

The Development of Delinquency and Perceived Friendship Quality in Adolescent Best Friendship Dyads

Maarten H. W. Selfhout · Susan J. T. Branje ·
Wim H. J. Meeus

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Abstract The present study examines both the unique and the combined role of best friends' delinquency and perceived friendship quality in the development of adolescent delinquency. Questionnaire data were gathered from 435 Dutch adolescent best friends (mean age at first wave=12.97) over a period of 5 years with annual assessments. Results showed that mean levels of delinquency and perceived friendship quality increased over time. Adolescent best friends were highly similar in both mean levels and changes in delinquency over time. For boys, similarity in mean level delinquency between best friends was higher than for girls. In addition, only for boys, friends' delinquency is associated with increases in adolescent delinquency over time, and adolescents' delinquency is associated with increases in friends' delinquency over time. No bidirectional longitudinal associations were found between perceived friendship quality and adolescent delinquency. No interaction effects between friendship quality and friends' delinquency on adolescent delinquency were found. Thus, findings were more in support of the differential association theory than of the social control theory.

Keywords Adolescent delinquency · Best friend delinquency · Perceived friendship quality · Latent growth curve modeling

A growing body of evidence suggests that adolescent delinquency is strongly associated with delinquency of best friends (Ackerman 2006; De Kemp et al. 2006; Dishion et al. 1996; Fergusson et al. 2002; Haynie and Osgood 2005; Regnerus 2002; Van Lier et al. 2005; Vitaro et al. 2000).

However, more research is needed to examine to what extent delinquency of best friends predicts adolescent delinquency over time. Furthermore, although friendship quality has been suggested to directly affect the development of adolescent delinquency (e.g., Hirschi 1969; Swenson 2004), previous studies have not yet examined the longitudinal bidirectional associations between adolescent delinquency and perceived friendship quality. Finally, few studies have examined the interactive effects of both friendship quality and friends' delinquency on adolescent delinquency. The present study will examine the developmental trajectories of delinquency from early to middle adolescence for boys and girls separately. In addition, we will examine the two major theories of crime and deviance, namely differential association theory (Sutherland 1947; Sutherland and Cressy 1978) and social control theory (Hirschi 1969), to the development of delinquency in friendship dyads. The differential association theory will be tested by examining the associations between adolescents' delinquency and best friends' delinquency, by using adolescent and friends' reports on their own delinquency over a period of 5 years. The social control theory will be tested by examining the bidirectional longitudinal associations between perceived friendship quality and adolescent delinquency. Finally, we will examine interaction effects between friends' delinquency and perceived friendship quality on adolescent delinquency.

The Role of Best Friends' Delinquency

Several studies have shown that on average, adolescents become more delinquent from early to middle adolescence, and tend to become less delinquent from ages 16 to 17 years onwards (Duncan et al. 2000; Landsheer and Van Dijkum 2005; Martin 1998; Meeus et al. 2004b; Van Lier et al.

M. H. W. Selfhout (✉) · S. J. T. Branje · W. H. J. Meeus
Research Centre Adolescent Development, Utrecht University,
P.O. Box 80140, 3508 TC Utrecht, The Netherlands
e-mail: M.Selfhout@uu.nl

2005; Windle 2000). However, individual differences exist in the developmental trajectories of adolescents and different theoretical explanations have been provided to explain these differences. *Differential association theory* (Sutherland 1947) is a learning theory that assumes that the motivation to commit delinquent acts is related to social conditions that encourage individuals to behave more delinquent. The basic principle of this theory is “a person becomes delinquent because of an excess of definitions favorable to violation of law over definitions unfavorable to violation of law” (Sutherland 1947, p. 7). The learning of definitions favorable to violation of the law primarily occurs within intimate personal relationships (Sutherland and Cressy 1978). Adolescents are more likely to adopt pro-deviant beliefs when associating with friends who are deviant. Thus, the differential association theory predicts that friends’ delinquency will influence adolescent delinquency by increasing adolescent delinquent norms.

Many studies examining adolescent delinquency have focused on the role of delinquent behavior of adolescents’ best friends (e.g., Fergusson et al. 2002; Kandel 1978; Landsheer and Van Dijkum 2005; Van Lier et al. 2005; Van Lier et al. 2007; Warr 2002). These studies have controlled for initial selection processes, which make delinquent adolescents tend to choose delinquent friends, when examining influence processes in which interactions with deviant peers stimulate delinquent behavior (Kandel 1978; Thornberry and Krohn 2001). That is, they controlled for stability of delinquency and initial relations between friends’ delinquency when examining the effects of friends’ delinquency on adolescent delinquency. Since these latter processes are the focus of the differential association theory, we will examine these processes when discussing selection versus influence processes. Several studies found evidence for effects of friends’ delinquency on adolescent delinquency over time, while controlling for initial similarity in delinquency between friends (Duncan et al. 2000; Fergusson et al. 2002; Lacourse et al. 2003). In one of these studies, friends’ delinquency was associated with increases in self-reported delinquency over a period of 14 to 21 years, while controlling for initial similarity at the start of the study (Fergusson et al. 2002). However, analyses in which adolescents themselves report on both their own and their friends’ delinquent behaviors might overestimate the association between friend delinquency and adolescent’s own delinquent behavior because of projection (Bauman and Ennett 1996; Ennett and Baumann 1994; Kandel 1978; Regnerus 2002).

A few studies used reports of the friends themselves on their own behavior and found more inconsistent results regarding effects of friends’ delinquency on adolescent delinquency. Among 13- to 14-year old boys, friends’ delinquency did not predict increases in adolescent delin-

quency over a period of 2 years (Poulin et al. 1999). Similarly, for 11- to 14 year olds higher delinquency was associated with the selection of more delinquent mutual best friends, but friends’ delinquency did not predict adolescent delinquency over a period of 6 months (De Kemp et al. 2006). In contrast, delinquent behavior of mutual best friends was found to be predictive of changes in adolescent delinquency while controlling for prior adolescent delinquency over a period of 1 to 2 years for adolescents between ages 12 and 17 (Haynie and Osgood 2005; Vitaro et al. 2000). Moreover, reductions in adolescent antisocial behavior were related to decreased affiliations with deviant mutual friends over a period of 4 years (Van Lier et al. 2005). In sum, these longitudinal studies provide inconsistent support for longitudinal effects of best friends’ delinquency on adolescent delinquency.

The Role of Quality of Friendships

Perceived friendship quality may be another important factor in the development of adolescent delinquency (e.g., Haynie and Osgood 2005; e.g., Poulin et al. 1999). *Social control theory* posits that variations in the strength of social bonds produce variations in rates of deviance. Weakly bonded individuals are more likely to engage in law violation if the course of action appears beneficial (Hirschi 1969). By increasing the anticipated costs of deviance, social bonds reduce the likelihood of its occurrence. Thus, according to the basic premise of social control theory, the greater an individual’s social attachments to significant others, such as family, friends, and teachers, the lower the probability of engaging in deviance.

