethnic minority youth of Moroccan descent scored lower than their Dutch counterparts on conduct problems and lower on depression (Paalman et al., 2015). As for ethnic differences in the co-occurrence of delinquency and depression, although Paalman et al. (2015) reported a positive association between the two, ethnic differences in these associations were absent over the 4 years. However, these findings await to be replicated in studies with a substantial amount of ethnic minority youth. In addition, Paalman et al. (2015) did not employ a methodology that could disentangle the temporal order of the longitudinal links found. Nevertheless, since a positive association existed between externalizing and internalizing problems, it appears that the Failure model *and* Acting out model could be applicable for both ethnically non-Western (e.g., Moroccan) and ethnically Western Dutch youth. Of note is that these models suggest different temporal orders; thus, the current study directly examines which of those two models are more relevant for ethnically Western versus ethnically non-Western youth in the Netherlands.

As demonstrated above, Dutch studies that focus on moderation of ethnicity on the link between delinquency and depression are scarce, and apparently evidence has been found for a positive association between these behaviors for both ethnically non-Western (i.e., non-Western ethnic minorities) and ethnically Western Dutch youth. Still, there are reasons to believe that the Strain theory could particularly be useful for explaining delinquency in ethnic minorities. Namely, according to Strain theory, ethnic minorities typically endure more and different types of stressors (e.g., discrimination, poverty) than ethnic majorities (Agnew, 2006; 2001; Kaufman et al., 2008; Isom Scott & Grosholz, 2019), and might resort to delinquency to cope with the negative consequences (e.g., depression) of these stressors (Agnew, 2006; 2001; Kaufman et al., 2008). Hence, it can be extrapolated from Strain theory that higher levels of delinquency would predict lower levels of depression (Brezina, 1996, 2000) particularly in ethnic minority groups. We explore this hypothesis in the current study.

Taken together, when it comes to scientific studies on the link between delinquency and depressive symptoms, most of the current Dutch research that include ethnic minority youth is descriptive and the existing (cross-sectional) studies show mixed findings (cf. Ftitache, 2015). Accordingly, the current study is unique in that it is one of the few Dutch studies that include a substantial sample of ethnic minority youth to allow the investigation of ethnicity moderation effects using a longitudinal design (but see also, e.g., Paalman et al., 2015). Specifically, we use an ethnically diverse sample to explore whether ethnic minority versus ethnic majority moderation effects exist in the hypothesized link between depressive problems and

delinquency. Considering that the investigated ethnic minority groups as a whole are more similar to each other on psychological adjustment factors (cf. Ftitache, 2015), in comparison with the Western-ethnic majority group, we combine the non-Western ethnic minority groups when comparing them to the Western ethnic majority group. Moreover, since ethnicity (i.e., minority versus majority ethnic groups) and socioeconomic status (SES) are often confounded in youth in the Netherlands (Deković et al., 2004), we control for SES when testing for ethnicity moderation effects.

Current Study

In the current study, we investigate whether a longitudinal link between depressive symptoms and delinquency exists among a sample of ethnically and socioeconomically diverse adolescents ($N= 602$; 13.50 years at baseline) who were either in their 1st or 3rd year of secondary school (i.e., a 2 cohort sample). These adolescents participated in the research once per year over 3 years, with 1 year between assessments. Furthermore, we investigate whether gender in combination with adolescent phase (early adolescent girls versus mid-late adolescent girls versus early adolescent boys versus mid-late adolescent boys) and ethnicity (non-Western ethnic minority versus Western ethnic majority [i.e., ethnically Dutch]) moderate the temporal order of these links, while accounting for potential SES confounding effects in the latter moderation model. At baseline, we categorized the participants in the 1st year of secondary school as “early adolescence,” and those in their 3rd year of secondary school as “mid-late adolescence”.

Methods

Sample

The sample used in the current study was part of a larger 3 wave longitudinal project in the Netherlands on adolescent risk-taking in multiple domains, which began in 2012 (for detailed information, see Defoe et al., 2016). We recruited the participants via schools throughout the Netherlands. Annual data-collections took place three times, with sample sizes of 602, 582, and 442, respectively across the waves. In wave 1, the adolescents (46.40% female) were either in the 1st or 3rd year of “preparatory middle-level applied education” (*VMBO* in Dutch) or “higher general continued education” (*HAVO* in Dutch). At wave 1, adolescents were 13.50 ($SD = 1.23$) on average. Most these adolescents (93.2%) reported that they were born in the Netherlands with 61.6% identifying as Dutch, 9.3% as Turkish or Turkish-Dutch, 7.4% as Surinamese or Surinamese-Dutch, and 5.5% as Moroccan or Moroccan-Dutch, and the rest (16.2%) identified with various other ethnicities (e.g., Dutch-Caribbean). To gauge the SES of the sample, the adolescents were asked about their mother’s highest level of completed education. Almost half (47.7%) of the 602 adolescents were unaware of this information, partly because their mothers (12.1%) were born in countries where the educational system was not similar to the Dutch educational-system. For the other half who knew their mother’s highest level of completed

education, 23.2% and 22.3% of their mothers completed secondary school or college/university as the highest level of completed education, respectively.

Procedure

We recruited participants from 8 high-schools in 6 different regions in the Netherlands.¹ We especially approached what are called “Zwarte” (Black) and “Gemengde” (Mixed) schools in the Netherlands. These are schools with a significant number of ethnic minorities (and ethnic majorities) students. Parents received dissent letters that could be returned to the schools if parents refused to let their children participate in the study, and during the data-collections, the participant themselves could also decline to join the study. Adolescents who were absent from school in wave 1 could still participate in subsequent waves if they had parental permission, and new adolescents could also participate after wave 1.

The data-collections which were led by trained research assistants and took place at schools of the participants. Participants were offered the choice between a chocolate candy worth 2 euros as a participation prize, or to have their name entered in a raffle for a chance to win a 50 euro gift voucher.