Theoretically, social control theory would predict that a stronger bond between adolescent and his or her best friend would inhibit the development of delinquent behavior. That is, if an adolescent has a strong emotional bond to a best friend, he or she is less likely to behave defiantly since that will increase the risk of losing their high quality friendship. Research on the associations between perceived friendship quality and delinquency shows inconsistent results. Supporting the social control theory, higher perceived friendship quality is found to be negatively associated with less delinquency in cross-sectional studies (Junger-Tas 1992; Lansford et al. 2003; Rankin 1976; Swenson 2004). However, positive cross-sectional associations have also been found between perceived friendship quality and delinquency (Barton and Figueira-McDonough 1985; Conger 1976; Evans et al. 1996; Gardner and Shoemaker 1989; Hindelang 1973; Shoemaker 1994), suggesting that a stronger bonding with friends is associated with *more* delinquency. Several cross-sectional studies (Baerveldt et al. 2003; Johnson 2003; Matsueda 1982; Solomon 2006) found no significant

correlations between friendship quality and adolescent delinquency. Moreover, several short-term longitudinal studies on this topic (Haynie and Osgood 2005; McElhaney et al. 2006; Poulin et al. 1999; Zimmerman et al. 2000) failed to find any direct effects of perceived friendship quality on adolescent delinquency. Thus, to what extent friendship quality can prevent the development of adolescent delinquency remains unclear.

Interaction Between Friends' Delinquency and Perceived Friendship Quality

Since adolescent friendships are multidimensional and perceived friendship quality exists along side with delinquent behaviors of the best friend, effects of perceived friendship quality and delinquent behavior of the friend may interact in affecting adolescent delinquency. Both differential association theory and social control theory suggest an interaction of perceived friendship quality and friends' delinquency, although the interpretation of the interaction is slightly different. Differential association theory suggests that friendship quality moderates the effect of friends' delinquency on adolescent delinquency. Opp (1974) proposed that a stronger attachment between individuals will lead to stronger excess of positive definitions of deviant behavior, which in turn will lead to more delinquent behavior. In other words, friendship quality enhances the negative effects of best friends' delinquency on adolescent delinquency. Social control theory suggests that friends' delinquency moderates the effect of friendship quality on the development of adolescent delinquency. Social control theory proposes that bonding to more conventional institutions, including peers, reduces the risk of developing delinquency, since specifically the conventional norms will refrain them from performing delinquent acts (Hirschi 1969). In other words, if an adolescent friend has a less delinquent friend, higher friendship quality predicts less adolescent delinquency. If, on the other hand, an adolescent friend has a more delinquent friend, higher friendship might predict more adolescent delinquency. Thus, although social control theory and differential association theory emphasize different main effects on adolescent delinquency, with social control theory emphasizing perceived friendship quality and differential association theory emphasizing friends' delinquency, both suggest that these two factors might interact in predicting adolescent delinquency.

Several studies have examined the moderation of best friends' delinquency effects by perceived friendship quality. For example, early adolescents with high peer acceptance and high perceived friendship quality were found to be more apt to conform to friends' alcohol and cigarette use

(Urberg et al. 2003). Furthermore, adolescents who identified more strongly with their friends also showed stronger cross-sectional associations between perceived friends' delinquent behaviors and adolescents' norms regulating deviancy (Bruinsma 1992). Thus, following this line of reasoning, best friends' delinquency can be expected to predict increases in adolescent delinquency more in high quality friendships than in low quality friendships. However, the extent to which friends' delinquency moderates longitudinal effects of friendship quality on adolescent delinquency needs to be further examined.

Moderation of Gender, Friendship Stability, and Reciprocity

Since most theories and studies of delinquency only focus on boys' delinquency in adolescence (e.g., Dishion 1990; Moffit et al. 1996), relatively little is known about the correlates of developmental trajectories of delinquency for girls. One study showed that the developmental trajectories of status violations, aggression, and property violations were not different in shape for girls and boys from age 4 to 18 years (Bongers et al. 2004). In addition, boys may be more influenced by their friends' delinquency than girls (Ackerman 2006; Heinze et al. 2004). For example, adolescent delinquency was found to be cross-sectionally associated to the number of delinquent peers more strongly for boys than for girls (Heinze et al. 2004). However, it remains unclear to what extent sex moderates the effects of friends' delinquency on subsequent adolescent delinquent behavior.

Furthermore, prior studies have suggested that similarity in delinquency between friends may be moderated by specific friendship characteristics, namely reciprocity of the friendship (Hicks 2006) and friendship stability (Brendgen et al. 2000; Griffon-Smith and Brownwell 2003; Urberg et al. 1998). That is, if the friendship is more intimate as indicated by higher stability and reciprocity, friends are thought to resemble each other more in delinquent behaviors because they are more intimate and have more opportunities to influence one another (Griffon-Smith and Brownwell 2003). For example, in early to middle adolescence, similarity in delinquency between friends has been found to be higher in stable friendships than in unstable friendships (Urberg et al. 1998). Furthermore, early adolescents' alcohol use was found to be predicted more by reciprocated friends' alcohol use than by unreciprocated friends' alcohol use (Hicks 2006). However, the moderating role of friendship stability and reciprocity of friendship in longitudinal effects of friends' delinquency and friendship quality on adolescent delinquency needs further examination.

The Present Study

As shown in the discussion of prior studies concerning the associations between friends' delinquency, friendship quality, and adolescent delinquency, further long-term longitudinal research using more measurement waves is needed to investigate the differential association theory and the social control theory simultaneously when examining the development of delinquent behavior and thereby compare these theories directly. The present study will use Longitudinal Growth Modeling (LGM) to examine effects of friends' self-reported delinquency on adolescents' delinquency over a period of 5 years with annual measurements, while controlling for initial similarity in delinquency prior to the first wave of the study. One advantage of using LGM over the more commonly used autoregressive models is that mean developmental trajectories of delinquency as well as individual differences in and associations between friends in these trajectories can be modeled instead of associations between changes in rank-order distribution of scores only. In autoregressive models, a cross-lagged positive regression coefficient may indicate that one variable leads to an increase in a second variable, but the mean scores on the second variable may actually decline for everyone in the sample. When using LGM, the variability in each individual's trajectory of delinquency is investigated in terms of initial status (intercept) and rate of growth (slope). By associating variances of mean intercepts and slopes of different variables with each other, one is modeling inter-individual differences in associations between developmental trajectories of delinquency and developmental trajectories of friends' delinquency and friendship quality. Therefore, LGM offers the opportunity to investigate the mean level development of delinquency from early to middle adolescence, as well as examining to what extent the rate of increases or decreases in development of delinquency are associated with the development of friends' delinquency and friendship quality. In addition, by examining LGMs over a relatively long time-frame with multiple measurements, bidirectional associations between friends' delinquency and friendship quality on the one hand and adolescent delinquency on the other can be modeled as a continuous process instead of focusing on time-to-time effects as usually is done in autoregressive models. Therefore, LGM can provide new insights into the mean development of adolescent delinquency as well as the longitudinal associations of adolescent delinquency with friends' delinquency and friendship quality over a relatively long timeframe. Additionally, by performing multiple-group analyses, we will examine to what extent friends' delinquency moderates effects of perceived friendship quality on the development of adolescent delinquency, and to what extent perceived friendship quality moderates effects of friends' delinquency on the development of adolescent delinquency.

Finally, we will examine the moderating role of friendship stability and reciprocity of the friendship in the longitudinal associations between adolescents' delinquency and their best friends' delinquency with multiple group comparisons. Since comparisons between the effects of best friends' delinquency (first nominated friend) and other friends' delinquency (second, third, or fourth nominated friend) have shown that only the former significantly predicts later deviant behaviors (Vitaro et al. 2000), the current study focuses only on the role of best friends' delinquency in the development of adolescent delinquency.

To summarize, the present study examines the following research questions:

1. In what way does delinquency develop from early to middle adolescence? Based on earlier research, we expect that delinquency increase over time. Although boys are expected to show higher mean levels of delinquency, no sex differences in the growth rate of delinquency are expected to be found.
2. To what extent does best friends' delinquency predict increases in adolescent delinquency over time, controlling for initial similarity in delinquency? According to the differential association theory, friends' delinquency predicts increases in adolescent delinquency over time. Furthermore, the moderating role of sex in these effects will be examined. We expect that associations of delinquency between best friends will be stronger for males than for females. We will examine moderation of gender, friendship stability, and reciprocity of friendship in effects of friends' delinquency on adolescent delinquency.
3. To what extent does the perceived friendship quality predict the development of adolescents' delinquency? According to the social control theory, perceived friendship quality predicts less adolescent delinquency over time. In addition, we will explore whether adolescent delinquency predicts best perceived friendship quality over time as well as whether there are sex differences in the bidirectional associations between perceived friendship quality and adolescent delinquency. We will examine moderation of gender, friendship stability, and reciprocity of friendship in effects of friendship quality on adolescent delinquency.
4. To what extent does perceived friendship quality moderate the longitudinal associations between adolescents' delinquency and friends' delinquency? Two hypotheses will be tested:
 - a. According to social control theory (Hirschi 1969), perceived friendship quality predicts less adolescent delinquency when friends' delinquency is low.
 - b. According to differential association theory (Opp 1974), friends' delinquency predicts more adolescent

delinquency in particular when perceived friendship quality is high.

Method

Participants

Participants in this study were 435 adolescents and their best friends selected from 938 respondents of the early adolescent cohort participating in the CONflict And Management Of RELationships study (CONAMORE) (Meeus et al. 2004a). CONAMORE is an ongoing longitudinal study that examines the relationships of Dutch adolescents with parents and peers as well as their emotional states. In the current study, data were used from annual waves one to five. Four steps were used to select best friendship dyads. First, adolescents were excluded if they did not nominate a best friend that participated in the study at two or more waves ($n=343$). Next, if there was a friendship dyad that was mutual at a specific wave (i.e., A selected B as best friend and B selected A as best friend), half of them were randomly selected at that wave to insure that none of the mutual dyad members was already present in the dyadic analyses. This resulted in an exclusion of 112 adolescents with mutual friendships over five waves. In addition, eight adolescents were excluded from the analyses since they formed mixed-sex friendship dyads across all five waves. Finally, if a best friend was mentioned more than once by different target adolescents, one adolescent was randomly selected, resulting in the exclusion of 40 target adolescents. This resulted in a selection of 435 target adolescents (938-343-112-8-40) who nominated a best friend that participated in the study at two or more waves. The total group and the selected group of adolescents showed no significant ($p>0.10$) differences in sex, age, educational level and delinquency at all waves. Note that although non-mutual friendship dyads were retained in all analyses, we controlled for moderation of reciprocity of friendship in effects of friendship quality and friends' delinquency on adolescent delinquency.

The 435 friendship dyads consisted of 51.5% boys and 48.5% girls. The mean age of all adolescents at the first wave was 12.97 ($SD=1.57$), with a age range between 11 and 14 years at Wave 1. Note that the 435 adolescents labeled hereafter as target adolescents were the same individuals across waves, whereas the best friends at each wave they were coupled with could change across waves. Best friends in each dyad were unique in the sense that each best friend was not nominated as someone else's best friend at that specific wave.

The attrition was low across the five waves: of the 435 target adolescents, 4.6% ($n=20$) dropped out at one of the waves. The participants that dropped out of the study did

not significantly ($p>0.10$) differ from participants that continued the study on gender, age, delinquency, and perceived friendship quality on all five waves. Therefore, we estimated their scores using Full Information Maximum Likelihood within the program Mplus (Muthén and Muthén 2004). Furthermore, best friends that stayed in the study at all five waves ($n=292$) and best friends that dropped out at one to three waves ($n=43$) did not differ significantly ($p<0.05$) on all these dimensions. Therefore, we estimated their scores using the same procedure. Since missing data at each wave of either target adolescents or best friends was below 8%, we used the same method to impute scores for adolescents having missing data.

Procedure

Participants came from twelve high schools in Utrecht and surroundings. Parents and students received a letter in which the aims of the study were described and information was given about the option of not participating. Students and their parents were required to provide written informed consent at Wave 1: 99% of participants eligible for this study decided to do so. Participants completed a series of questionnaires in their classroom after school hours. Teachers of the participants cooperated in this study. They introduced the study to the students and scheduled the questionnaire assessments at hours in which all students could participate. They were paid an amount of € 100,- (around \$ 130,-) at each wave. Furthermore, research assistants, who attended the administration, gave verbal instructions about filling out the questionnaires; written instructions were also included. Confidentiality of their given answers was guaranteed explicitly. For students who were absent on the day of testing a second assessment time was organized. Students who were absent on both days of testing were not assessed. Each wave, respondents received € 10,- (around \$ 13,-) after completing the questionnaires.