Measures

Depressive symptoms were reported by adolescents at each of the three measurement waves via the Depressive Mood List (DML; Kandel & Davies, 1982), which was translated to Dutch by Engels et al., (2001). Adolescents indicated how often within the last 6 months they experienced depressive symptoms. The questionnaire contained 6 items, example items are “Feeling nervous or tense” and “Worrying too much about things.” The answer categories were as follows: 0= Never; 1= Rarely; 2= Sometimes; 3= Often; 4= Always. Means scores were computed, with higher means denoting higher levels of depressive symptoms. Cronbach alpha’s were .79, .85, and .81, for waves 1, 2, and 3 respectively, all indicating good reliability. We ran an explanatory factor analysis to determine whether the factor structure of the scale was comparable for “early adolescent boys versus mid-late adolescent boys versus early adolescent girls versus mid-late adolescent girls,” and for “ethnic minority youth versus ethnic minority youth.” We did this by exploring whether all items loaded on 1 factor, with a minimum loading of .30. We found that for early adolescent boys, one item had a slightly lower loading (.276) on the 1 factor structure, whereas for the other groups, all items had a >.30 loading on the 1 factor structure. We retained all items for the analyses.

Delinquency was measured with 7 items tapping vandalism (1 item; *Have you ever damaged something on purpose, such as a bus shelter, a window, a car or a seat in the bus or train?*) and property crime (4 items that related to theft) of the

¹ In waves 2 and 3, seven schools participated as one school no longer participated after wave 1 due to organizational changes at the school.

International Self-Reported Delinquency questionnaire (ISRD; Junger-Tas et al., 1994; Junger-Tas et al., 2003). An example theft item is “Have you ever stolen something from a store or warehouse.” An additional vandalism item “Have you ever tampered or ruined (vandalize) objects on the streets or inside a building with paint, graffiti, or markers?” and an additional delinquency item “Have you ever done something for which you were arrested by the police?” from another delinquency questionnaire were also used (i.e., Baerveldt et al., 2003). The answer-categories for all of the items were as follows: 0 = Never or Yes, but that was longer than 12 months ago; 1=Yes, once in the past 12 months; 2=Yes, twice in the past 12 months; 3= Yes, three times or more during the past 12 months. Thus, the current study investigates delinquency within the last 12 months, and accordingly, adolescents who indicated that they have committed a delinquent act more than 12 months ago were coded as 0. A mean score was computed, with higher means reflecting more delinquency involvement. The Cronbach’s alpha’s over the years were .73, .82, and .71, respectively, denoting adequate reliability. Similar to what we explained above for the depressive symptoms scale, for the delinquency scale, we also inspected the 1 factor structure with an explanatory factor analysis. We found that for early adolescent girls, three items had a loading that was (slightly) lower than .30 on the 1 factor structure, whereas for the other groups, all items had a $>.30$ loading on the 1 factor structure. We retained all items for the analyses, but readers should bear in mind that the delinquency scale might not be measuring the same construct for early adolescent girls compared to the other demographic groups. Additionally, of note is that the model did not run for early adolescent boys, since no boy indicated that he did something for which he was arrested by the police during the previous 12 months.

Gender (moderator variable) was a categorical variable, with the category 0 depicting boys, and 1 depicting girls.

Adolescent phase (moderator) was measured with a categorical variable, for which students who were in their 1st year of secondary school at baseline were coded as 0 and 3rd year students were coded as 1.

Ethnicity (moderator variable) was captured with a categorical variable, consisting of 0 = non-Western ethnic minority (i.e., Turkey, Morocco or another country in Africa, Suriname, Caribbean and Asia); 1= Western ethnic majority (i.e., ethnically Dutch). Adolescents with at least one parent who was born in a non-western country were classified as “non-Western ethnic minority” (see also Duinhof et al., 2015); the participants that did not belong to one of these categories were excluded from the ethnicity moderation analysis.

Social Economic Status (SES) was measured in wave 1, via adolescent’s reports on their mother’s highest level of education. This continuous variable that ranged from 0=no education to 7 = university was used as a proxy for SES.

Strategy of Analyses

We investigated the hypothesized link between depressive symptoms and delinquency, with transactional or autoregressive cross-lagged models (Jöreskog, 1970) in Mplus version 7. The autoregressive paths signify continuity within

the variables which were tested by regressing the repeatedly assessed variables over the three waves on their immediate prior values. The cross-lagged, cross-time paths represent associations between the repeated assessments of depressive symptoms and delinquency. The model also allowed for cross-sectional (or within-wave) correlations between parallel-assessed variables. We used the following recommended benchmarks to interpret the magnitude of the cross-lagged paths: .03 (small effect), .07 (medium effect), and .12 (large effect) (Orth et al., 2022). Before analyzing the multi-group models, we started off with the overall model for the total sample. Next, to test the interaction models of interest for gender by adolescent phase (i.e., early adolescent girls vs. mid-late adolescent girls vs. early adolescent boys vs. mid-late adolescent boys), and ethnicity (i.e., non-Western ethnic minority versus Western ethnic majority), we additionally specified two multi-group models. Of note, as a preliminary step, before conducting the above-described three-way interaction multi-group model for gender by adolescent phase, we first conducted separate two-way interaction multi-group analyses: one for gender (i.e., boy versus girl) and the other for adolescent phase (i.e., early adolescents versus mid-late adolescents). To limit redundancy, and to avoid confusion since we are not interested in those two-way interaction multi-group results for gender and adolescent phase separately, we relegated these to the supplemental materials. We used Wald tests to determine whether the moderation effects (i.e., differences across the subgroups in the multi-group models) were significant. Wald-tests further showed that the cross-lagged paths and reverse cross-lagged paths in each model could be constrained to be equal across the waves; thus, the models were time invariant.

As explained in the “Introduction” section, we used SES as a control variable in the ethnicity multi-group models. That is, we regressed this variable on depressive symptoms and delinquency in waves 1, 2, and 3 (Newsom, 2015). Considering that only half of the adolescents were aware of their mother’s highest level of education, we ran analyses with and without this proxy of SES. However, the conclusions of the results were the same with and without controlling for SES; thus, in the current paper, we report the results including SES as a control variable for the ethnicity moderation model. Also of note is that we attempted to control for SES in the other models as well. However, considering we ran into poor model fit issues, we decided to only control for SES in the ethnicity moderation model, as initially planned.