Measures

Best Friendships Best friendships were assessed by asking each respondent to name their best friend who was not a brother or sister and not someone they had an intimate relationship with. Of these 435 target adolescents, 145 (33,3%) had the same best friend across all five waves. Furthermore, 97 (22,3%) of the 435 target adolescents had mutual best friends on all waves, although not necessarily the same friends on each wave. Finally, 33 (34,0%) of these 97 adolescents who had mutual friends on all waves had the same best friend across all waves.

Friendship Stability and Reciprocity of Friendships Friendship stability was examined by comparing dyads in which

target adolescents consistently nominated the same best friend across five waves ($n=145$) to dyads consisting of target adolescents who nominated another best friend at one or more waves ($n=290$). Furthermore, reciprocity of the friendship was examined by comparing dyads in which the nominated best friend reciprocated the best friendship nomination at all waves ($n=97$) to dyads in which the best friend did not reciprocate the best friendship nomination at one or more waves ($n=338$).

Delinquency Both the target adolescent and the best friends filled out a questionnaire pertaining to minor delinquency that showed to be reliable in a Dutch adolescent sample (Baerveldt et al. 2003). Respondents were asked to indicate on four-point scales how many times they had committed 14 minor offences, such as shoplifting, petty theft, vandalism, and unarmed fights in the previous 12 months (1 = *never*, 2 = *once*, 3 = *two or three times*, 4 = *four times or more*). A mean score was computed by adding the responses to each item and dividing these scores by the total number of items. Internal consistencies of this measure ranged from 0.88 to 0.92 from Wave 1 to Wave 5.

Quality of Best Friendship To assess perceived quality of the best friendship by the target adolescent, the support scale of the short form of the Network of Relationship Inventory (Furman and Buhrmester 1985) was used. This scale contained 12 questions pertaining to perceived support (See Appendix for the items). Participants were asked to answer questions about relationship characteristics on a five-point scale (1 = *never*, 5 = *always*). An exploratory factor analysis showed that all 12 items loaded higher than 0.45 on one factor at each wave. Furthermore, Confirmatory Factor Analyses (CFA) revealed high factor loadings (>0.41) as well as adequate fit indices ($(\chi^2(54, N=835) > 103.45, p < 0.01$; CFIs > 0.98 , RMSEAs < 0.04) in models in which all items loaded on one single factor. Internal consistencies of this measure ranged from 0.92 to 0.95 from Wave 1 to Wave 5.

Strategy of Analyses

Several steps were undertaken to answer the research questions. First, to examine the development of adolescents' delinquency, best friends' delinquency, and quality of best friendship as perceived by the adolescent over five waves (research question 1), we examined univariate latent growth curve models (LGM) in Mplus (Muthén and Muthén 2004) for each of the three dimensions separately. Different types of latent growth models were estimated to determine which growth model best applied the data, that is, no growth, linear growth, freely estimated growth, or quadratic growth (Duncan et al. 1999). This was done by

using chi-square difference tests to see which model fitted the data best. Furthermore, the fit of the final model was evaluated by examining RMSEAs, and CFIs. RMSEA's smaller than 0.05 and CFI's larger than 0.95 indicate adequate fit of the model (Kline 1998). Intercepts and slopes within the same growth model were correlated because this significantly improved the fit in all models.

Second, a multivariate longitudinal growth model (see Fig. 2) was examined, in which associations between the three growth curves were simultaneously estimated: delinquency of the target adolescent over the five waves, delinquency of the best friend over five waves, and quality friendship perceived by the target over five waves. This way, associations between friends' delinquency and adolescent delinquency (differential association theory) and associations between perceived friendship quality and adolescent delinquency (social control theory) can be compared (research questions 2 and 3). Because members of a best friendship are indistinguishable in the sense that there is no consistent, clear way to order the two members, we followed the procedure of Olsen and Kenny (2006) to estimate LGMs for interchangeable dyads. When using this procedure, the mean level development of delinquency is modeled simultaneously for both dyads members but by adding constraints to the model, this mean level development is held constant for both dyad members. Specifically, estimated loadings on the growth factor, the means of the slopes and intercepts, the variances of the slopes and intercepts, and the variances of the measurement errors at each measurement wave were constrained to be equal for both friends. This way, dependency in delinquency reported by the adolescent and delinquency reported by the best friend because of nesting of individuals in friendship dyads was controlled for. This approach is equivalent to a multilevel latent growth curve approach, since means and variances of intercepts and slopes are constrained to be equal within dyads. The intercept and slopes of delinquency reported by target adolescent were correlated with the intercept and slopes reported by best friend. Note that unconstraining the means of intercepts and slopes of the adolescent and the best friend did not significantly ($p > 0.10$) worsen the fit, indicating the adolescent delinquency and friends' delinquency develop similarity from early to middle adolescence.

The intercept and slope of the target adolescent's delinquency were further correlated with both the intercept and the slope of perceived quality friendship by the target adolescent, to examine whether mean levels and change over time in delinquency were related to mean levels and change over time in perceived quality of friendship of the target adolescent. Note that in the upper part of the model the social control theory (i.e., associations between perceived friendship quality and adolescent delinquency) is tested, whereas in the lower part of the model the proposition of the

differential association theory (i.e., associations between best friends' delinquency and adolescent delinquency) is tested. Thus, in this model, associations between friends' delinquency with adolescent delinquency are controlled for associations between perceived friendship quality and adolescent delinquency and vice versa.

To examine moderating effects of sex, stability of friendship, and reciprocity of the friendship in the multivariate longitudinal growth model, multiple group analyses were run in which each of the means, variances, and correlations were unconstrained one by one between boys ($n=224$) versus girls ($n=211$), stable ($n=147$) versus nonstable ($n=288$) friends, and mutual ($n=97$) versus nonmutual ($n=338$) friendships. If unconstraining one parameter significantly improved the fit, reliability intervals of this parameter for the groups were examined to determine differences between parameters.

Finally, to examine the interactions between friendship quality and friend delinquency (research question 4), we tested two moderation models. To examine the moderating effect of perceived friendship quality on the longitudinal associations between friends' delinquency and adolescent delinquency, we estimated a multi-group model in which the effects of friends' delinquency on adolescent delinquency were compared between a low quality friendship group and a high quality friendship group, using the method of Kenny and Olson. Girls and boys were divided separately into two (almost) equal groups of lower and higher perceived friendship quality through a median split of the mean perceived support score across all waves. This was done for boys and girls separately because girls scored higher on quality of friendship and otherwise the low quality group would consist primarily of boys and the high quality group would consist primarily of girls. This resulted in a low quality ($n=217$) and high quality group ($n=218$). Thus, a total of four groups were examined in the multiple group analyses: low quality males ($n=112$), low quality females ($n=105$), high quality males ($n=112$), and high quality females ($n=106$). Correlations between friends were unconstrained one by one across the low and high quality groups in multi-group analyses. Next, interaction effects of sex by perceived quality were examined by unconstraining means, variances, and correlations across the four groups.

Second, to examine the moderating role of friends' delinquency on associations between perceived friendship quality and adolescent delinquency, we made a delinquent and a non-delinquent group for boys and girls separately. Those participants committing at least one delinquent act across all five waves (33.1% for girls and 53.7% for boys, respectively) were labeled the delinquent groups and those who did not commit at least one delinquent act across all five were labeled the non-delinquent groups. We performed the same multi-group analyses as used when examining the

moderating role of perceived friendship quality on associations between friends' delinquency and adolescent delinquency. Interactions effects of sex by friends' delinquency were examined by unconstraining means, variances, and correlations across the four groups.

Results

Table 1 provides the descriptives of delinquency of adolescent, delinquency of best friend, and perceived quality of friendship by the adolescent. These descriptives show that on average, males tend to score higher on delinquency reported by the adolescent and delinquency reported by the friend than females. Furthermore, the scores of delinquency seem to increase over time. Scores on quality of best friendship seem to be higher for females than for males, and also seem to increase over time.

Univariate LGM Analyses: Change of Delinquency and Perception of Friendship Quality

These patterns in delinquency of adolescent, delinquency of best friend, and perceived quality of friendship were modeled in three univariate latent growth curve models. Fit statistics indicated that for all three univariate models, linear models fit the data best compared to no growth, free growth, and quadratic growth models: final models showed the lowest chi-square values (Table 2). Means and variances of intercepts and slopes of the final models are shown in Table 2. Figure 1a and b show the developmental trajectories of adolescent and friends' delinquency as well as perceived friendship quality from age 12 to age 16 (i.e., Wave 1 to Wave 5, respectively) by sex. Intercepts in all models had significant variance, indicating that adolescents differ in the mean levels of delinquency and mean levels of quality of friendship. There was a significant positive slope for delinquency of both the adolescent and the best friend, indicating that on average, delinquency increased over time. Furthermore, the variances of the slopes of delinquency of both the adolescent and the friend were significant, indicating that adolescents and best friends differ in the rate they change in delinquency over the 5 years. The mean slope of quality was significant and positive, indicating that on average, perceived friendship quality increases over time. In addition, there was significant variance in the slope of perceived friendship quality, indicating that adolescents differ in the rate they change in perceived support over the 5 years.

Multivariate LGM Analyses: Testing Direct Effects of Friends' Delinquency and Perceived Friendship Quality

Next, the multivariate longitudinal growth model of associations between delinquency of adolescent, delinquency of

Table 1 Descriptives of delinquency and perceived friendship quality by sex

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5											
	Boys		Girls		Boys		Girls		Boys		Girls									
	M	SD	M	SD																
Delinquency target	1.21	0.38	1.05	0.32	1.22	0.38	1.07	0.15	1.23	0.34	1.08	0.16	1.25	0.39	1.09	0.18	1.26	0.38	1.11	0.23
Delinquency friend	1.21	0.44	1.04	0.42	1.23	0.26	1.06	0.12	1.23	0.35	1.08	0.12	1.24	0.25	1.09	0.19	1.26	0.39	1.11	0.17
Perceived friendship quality target	2.70	0.78	3.32	0.78	2.77	0.69	3.38	0.69	2.80	0.73	3.39	0.69	2.89	0.71	3.52	0.69	2.97	0.68	3.57	0.60

Boys: $n=224$; Girls: $n=211$

best friend, and perceived quality of friendship was estimated. Moderation effects of reciprocity of best friendship and stability of best friendship on these associations were not found and therefore not reported. Since moderation effects of sex on these associations were found, Table 3 shows model comparisons of moderation effects of sex in the multivariate longitudinal growth model.

First, differences between boys and girls in means and variances were found (see model comparisons 1 to 4 in Table 3). Estimation of means and variances for boys and girls are shown in Table 4. Boys were found to show higher intercept means of delinquency, greater variance in the intercepts of delinquency, and greater variance in slopes of delinquency. Furthermore, a higher intercept mean of perceived friendship quality was found for girls than for boys. Next, two sex differences in correlations between intercepts and slopes of delinquency of adolescent and delinquency of best friend were found (see model 5 and 6 in Table 3). These correlations are shown in Fig. 2 for males and females separately. First, the intercept of adolescent delinquency is positively and significantly associated with best friends' intercept of delinquency for both boys and girls, but a Fisher Z test revealed that this correlation is significantly ($p<0.05$) higher for boys ($r=0.78$) than for girls ($r=0.38$). This indicates that a higher mean level of adolescents' delinquency is associated with a higher mean level of best friends' delinquency for both boys and girls, and that male friends are even more similar in their mean levels of delinquency than girls. Second, a Fisher Z test revealed significant ($p<0.05$) differences in the correlations between intercept of delinquency with slope of delinquency between friends: the intercept of best friends' delinquency predicts increases in adolescents' delinquency over time and vice versa only for boys ($r=0.25$, $p<0.05$), not for girls ($r=-0.16$, $p>0.05$). Since this correlation was constrained to be equal to the correlation between the intercept of target adolescents' delinquency and slope of best friends' delinquency, the same sex difference was found here. Note that unconstraining this correlation to be different between friend's intercept with target's slope and target's intercept with friend's slope did not result in significant improvements in the fit for either boys ($\Delta\chi^2(435,1)=0.03$, $p>0.05$) or girls ($\Delta\chi^2(435,1)=0.04$, $p>0.05$), suggesting that friend's mean level in delinquency is associated as strongly with changes in target's delinquency over time as is the target's mean level in delinquency associated with changes in friends' delinquency over time. Results in Fig. 2 showed that the slopes of delinquency were positively and significantly associated for both boys and girls ($r=0.78$), indicating that changes in delinquency over time of both male and female adolescents are associated with changes in their best friends' delinquency over time. Results revealed that there were no

Table 2 Fit indices and final parameter estimates of univariate latent growth curve models