As customary for these models, the Comparative Fit Index and Tucker Lewis Index (CFI and TLI; acceptable values $> .90$) (Bentler, 1990) and the root mean squared error of approximation (RMSEA; acceptable values $< .08$) (Browne & Cudeck, 1993) were chosen to determine model fit. For the adolescent phase by gender multigroup model, we included additional two-wave stability paths from delinquency in year 1 to delinquency in year 3 for young adolescent boys, and in the ethnicity (ethnic minority versus ethnic majority) multi-group model we included such a path for the ethnic-majority subgroup, as this improved model fit. All models had a good fit to the data. A possible non-normal distribution of the study variables was accounted for by using a MLR estimator, in order to facilitate robust standard errors, and this estimator also allows the inclusion of missing cases.

Table 1 Descriptive statistics for early adolescents' and mid-late adolescents' delinquency and depressive symptoms across the three waves

Phase	DEL W1	DEL W2	DEL W3	DEP W1	DEP W2	DEP W3
Early adolescents						
<i>M(SD)</i>	.07(.20)	.12(.28)	.14(.27)	1.32(.69)	1.36(.79)	1.42(.82)
<i>n</i>	290	255	257	283	242	256
<i>Skewness</i>	3.43	3.42	2.67	.51	.52	.53
<i>Kurtosis</i>	12.27	13.65	7.86	.27	-.30	.13
Mid-late adolescents						
<i>M(SD)</i>	.11(.31)	.15 (.44)	.08(.28)	1.55(.71)	1.65(.83)	1.69(.70)
<i>n</i>	310	319	180	306	314	178
<i>Skewness</i>	4.70	4.61	6.90	.52	.46	.30
<i>Kurtosis</i>	27.06	23.61	54.86	.32	.16	.14

DEP, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3. The skewness and kurtosis depicted are retrieved from the models in Mplus

Table 2 Descriptive statistics for boys' and girls' delinquency and depressive symptoms across the three waves

Gender	DEL W1	DEL W2	DEL W3	DEP W1	DEP W2	DEP W3
Boys						
<i>M(SD)</i>	.12(.27)	.20(.49)	.15(.34)	1.24(.62)	1.30(.78)	1.30(.71)
<i>n</i>	321	312	238	314	304	238
<i>Skewness</i>	3.32	3.72	3.93	.66	.88	.52
<i>Kurtosis</i>	12.70	15.40	20.11	1.39	1.25	.73
Girls						
<i>M(SD)</i>	.07(.25)	.07(.18)	.07(.17)	1.68(.74)	1.79(.80)	1.81(.79)
<i>n</i>	280	263	199	275	253	196
<i>Skewness</i>	6.93	3.39	3.39	.26	.13	.15
<i>Kurtosis</i>	59.03	13.65	13.17	-.18	-.44	-.18

DEP, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3. The skewness and kurtosis depicted are retrieved from the models in Mplus

Results

Descriptive Analyses

The means and standard deviations can be seen below per adolescent phase (Table 1), gender (Table 2), and ethnicity (Table 3). At each time point, girls had significantly higher means on depressive symptoms ((wave 1: ($F(1, 599) = 5.54$, $p = .02$); wave 2: ($F(1, 573) = 16.41$, $p < .01$); wave 3: ($F(1, 435) = 9.76$, $p < .01$)), whereas boys consistently had higher means on delinquency (wave 1: ($F(1, 587) = 62.39$, $p < .01$); wave 2: ($F(1, 555) = 54.27$, $p < .01$); wave 3: ($F(1, 432)$

Table 3 Descriptive statistics for ethnic minority versus ethnic majority adolescents' delinquency and depressive symptoms across the three waves

Ethnicity	DEL W1	DEL W2	DEL W3	DEP W1	DEP W2	DEP W3
Ethnic minority						
<i>M</i> (<i>SD</i>)	.08(.21)	.16(.50)	.12(.32)	1.53(.75)	1.55(.85)	1.66(.86)
<i>n</i>	202	155	107	197	152	107
<i>Skewness</i>	3.90	4.51	4.01	.067	.51	.32
<i>Kurtosis</i>	19.87	20.71	18.69	.53	-.16	-.06
Ethnic majority						
<i>M</i> (<i>SD</i>)	.09(.25)	.12(.31)	.12(.29)	1.39(.68)	1.50(.78)	1.47(.73)
<i>n</i>	344	262	218	340	255	217
<i>Skewness</i>	4.08	4.61	4.42	.48	.52	.27
<i>Kurtosis</i>	20.95	30.96	27.98	.00	.20	-.47

DEP, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3. The skewness and kurtosis depicted are retrieved from the models in Mplus

= 49.38, $p < .01$). As for adolescent phase, early adolescents had significantly higher levels for delinquency than mid-late adolescents, but only in wave 3 ($F(1, 435) = 4.62$, $p = .03$), and the latter had higher levels of depressive symptoms than the former for each measurement wave ((wave 1: ($F(1, 587) = 16.41$, $p < .01$); wave 2: ($F(1, 554) = 16.89$, $p < .01$); wave 3: ($F(1, 432) = 12.70$, $p < .01$)). Finally, the levels of delinquency did not significantly differ across ethnicity; however, ethnic minority youth reported higher levels of depressive symptoms than ethnic majority youth, at wave 1 ($F(1, 535) = 4.66$, $p = .03$) and wave 3 ($F(1, 322) = 4.49$, $p = .04$), but not at wave 2. These significant differences in levels of delinquency and depressive symptoms across adolescent phase, gender, and ethnicity underscore the importance of exploring moderation by these variables in the hypothesized link between delinquency and depressive symptoms.

We ran bias checks to inspect whether participants who dropped out the study after wave 1 were (dis)similar compared to participants who remained in the study, with respect to gender, socio-economic status, depressive symptoms, and delinquency levels. We controlled for age when examining depressive symptoms and delinquency levels. For each of the abovementioned variables, we did not find that participants who dropped out of the study were different from participants who remained in the study.

The correlations and means for the entire sample can be seen in Table 4. The means for depression and delinquency were low, but comparable to a previous study based on ethnically diverse Dutch adolescents (Duinhof et al., 2015). The co-occurrence (correlation) of delinquency and depressive symptoms was only significant in wave 2, and the correlation was of medium magnitude.