Dimension	Intercept									Slope ^a	
	<i>df</i>	χ^2	RMSEA	CFI	$\Delta\chi^2$	Δdf	<i>p</i> (<i>d</i>)	<i>M</i>	σ^2	<i>M</i>	σ^2
Delinquency target											
No growth	11	38.10	0.06	0.94							
Linear growth	10	16.85	0.02	0.96	21.25	1	<i>p</i> <0.01				
Free growth	9	19.09	0.04	0.92	-2.24	1	<i>p</i> >0.05				
Quadratic growth	6	13.17	0.02	0.96	3.68	4	<i>p</i> >0.05				
Final Model	10	16.85	0.02	0.96				1.14***	0.03***	0.01**	<0.01*
Delinquency friend											
No growth	11	29.04	0.05	0.93							
Linear growth	10	15.93	0.02	0.97	13.11	1	<i>p</i> <0.01				
Free growth	9	18.94	0.02	0.97	-3.01	1	<i>p</i> >0.05				
Quadratic growth	6	14.12	0.02	0.97	1.81	4	<i>p</i> >0.05				
Final Model	10	15.93	0.02	0.97				1.14***	0.03***	0.01**	<0.01*
Perceived friendship quality target											
No growth	11	38.90	0.06	0.91							
Linear growth	10	20.64	0.04	0.96	18.26	1	<i>p</i> <0.01				
Free growth	9	18.63	0.04	0.96	2.01	1	<i>p</i> >0.05				
Quadratic growth	6	13.81	0.03	0.96	6.83	4	<i>p</i> >0.05				
Final	10	20.64	0.04	0.96				3.10***	0.31***	0.04**	0.01*

RMSEA Root mean square error of approximation, CFI Comparative fit index.

^a All slope factors were fixed at 0, 1, 2, 3, and 4, respectively, to estimate linear growth.

**p*<0.05

***p*<0.01

****p*<0.001

associations between intercepts and slopes of perceived friendship quality by the target adolescent and intercepts and slopes of delinquency of adolescent. Thus, perceived friendship quality is not related to changes in delinquency, and adolescent delinquency is not related to changes in perceived friendship quality.

In all models, correlations of intercept with slopes within the individual (intercept delinquency with slope delinquency for adolescent, intercept delinquency with slope delinquency for best friend, and intercept quality with slope quality) were significant and negative, indicating regression to the mean over time for all variables.¹ Finally, note that using the 112 mutual

friendship dyads that were dropped from the analyses to avoid double entry of the data showed equivalent associations between intercepts and slopes of friends' delinquency and friendship quality with adolescent delinquency.

Multiple Group MLGM Analyses: Testing Interaction Effects of Perceived Friendship Quality and Friends' Delinquency

Finally, we examined interactions between perceived friendship quality and friends' delinquency by testing two moderation models. When examining the model comparisons of the moderation effects model, the same sex differences were found as in the direct effects model. Therefore, the fit indices of these model comparisons are not reported. First, the moderation effects of friendship quality and the interaction between friendship quality and sex on the associations between friends' delinquency and adolescent delinquency was examined. The final model showed adequate fit ($\chi^2(203, N=435)=257.83, p<0.01$; RMSEA=0.03; CFI=0.97). No differences were found between the low and high quality groups, or between low quality male, high quality male, low quality female, and high quality female groups in the associations between delinquency of target adolescent and delinquency of best friend. This indicates that there are no

¹ To control for the so-called stereotype effect, that is, similarity between individuals because of shared cultural values, social desirability, and response biases (Cohen 1977; Luo and Klohnen 2005), we compared all associations of delinquency between best friends to corresponding associations between random dyads and test whether associations between friends are higher than between random dyads. Results showed that all random adolescents' intercept and slopes of delinquency were not significantly associated with adolescents' intercepts and slopes of delinquency. Moreover, multigroup tests of models of best friends and models of random dyads showed that all significant correlations between friends were significantly different (*p*<0.05) from the same correlations between random dyads. This indicates that these associations found between friends are unique to the best friendship, and are not due to the stereotype effect.

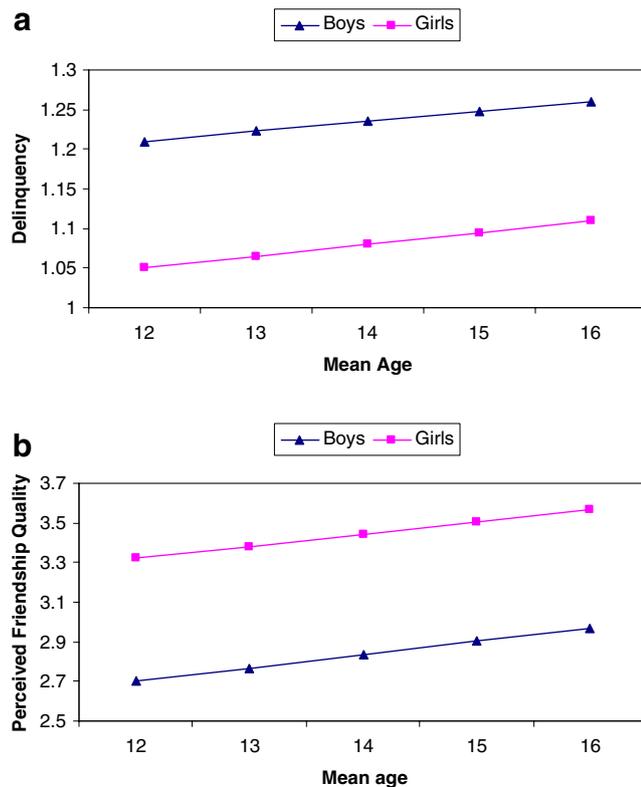


Fig. 1 **a** Delinquency of adolescents and their best friends from age 12 to age 16 by sex. Note that since the development of adolescent delinquency and best friends' delinquency were constrained to be equal across the five waves, these two lines are represented as one single line. **b** Perceived friendship quality according to the target adolescent from age 12 to age 16 by sex

moderation effects of either quality or the interaction between sex and quality on the cross-sectional and longitudinal associations between delinquency of target adolescent and delinquency of best friend.

Second, we examined moderation of adolescent delinquency in effects of friendship quality on adolescent delinquency (following the same procedure as when examining moderation of friendship quality in effects of friends' delinquency on

adolescent delinquency, but using the delinquent group to the non-delinquent group instead of the friendship quality groups). For both boys and girls, none of the associations of intercept and slope of friendship quality with intercept and slope of adolescent delinquency differed significantly ($p < 0.05$) between the delinquent and the non-delinquent groups. Furthermore, no differences were found in these associations for male delinquent, male non-delinquent, female delinquent, and female non-delinquent groups. This suggests that effects of friendship quality on adolescent delinquency do not differ according to the context of the conventional agencies: friends' delinquency did not moderate the effects of perceived friendship quality on adolescent delinquency.

Discussion

The present study first examined the development of adolescent delinquency from early to middle adolescence, as well as sex differences in these developmental trajectories. Results showed that the mean level of adolescent delinquency increased from age 12 to age 16. This pattern was also found in earlier studies (e.g., Duncan et al. 2000; Van Lier et al. 2005) and indicates that, on average, Dutch adolescents become increasingly delinquent from early to middle adolescence. Furthermore, consistent with prior studies (Bongers et al. 2004), although boys have a higher mean level of delinquency, no sex differences were found in the shape of the developmental trajectories of delinquency from early to middle adolescence.