Table 4 Correlations between variables of interest

	1	2	3	4	5	6
1. DEL W1	-					
2. DEL W2	.45**	-				
3. DEL W3	.34**	.47**	-			
4. DEP W1	.07	.01	.02	-		
5. DEP W2	-.02	.13**	.10	.55**	-	
6. DEP W3	-.04	-.01	.04	.49**	.65**	-
Means (SD)	.093 (.265)	.139 (.384)	.112 (.279)	1.44 (.710)	1.524 (.827)	1.529 (.786)

** $p < .01$; *DEP*, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3

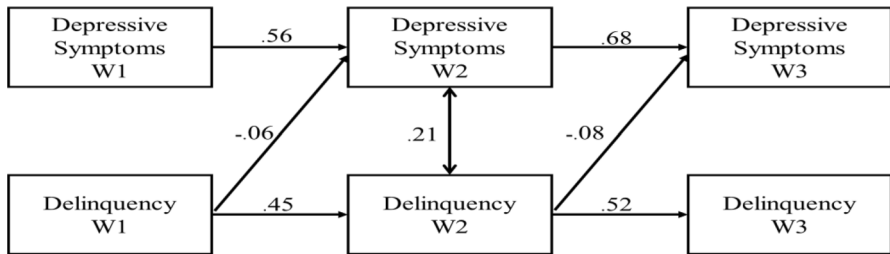


Fig. 1 Overall model. Significant STDYX standardized paths are depicted

Main Analyses

The cross-lagged path models for the full/overall sample, per adolescent phase by gender, and per ethnicity are depicted in figures below.

Overall Model

Model fit: $\chi^2(6) = 12.485$ ($p = .052$); CFI = .968; TLI = .925; RMSEA = .038 (90%CI = 0.000–0.068). In the overall model (Fig. 1 and Table 5), higher levels of delinquency predicted lower levels of depressive symptoms over the years (medium-large effects).

Gender by Adolescent Phase Moderation

First, we report the model fit separately per group. The model fit for the early adolescent phase model was as follows: $\chi^2(5) = 9.117$ ($p = .105$); CFI = .979; TLI = .940; RMSEA = .050 (90%CI = 0.000–0.100). The model fit for the mid-late adolescent phase model was as follows: $\chi^2(6) = 10.900$ ($p = .092$); CFI = .965; TLI = .911; RMSEA = .045 (90%CI = 0.000–0.086).

The model fit for the girl model was as follows: $\chi^2(6) = 4.993$ ($p = .545$); CFI = .965; TLI = .911; RMSEA = .000 (90%CI = 0.000–0.063). The model fit for boy model was as follows: $\chi^2(6) = 11.310$ ($p = .079$); CFI = .948; TLI = .879; RMSEA =

Table 5 Stability paths, (reversed) cross-lagged paths (*B*-values) for the total sample

	Total sample		
	<i>B</i>	<i>SE</i>	<i>p</i>
Stability paths			
W1 DEP → W2 DEP	.65	.05	<.01
W2 DEP → W3 DEP	.66	.04	<.01
W1 DEL → W2 DEL	.64	.15	<.01
W2 DEL → W3 DEL	.40	.11	<.01
Cross-lagged paths			
DEL W1 → DEP W2	-.17	.07	.01
DEL W2 → DEP W3	-.17	.07	.01
DEP W1 → DEL W2	.01	.02	.77
DEP W2 → DEL W3	.01	.02	.77
Within-wave associations			
DEL W1—DEP W1	.01	.01	.35
DEL W2—DEP W2	.05	.02	.03
DEL W3—DEP W3	.01	.01	.43

DEP, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3

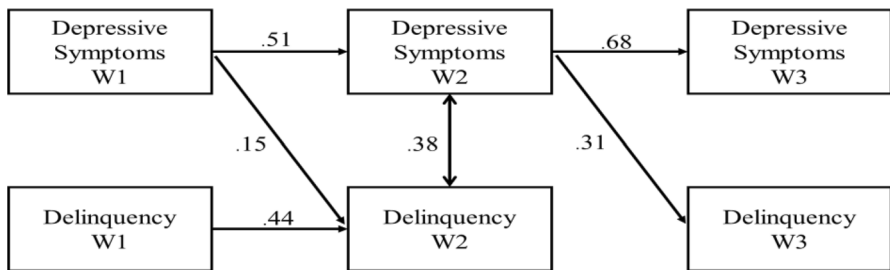


Fig. 2 Mid-adolescent boys model. Significant STDYX standardized paths are depicted

.047 (90%CI = 0.000–0.089) (see supplementary material for further details about these analyses).

Model fit for the multi-group model for gender by adolescent phase was as follows: $\chi^2(23) = 32.025$ ($p = .100$); CFI = .974; TLI = .937; RMSEA = .046 (90%CI = 0.000–0.081). The multi-group models for the gender by adolescent phase analyses (see Figs. 2, 3, 4, and 5 and Table 6) showed that there was a positive link from delinquency to depressive symptoms for early adolescent girls, indicating that higher levels of delinquency predict higher levels of depressive symptoms. However, this link was negative in mid-late adolescent girls. Specifically, higher levels of delinquency predicted lower levels of depressive symptoms for mid-adolescent girls. Follow-up moderation analyses showed that there was a significant moderation effect for early adolescent girls versus mid-adolescent girls (Wald $\chi^2(1) = 11.075$, $p < .01$). As for boys, no cross-lagged links were found

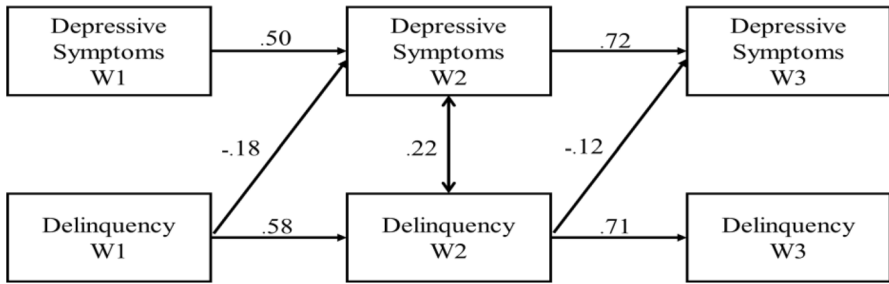


Fig. 3 Mid-late adolescent girls model. Significant STDYX standardized paths are depicted