Second, the present study tested two dominant theories of crime and delinquency, namely the differential association theory (Sutherland 1947; Sutherland and Cressy 1978) and the social control theory (Hirschi 1969), by examining associations between best friends' delinquency, friendship quality, and adolescent delinquency from early to middle adolescence with five annual assessments. Adolescents and

Table 3 Model comparisons and fit indices for nested models with sex as moderator

Model	χ^2	<i>df</i>	RMSEA	CFI	$\Delta\chi^2$	Δdf
1. Fully constrained	566.40*	211	0.07	0.76		
2. Model 1 with IC's of delinquency target and friend unconstrained	510.19*	210	0.06	0.83	56.21**	1
3. Model 2 with IC of perceived friendship quality unconstrained	386.84*	209	0.06	0.83	123.35**	1
4. Model 3 with IC variances delinquency target and friend unconstrained	263.49*	208	0.04	0.90	61.21**	1
5. Model 4 with correlation between IC target delinquency and IC friend delinquency unconstrained	226.27*	207	0.01	0.99	37.22**	1
6. Model 5 with correlation between IC delinquency target and SL delinquency friend and vice versa unconstrained	217.36*	206	0.01	0.99	8.91*	1

IC Intercept, SL Slope, RMSEA Root mean square error of approximation, CFI Comparative fit index.

* $p < 0.01$

** $p < 0.001$

Table 4 Parameter estimates for final multivariate latent growth curve models for total group and for males and females separately

Dimension	Intercept		Slope ^a	
	M	σ^2	M	σ^2
Total group (N=435) ^b				
Delinquency adolescent/friend ^c	1.14***	0.03***	0.01**	<0.01*
Perceived friendship quality target	3.10***	0.31***	0.04**	0.01**
Boys (n=224) ^d				
Delinquency adolescent/friend ^c	1.20***	0.06**	0.01**	<0.01*
Perceived friendship quality target	2.78***	0.30***	0.04**	0.02**
Girls (n=211) ^d				
Delinquency adolescent/friend ^b	1.07***	<0.01*	0.01**	<0.01*
Perceived friendship quality target	3.43***	0.30***	0.04**	0.02**

RMSEA Root mean square error of approximation, CFI Comparative fit index

^a All slope factors were fixed at 0, 1, 2, 3, and 4, respectively, to estimate linear growth.

^b For the total group, $\chi^2(100, N=435)=133.43, p<0.01$; RMSEA=0.02; CFI=0.97.

^c Since friends are exchangeable, intercepts and slopes of delinquency of adolescent and delinquency of best friend were estimated simultaneously. The means of the slopes and intercepts, the variances of the slopes and intercepts, and the variances of the measurement errors at each measurement wave were constrained to be equal for both friends.

^d For the multigroup approach, $\chi^2(206, N=435)=217.36, p<0.01$; RMSEA=0.01; CFI=0.99.

* $p<0.05$

** $p<0.01$

*** $p<0.001$

friends reported on their own delinquency, insuring that associations found between friends' delinquency and adolescent delinquency would not be inflated because of shared observer variance (Ennet and Baumann 1994; Kandel 1978). The present study clearly showed that adolescent delinquency is strongly associated with best friends' delinquency, both at the mean level and in changes over time. These results were found even when controlling for moderation effects of stability of the friendship and reciprocity of the friendship.

Thus, adolescent best friends seem to start and develop similarly in delinquency over time from early to middle adolescence. Other studies have also shown that best friends' may develop similarly in delinquency, especially in adolescence (Van Lier et al. 2005; Van Lier et al. 2007). Thus, it seems that as a specific adolescent increases at a certain rate in his or delinquency over time, his or her best friend increases at a similar rate in his or her delinquency over time. According to this study, adolescent best friends might be viewed in this sense as 'partners in crime.'

For boys, however, best friends' delinquency seemed to play an even larger role in adolescent delinquency than for girls. The mean level of adolescent delinquency was even stronger associated with best friends' delinquency for boys than for girls, indicating that male friends are even more similar in their mean levels of delinquency than girls. This result is consistent with prior studies reporting that males are more similar in delinquency than females (Ackerman 2006; Heinze et al. 2004). Perhaps even more importantly, best friends' delinquency are associated with increases in adolescents' delinquency over time, and adolescents' delinquency are associated with increases in best friends' delinquency over time for boys only. This latter result provides evidence for the central proposition of the differential association theory (Sutherland 1947; Sutherland and Cressy 1978) for boys: delinquent best friends may increase delinquency of adolescents over time, because adolescents adopt the social norms of their delinquent friends. Specifically, having a delinquent male friend may increase delinquency because delinquent boys may influence each others deviant behavior more trough the deviancy

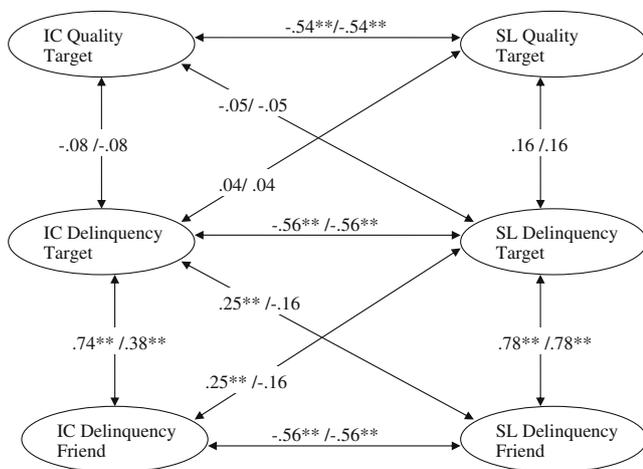


Fig. 2 Multivariate longitudinal growth model for best friends. Note. IC = Intercept; SL = Slope. Correlations between intercepts and slopes of perceived quality of friendship by target, adolescent delinquency, and best friends' delinquency in the multivariate latent growth curve model for boys and girls. The first correlations are correlations for boys and the second correlations are for girls, respectively. If different correlations are given for boys and girls, correlations between boys and girls differed significantly at $p<0.05$. ** $p<0.01$; * $p<0.05$

training process than girls (Ackerman 2006; Capaldi et al. 2001; Solomon 2006). Delinquent boys have been found to exchange more positive signals when discussing antisocial topics, which may reinforce antisocial behaviors (Dishion et al. 1996). Recent evidence has shown that incarcerated girls delinquents primarily have male friends, which may explain their delinquent behavior (Solomon 2006). Since the present study only examined same-sex friendships, girls friends' delinquency may have no influence on girls' development of delinquency because girls may not reinforce delinquent behaviors in general as much as boys do. Future studies should include other-sex friendships to examine effects of other-sex friends' delinquency on the development of adolescent delinquency.