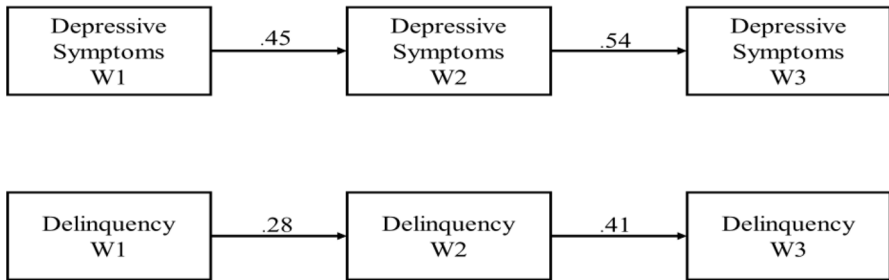


Fig. 4 Early adolescent boys model. Significant STDYX standardized paths are depicted. The 2-year stability path from T1 delinquency to T3 delinquency is not depicted

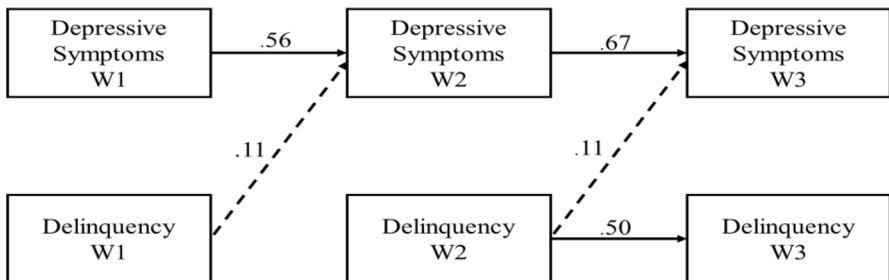


Fig. 5 Early adolescent girls model. STDYX standardized paths are depicted. Please note, while the *p*-value of the unstandardized path from delinquency to depressive symptoms reached significance at a *p* < .05 level. The *p*-value in the standardized model was only significance at *p* < .10 level (i.e., *p* = .056 from T1 delinquency to T2 depressive symptoms and *p* = .060 from T2 delinquency to T3 depressive symptoms). Nevertheless, the standardized values for these paths are large, and these paths constituted a significant interaction effect; thus, we include them (see dashed arrows) in the figure to put these paths into context

for early adolescents. However, for mid-late adolescent boys, there was a positive link from depressive symptoms to delinquency, such that higher levels of depressive symptoms predicted higher levels of delinquency. Moreover, that link was significantly different from the respective link in early adolescent boys (Wald χ^2

Table 6 Stability paths, (reversed) cross-lagged paths (*B*-values) for the adolescent phase by gender multi-group models

	Early adolescent boys			Mid-late adolescent boys			Early adolescent girls			Mid-late adolescent girls		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Stability paths												
W1 DEP→ W2 DEP	.52	.12	<.01	.70	.09	<.01	.61	.08	<.01	.56	.11	<.01
W2 DEP→ W3 DEP	.57	.09	<.01	.53	.07	<.01	.70	.07	<.01	.66	.09	<.01
W1 DEL→ W2 DEL	.42	.17	.02	.79	.26	<.01	.23	.17	.19	.35	.07	<.01
W2 DEL → W3 DEL	.40	.09	<.01	.25	.18	.15	.56	.16	<.01	.59	.21	<.01
Cross-lagged paths												
DEL W1 → DEP W2	-.11	.12	.37	-.16	.09	.09	.52	.26	.04	-.49	.17	<.01
DEL W2 → DEP W3	-.11	.12	.37	-.16	.09	.09	.52	.26	.04	-.49	.17	<.01
DEP W1→ DEL W2	-.01	.03	.86	.14	.07	.03	.00	.02	.81	.01	.01	.43
DEP W2→ DEL W3	-.01	.03	.86	.14	.07	.03	.00	.02	.81	.01	.01	.43
Within-wave associations												
DEL W1—DEP W1	.01	.01	.27	-.01	.02	.78	.02	.01	.07	.03	.02	.20
DEL W2—DEP W2	.02	.02	.35	.14	.07	.06	.01	.01	.61	.02	.01	.06
DEL W3—DEP W3	.03	.02	.11	-.01	.01	.48	.01	.01	.34	.01	.01	.35

DEP, depressive symptoms; *DEL*, delinquency; *W1*, wave 1; *W2*, wave 2; *W3*, wave 3

(1) = 4.17, *p* = .04). Thus, a significant moderation effect was present for mid-adolescent boys versus early-adolescent boys.

As for cross-gender moderation effects, the above-described positive significant link from depressive symptoms to delinquency in mid-adolescent boys was significantly different from the non-significant respective link in mid-late adolescent girls (Wald $\chi^2(1) = 3.91, p < .05$). Of note, although a negative significant link was found from delinquency to depressive symptoms in mid-adolescent girls (as described above), this link did not significantly differ from the non-significant (*p* = .085) negative link found in mid-adolescent boys (Wald $\chi^2(1) = 3.106, p = .078$). Finally, the significant positive link from delinquency to depressive symptoms in early adolescent girls,² significantly differed from the non-significant respective link in early adolescent boys (Wald $\chi^2(1) = 5.04, p = .025$).

Ethnicity Moderation

The model fit for the ethnic minority model was as follows: $\chi^2(6) = 10.669 (p = .100)$; CFI= .962; TLI = .867; RMSEA= .061 (90%CI = 0.00–0.120). The model fit for the

² Please note, while the *p*-value of the unstandardized path from delinquency to depressive symptoms in early adolescent girls reached significance at *p*<.05; the *p*-value in the standardized model only reached significance at a *p*<.10 level (i.e., *p* = .056 from T1 delinquency to T2 depressive symptoms and *p* = .060 from T3 delinquency to T3 depressive symptoms).