Caution should be warranted when interpreting the effects of friends' delinquency on adolescent delinquency and vice versa in light of the differential association theory. First, since we did not measure deviant norms of adolescent, we could not explicitly test the indirect link proposed by Sutherland: that is, whether best friends' delinquency increases delinquent norms of adolescents, which in turn increases actual delinquent behaviors. Second, since the design of our study allowed adolescents to nominate different best friends across the five waves, the bidirectional associations between friends' delinquency and adolescent delinquency might suggest both selection effects (i.e., delinquent adolescents select other delinquent friends) or influence effects (interactions with delinquent friends will stimulate delinquent behavior). However, results do indicate that friends' delinquency predicts increases in adolescent delinquency and vice versa while controlling for relatively strong initial similarity in delinquency over a period of 5 years, suggesting that best friends' delinquency may play an important role in the development of adolescent delinquency.

The current study furthermore showed that perceived friendship quality did not have an important role in the development of adolescent delinquency. Results revealed that there were no cross-sectional or longitudinal bidirectional associations between adolescent delinquency and quality of best friendship. These results suggest that, when controlling for previous levels of adolescents' own delinquency and best friends' delinquency, the quality of friendship does not directly affect the development of delinquency. Prior studies also found that perceived friendship quality did not predict later adolescent delinquency when controlling for previous delinquency (e.g., Zimmerman et al. 2000). Thus, no evidence was found for the role of perceived friendship quality according to the social control theory (Hirschi 1969). Furthermore, results of the current study showed that adolescent delinquency did also not predict changes in perceived friendship quality over time. Consistent with findings that delinquent friends experience the same quality in their friendships as non-delinquent friends do (Solomon

2006), these results indicate that delinquency does not disrupt the perceived friendship quality.

Third, when examining interaction effects between perceived friendship quality and friends' delinquency on the development of adolescent delinquency, no evidence was found for either a moderating role of friends' delinquency in effects of perceived friendship quality on adolescent delinquency as suggested by social control theory, or a moderating role of perceived friendship quality in effects of friends' delinquency on adolescent delinquency as suggested by differential association theory. A reason for differences between results found in prior studies (Bruinsma 1992; Urberg et al. 2003) and results of the current study regarding differences in influence processes between lower and higher quality friendship might be that prior studies did not always take into account possible sex differences in quality of friendships and sex differences in effects of friends' delinquency on adolescent delinquency (Urberg et al. 2003).

It must be noted that consistent with the notion that relationships with friends become increasingly important to adolescents from early to middle adolescence (Daddis 2005; Furman and Buhrmester 1992; Sippola 1999), the mean level of perceived social support of best friends was found to increase from age 12 to age 16. Although girls consistently report higher mean level perceived quality in friendship than boys (Cheng and Chan 2004; Mathur and Berndt 2006), sex differences in the developmental trajectories of perceived friendship quality were not found, indicating that boys and girls perceive the same level of growth of friendship quality from early to middle adolescence.

Several limitations of the present study should be noted. Since questionnaires were collected at schools and adolescent best friends in the present study only participated if they were in the same dataset, the present study deals with best friendships within schools only. Recent research has shown that friends outside the school context may be more influential on adolescent delinquency than best friends within the school context (Burk 2006). Furthermore, we used a relatively normative sample which does not contain many truly delinquent adolescents. However, an average of 13.7% of girls and 38.1% of boys reported vandalism, 25.2% of the girls and 40.1% of the boys reported property offenses, and 12.6% of girls and 30% of boys reported violent acts across five waves. The total percentage of girls and boys reporting a delinquent act was 33.1 and 53.7% across all five waves, respectively. Thus, delinquent acts were not uncommon among adolescents in the present normative sample (also see Luijpers 2000). Thus, although the group of very delinquent adolescents may be relatively small, the group of adolescents displaying minor delinquent acts is substantial larger, and individual differences in delinquent behavior among adolescents are expected to be sufficient for commonly employed analyses. Nevertheless,

the associations of friends' delinquency and friendship quality with adolescent delinquency may differ between truly delinquent adolescents and adolescents from a normative sample, and therefore the former should be included in future studies. In addition, perceived quality of friendships was measured of only one person in the dyad and since studies using more objective measures of friendship quality did find differences between delinquent and non-delinquent adolescents in friendship quality (Poulin et al. 1999), we might have found associations between friendship quality and delinquency when these measures would have been used. It may be, for example, that although actual friendship interactions display low perceived friendship quality characteristics which may increase effects of friends' delinquency on adolescent delinquency, adolescents perceive their friendship to be of relatively high quality. In addition, we focus only on mutual and non-mutual best friendships, whereas studies have shown that other types of friends may also influence each other in problem behaviors to a certain extent (e.g., Mounts and Steinberg 1995). Finally, the focus of the present study was on positive aspects of friendship quality. Including the negative aspects of friendship quality, such as conflict and peer victimization, might have shown that perceptions of more negative aspects in friendships are associated with more adolescent delinquency (see also Kupersmidt et al. 1995). Future studies should therefore incorporate perceptions of both friends or more objective measures of perceived friendship quality when examining longitudinal associations between perceived friendship quality and adolescent delinquency.

In sum, the present study shows that adolescent best friends play an important role in the development of delinquency from early to middle adolescence: adolescents show high similarity in mean levels of delinquency and changes in delinquency over time. For boys, similarity in mean level delinquency is even higher, friends' delinquency is associated with increases in adolescent delinquency over time, and adolescents' delinquency is associated with increases in friends' delinquency over time. These results provide evidence for the differential association theory for boys. Reciprocity in best friendship, and stability of best friendship did not moderate these results. No evidence was found for the social control theory: Perceived friendship quality played no direct or indirect role in the development of adolescent delinquency, and adolescent delinquency did not predict development of quality over time.

Appendix

Items of the Support scale of the Network of Relationship Inventory (Furman and Buhrmester 1985).

1. How much does your best friend treat you like you're admired and respected?
 2. How often do you turn to your best friend for support with personal problems?
 3. How much do you play around and have fun with your best friend?
 4. How often do you go places and do enjoyable things with your best friend?
 5. How sure are you that your friendship will last no matter what?
 6. How much does your best friend teach you how to do things that you don't know?
 7. How much do you share your secrets and private feelings with your best friend?
 8. How much does your best friend like or approve of the things you do?
 9. How much do you take care of your best friend?
 10. How much does your best friend treat you like you're good at many things?
- Two new items:
11. How much does your best friend consider you worth listening to?
 12. How much does your best friend think he or she can learn from you?

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