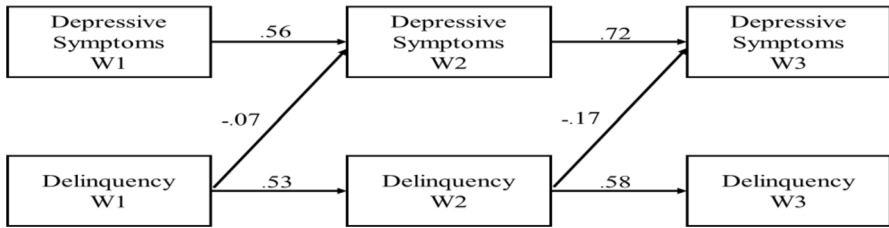


Fig. 6 Ethnic minority model. Significant STDYX standardized paths are depicted

Table 7 Stability paths, (reversed) cross-lagged paths (B-values) for the ethnicity multi-group models

	Ethnic minority			Ethnic majority		
	B	SE	p	B	SE	p
Stability paths						
W1 DEP → W2 DEP	.63	.08	<.01	.66	.07	<.01
W2 DEP → W3 DEP	.72	.07	<.01	.62	.06	<.01
W1 DEL → W2 DEL	1.21	.26	<.01	.64	.21	<.01
W2 DEL → W3 DEL	.40	.18	.03	.37	.16	.02
Cross-lagged paths						
DEL W1 → DEP W2	-.29	.07	<.01	-.14	.21	.51
DEL W2 → DEP W3	-.29	.07	<.01	-.14	.21	.51
DEP W1 → DEL W2	.02	.03	.44	-.01	.02	.64
DEP W2 → DEL W3	.02	.03	.44	-.01	.02	.64
Within-wave associations						
DEL W1—DEP W1	.02	.01	.12	.02	.02	.37
DEL W2—DEP W2	.07	.06	.23	.05	.03	.09
DEL W3—DEP W3	.03	.02	.23	.00	.01	.91

DEP, depressive symptoms; DEL, delinquency; W1, wave 1; W2, wave 2; W3, wave 3

ethnic majority model was as follows: $\chi^2(5) = 7.468$ ($p = .188$); CFI = .987; TLI = .944; RMSEA = .039 (90%CI = 0.00–0.094).

Model fit for the ethnicity multi-group model was as follows: $\chi^2(11) = 18.012$ ($p = .081$); CFI = .977; TLI = .913; RMSEA = .049 (90%CI = 0.00–0.89). While controlling for SES, we found a significant negative link from delinquency to depressive symptoms in the minority sample (Fig. 6 and Table 7), but not in the majority sample (Fig. 7); however, there was no significant moderation effect (Wald $\chi^2(1) = .50$, $p = .480$).

Discussion

The current 3-wave longitudinal study was guided by three competing theories: the Acting out model, Failure model, and Strain theory, as theoretical frameworks to investigate the hypothesized longitudinal links between depressive symptoms

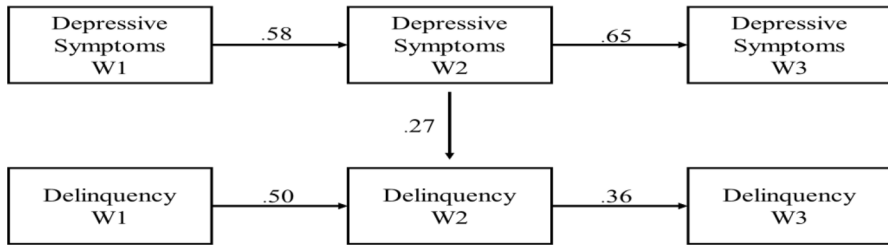


Fig. 7 Ethnic majority model. Significant STDYX standardized paths are depicted. Controls for SES paths and the 2-year stability path from T1 delinquency to T3 delinquency are not depicted

and delinquency in adolescents. Additionally, we investigated whether (1) gender by adolescent phase and (2) ethnicity moderated these links. Whereas the Failure model suggests that higher levels of delinquency predict higher levels of depressive symptoms, the Acting out model and Strain theory posit that higher levels of depressive symptoms predict higher levels of delinquency. Moreover, the Strain theory further suggests that when depressive symptoms are caused by strain, adolescents will use delinquency as a coping mechanism to alleviate depression (Brezina, 1996). Accordingly, at least in the short term, higher levels of delinquency will actually predict lower levels of depression (Brezina, 1996)—which contradicts both the Acting out model and the Failure model.

Results of cross-lagged panel models showed a significant concurrent positive association between depressive symptoms and delinquency at wave 2 in the total sample and in mid-adolescent boys and girls (but not in early adolescents). This co-occurrence was comparable in size to previous concurrent findings in cross-lagged panel studies (i.e., Van der Giessen et al., 2013). That the co-occurrence was particularly present in mid-adolescence is in accordance with the literature (for a review, see Wolff & Ollendick, 2006).

As for the cross-lagged paths, we found support for all three of the above-mentioned theoretical frameworks, but they differed by subgroup. Namely, for the total sample, consistent with *Strain theory*, higher levels of delinquency predicted lower levels of depressive symptoms. Although this link was significant in the non-Western ethnic minority group (but not in the Western ethnic majority group [i.e., the ethnically Dutch group]), no significant ethnicity moderation existed for this link. When gender by adolescent phase was considered, a link from higher levels of delinquency to lower levels of depressive symptoms (in support of *Strain theory*) was found among mid-adolescent girls, whereas in early adolescent girls, that link was positive, that is, higher levels of delinquency predicted higher levels of depressive symptoms (in support of the *Failure model*). Additionally, for mid-late adolescent boys, higher levels of depressive symptoms predicted higher levels of delinquency (in support of both the *Acting out model* and the *Strain theory*). Taken together, the most support was found for the *Strain theory*. Interpretations of these findings are discussed below.

Longitudinal Links Between Depressive Symptoms and Delinquency

Total Sample

Results for the total sample showed that higher levels of delinquency predict lower levels of depressive symptoms, which is consistent with Strain theory, but in sharp contrast with the Failure model. These results could imply that, on average, during the adolescent period, delinquency could be functional, that is, it is a means of alleviating negative affect. That adolescents might opt for delinquency to cope with depressive symptoms is controversial, but the evidence of such “deviant coping” was quite strong in the current study. Namely, the cross-lagged effects for the negative link from delinquency to depressive symptoms were medium for the total sample, medium to large for ethnic minorities, and large for mid-adolescent girls (more below). Additionally, these results support a few past studies that also found that delinquency can have an adaptive function (Brezina, 1996; Liu, 2004), which supports Strain theory. These findings are reminiscent of a quote by Masten et al. (2005), namely “What are termed internalizing symptoms may reflect behaviors that serve adaptive purposes under some conditions or for some outcomes, at the same time as they promote risk in other circumstances or for other outcomes.” Similarly, the current findings demonstrate that delinquency might promote risk in some circumstances, or for specific demographic groups, but might serve an adaptive function under some circumstances or for specific demographic groups.

Girls: the Longitudinal Link Between Delinquency and Depressive Symptoms

As mentioned above, we found that the link from higher levels of delinquency to lower levels of depressive symptoms (Strain theory) existed in mid-adolescent girls, while for early adolescent girls, higher levels of delinquency predicted higher levels of depressive symptoms (Failure model). Apparently, while delinquency is maladaptive for girls in early adolescence, it begins to serve a functional purpose in mid-adolescence to lower their heightened depression levels. Perhaps at least during early adolescence, delinquency was found to be a risk factor for depressive symptoms because in accordance with societal norms, early adolescents (compared to older adolescents), and in particular girls are expected to be the least deviant. Thus, delinquent early adolescent girls might be rejected quicker by their social circle which could cause them to pull back from society, and in turn, this might ultimately lead to depressive symptoms. This speculation is supported by a study that showed that kindergarteners who exhibit aggressive/violent and oppositional defiant behaviors were consequently rejected and victimized by their peers, which predicted internalizing problems (including depressive symptoms) in fourth grade (Van Lier & Koot, 2010). Although the cascading effects in Van Lier and Koot (2010) were equal for boys and girls, they await to be replicated in an adolescent sample with a focus on delinquency to determine whether they might be more relevant for girls during early adolescence.

Finally, the question as to why delinquency that was a *risk* factor for depressive symptoms in early adolescence, eventually becomes a *protective* factor in mid-late

adolescent girls, is fascinating. Perhaps during mid-late adolescence when depressive symptoms are the highest for girls, girls might engage in delinquency to cope with their depression, and hence engagement in delinquency might even lower their depressive symptoms as we found, and as predicted by Strain theory. Of note is that Strain theory further suggests that higher levels of delinquency would particularly predict lower levels of depression in the *short* term, but later on (e.g., in adulthood), if involvement in delinquent acts is not viewed as an effective means to cope in society, it could result in depression (Brezina, 1996, 2000). Hence, longer term studies can follow-up on the current results to establish whether the link from delinquency to depression in females remains statistically negative, or whether it eventually turns statistically positive during adulthood—as implied by Strain theory.

Boys: the Longitudinal Link Between Delinquency and Depressive Symptoms

Next, the results for boys also depended on adolescent phase. For early adolescent boys, no longitudinal associations between depressive symptoms and delinquency were found whereas for mid-late adolescent boys, support was found for both the Acting out model and the Strain model. That is, higher levels of depressive symptoms predicted higher levels of delinquency. Interestingly, most studies do not find support for a link from depression to delinquency (but see, e.g., Beyers & Loeber, 2003; Reynolds & Crea, 2015), but this is perhaps because most studies do not consider gender by adolescent phase moderation effects. For this link, it is important to consider that delinquency is known to peak in mid-late adolescents, and particularly boys are overrepresented in delinquency statistics (e.g., Farrington, 1986; Puzanchara et al. 2012). Thus, reasoning from the Acting out model, assumingly around the peak of delinquency during mid-late adolescence, boys in particular try to mask their depressive symptoms by engaging in heightened levels of delinquency. In contrast, during early adolescence, when both delinquency and depression are the lowest for boys compared to the other adolescent phases (as also the case in the current study), longitudinal associations between these two behaviors are negligible.

Boys Versus Girls: the Longitudinal Link Between Delinquency and Depressive Symptoms

We found that higher levels of depressive symptoms predict higher levels of delinquency (consistent with Acting Out model and Strain theory) for mid-adolescent boys, but not for mid-adolescent girls, and a significant moderation effect was found. Thus, mid-adolescent boys appear to have more difficulties with coping with depressive symptoms, than mid-adolescent girls, as these boys tend to “act out” their depressive symptoms by engaging in delinquency. In other words, at least in the context of delinquency, depressive symptoms are more maladaptive for boys than girls during mid-late adolescence, while for mid-late adolescent girls, delinquency seems to be protective for depression (Strain theory). Thus interestingly, the above-described results for boys and girls during mid-late adolescence, both support the Strain theory, but just in different ways (i.e., for girls, higher levels of delinquency

predict *lower* levels of depressive symptoms, while for boys, higher levels of depressive symptoms predict *higher* levels of delinquency).

As for early adolescents, delinquency in girls is more dysfunctional, since it predicts higher levels of depressive symptoms (consistent with the Failure model), whereas this is not the case in early adolescent boys. Hence, at least in the context of depressive symptoms, delinquency is more dysfunctional for *early*-adolescent girls than for early adolescent boys.

Ethnic Minority Versus Ethnic Majority

Strain theory argues that ethnic minorities often endure quantitatively and qualitatively more stressors (e.g., discrimination, poverty) than ethnic majorities (Agnew, 2006; 2001; Kaufman et al., 2008; Isom Scott & Grosholz, 2019), and might opt for delinquency to cope with the negative consequences (e.g., depression) of these stressors (Agnew, 2006; 2001; Kaufman et al., 2008). Hence, particularly in ethnic minority groups, higher levels of delinquency would lead to lower levels of depression in accordance with Strain theory (Brezina, 1996, 2000). Although we indeed only detected a significant link from delinquency to lower levels of depressive symptoms in the ethnic minority group, the ethnicity moderation did not reach significance. Nevertheless, considering Strain theory, it would be worthwhile for future studies to draw on a larger sample of ethnic minority youth, while taking potential higher levels of minority stress into account, in order to explore potential mechanisms behind these associations. Indeed, in the current sample, we found that ethnic minority adolescents reported significantly more depressive symptoms than ethnic majority adolescents in waves 1 and 3. Future studies could investigate whether these heightened levels of depressive symptoms in ethnic minorities stem from specific types of strain more prevalent among ethnic minority youth and which type of strain is more or less likely to be connected to depression and/or delinquent behavior.

Strengths, Limitations, and Future Research

The current study is unique in that it included an ethnically and socioeconomically diverse sample that was large enough to investigate important understudied moderators in the link between delinquency and depressive symptoms. Furthermore, the current multi-wave study used strict cross-lagged panel models accounting for concurrent associations, stability, and prior levels of the behaviors of interest. But there are some limitations that should be mentioned also. First, as for the measures, there was a mismatch between the time frame adolescents had to report on their delinquent behaviors and depressive symptoms. Specifically, adolescents had to report the presence of depressive symptoms over the last 6 months, whereas they reported on their delinquent behaviors in the last 12 months. Whether this affected the association between these two behaviors cannot be traced, but the substantial association we found between delinquency and depressive symptoms at wave 2 implies that the difference in time frame did not obscure existing associations between these two behaviors. We used exploratory factor analysis to determine whether the factor

structure of the measures was comparable across boy versus girls, early adolescence versus mid-late adolescence, and ethnic minorities versus ethnic majorities. Although informative, future studies could consider more stringent measurement invariance testing (e.g., confirmatory factor analysis) to further determine the factor structure across these different demographic groups. Additionally, data on SES was missing for a substantial number of participants. Thus, although we used FIML, we still cannot know for sure whether the results for the ethnicity moderation model would be different if we had SES information for all participants.

As for the theoretical framework, we mentioned that a strength of our study is the longitudinal design across multiple waves. For example, this allowed us to assess multiple phases during adolescence, and compare them with each other. However, an additional wave that extended into early adulthood would be of added value since certain forms of delinquency increase and peak during that period (Defoe, 2021; Willoughby et al., 2021). Thus, it would be meaningful to determine whether the negative link from delinquency to depression that we found for the entire sample and for mid-late adolescent girls would still apply in emerging adulthood. Extrapolating from the Strain theory, we expect that later on, higher levels of delinquency would actually become maladaptive, leading to higher levels of depressive symptoms (which corresponds with the Failure model).

Regarding the methodology, although cross-lagged panel models are highly informative and rigorous, they do not account for growth/decline in variables of interest, which could also be relevant to take into account (see, e.g., Beyers & Loeber, 2003; Measelle et al., 2006). In the same vein, although cross-lagged panel models account for reversed effects, prior levels of behaviors, stability, and concurrent associations, and are thus among the statistical models that come close to facilitating causal inferences, strictly speaking, causality can only be determined with experimental research (such as randomized control trials for interventions). Of note is also the use of self-report data, which are prone to social desirable answers. Thus, this limitation should be taken into account when interpreting the results. Finally, our results cannot be generalized to clinical samples, especially since we used a normative sample.

Conclusion

The current study showed that a co-occurrence of delinquency and depressive symptoms appears in mid-adolescence. However, the longitudinal link between these two problem behaviors is complex, as it is qualified by a gender by adolescent phase moderation effect. No ethnicity moderation effects were found. As for the significant adolescent by gender moderation effects, the current findings suggest that the Failure model that predicts that higher levels of delinquency lead to higher levels of depressive symptoms, might be particularly meaningful for early adolescent girls. Additionally, the reversed link as predicted by the Acting out model and Strain theory that higher levels of depressive symptoms predict higher levels of delinquency was particularly relevant for mid-late adolescent boys. Thus, begging the question as to whether the historically reported peak in delinquency during mid-late adolescence

could be (at least partially) the consequence of increasing levels of depression? Future research could explore this hypothesis.

Additionally, the Strain theory also appears to be relevant for mid-late adolescent girls (versus early adolescent girls), since higher levels of delinquency predicted lower levels of depressive symptoms in that demographic group. This latter link was also found in the total sample, and it suggests that delinquency can have an adaptive function during adolescence, at least for the short term. Similar to the results of Masten et al. (2005), the current results are a striking reminder that nuance is sometimes needed before designating a particular behavior as pervasively good versus bad, or as risky versus protective (Masten et al., 2005). Our results also emphasize why researchers need to focus more on the motivations of adolescents for engaging in delinquency and other related risk behavior (cf. Defoe et al., 2022), especially since some forms of delinquency peak in adolescence. If one considers that some individuals use deviant coping such as via illicit substance use to self-medicate for emotional distress (for reviews, see Cooper et al., 2016; Defoe et al., 2022), then it becomes less difficult to imagine that some individuals might also engage in other forms of delinquency to alleviate depression.

In sum, all of the prevailing theories on the developmental link between delinquency and depressive symptoms are relevant, but as the current results suggest, they are relevant in different phases of adolescence and their relevance differs for boys and girls. Hence, these results demonstrate why particularly gender by adolescent phase moderation effects are essential to consider when investigating the link between these two behaviors. As for prevention and intervention purposes, our results suggest that gender in combination with adolescent phase matter when intervening on adolescent depressive symptoms and delinquency, and their co-occurrence. For example, for early adolescent girls with co-occurring delinquency and depression, intervening on delinquency could lower depression while the reverse (i.e., intervening on depression to lower delinquency) is not likely to be effective for this group. Moreover, whereas these suggestions apply to early adolescent girls, they do not apply to early adolescent boys, for whom we did not find a longitudinal link (in any direction) between delinquency and depressive symptoms.

Although we did not find any ethnicity moderation effects in the linkages, the ethnic differences (i.e., ethnic minority youth reporting more depressive symptoms than ethnic majority youth) and the fact that a strong association was found between delinquency and lower levels of depressive symptoms among ethnic minority youth (but not in ethnic majority youth) suggest that ethnicity is still important to consider. Namely, ethnic minorities are expected to experience quantitatively and qualitatively more types of strain than their ethnic majority counterparts (Agnew, 2006; 2001), and it could be that certain groups experience greater problems than others, something we could not examine in the present study because of sample size. Future studies with large samples of ethnically and socio-economically diverse samples spanning multiple adolescent phases are needed to further explore some of the unique findings and hypotheses put forward in the current study.

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Declarations

Conflict of Interest The authors declare no competing interests.

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