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Seddig, Daniel

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# Peer group association, the acceptance of norms and violent behaviour:

## A longitudinal analysis of reciprocal effects

### **Abstract**

Differential association and social learning theory assume delinquent peers to be instigators and reinforcers of delinquent behaviour and norms favourable of delinquency. Control theory, on the other hand, assumes that delinquents will group together with peers that share a common normative and behavioural background. Interactional theory as an integrative paradigm argues that both – influence and selection – processes might be active simultaneously and are embedded in a reciprocal causal relationship. This paper tests the reciprocity between the association with delinquent peer groups, the acceptance of pro-violent norms and violent delinquency during adolescence with data from a German longitudinal panel study in a longitudinal structural equation model. Results indicate that peers, norms and violence are interactionally related and that influence and selection processes are active simultaneously. Moreover, further structural dimensions are able to explain delinquent peer group association, the acceptance of pro-violent norms and violence in early adolescence.

### **Keywords**

Delinquent peer groups, pro-violent norms, violent delinquency, reciprocity, structural equation model

### **Introduction**

One of the most consistent findings in criminological research on the causes and development of juvenile delinquency is the almost always observable effect of delinquent peers and peer group association on individual behaviour (Warr, 2002). Following the criminological formulations of social learning theory (Sutherland, 1947; Akers, 1998), there are two distinct characteristics that mark peer groups as important socialising factors that influence juvenile behaviour. The first is the social transmission of attitudes towards norms favourable to delinquent behaviour within the peer group context. Norms guide the individuals' choices and are therefore assumed to have a direct effect on delinquent behaviour. The second is the observation of friends' behaviour, the

consequences of friends' behaviour, the imitation of friends' behaviour and individual delinquent behaviour. Further, individual delinquency might be a consequence to pressures in the context of delinquent groups. For both processes the peer group serves as learning and reinforcing environment for both the acceptance of norms and the behavioural techniques themselves.

Despite the overall agreement on the direct or indirect importance of these dimensions in crime-causation, there have been (and still are) debates on three dominant issues representing different theoretical and methodological approaches. First, some researchers question the importance of individual and friends' normative orientations compared to the direct effects of friends' behaviour on individual delinquency (Warr and Stafford, 1991). Second, other researchers from a background of social control theory argue that the association with delinquent peers is the consequence of a selection process and hence its correlation with delinquency – no matter how large it appears – is spurious (Glueck and Glueck, 1950; Gottfredson and Hirschi, 1990; Hirschi, 1969). Third, there seems to be a considerable critique to the indirect measurement of peers' attitudes and behaviour. Rather than to rely on information given by respondents as an approximation of the 'true' extent of these variables, direct measures and network based analysis should be preferred (Haynie, 2001, 2002; Megens and Weerman, 2012).

Several integrative approaches that combine assumptions from different theories addressed the first two of the portrayed issues in a suitable manner. As outlined by Thornberry (1987), interactional theory more specifically addresses a combination of social control and social learning processes and especially the reciprocal character of the relationship between delinquent behaviour and its causal antecedents as well as between the causal antecedents themselves. Thornberry (1987: 865) describes the reciprocal conception as 'an interactive setting in which delinquency is learned, performed, and reinforced.' The theory also assumes that the 'causal loop' (Thornberry, 1987: 873) leading to delinquency, the reinforcement of pro-delinquent norms and peer group association is dynamic rather than static and unfolds over the individuals' life-course. Given this assumption, the

analysis of the bidirectional character between the relevant dimensions requires a longitudinal perspective.

The third issue, the adequate measurement of peer group influence can be addressed by alternative approaches that do not solely rely on the number of delinquent friends or the number of delinquent acts committed by peers. Weerman (2011: 263) used a measure of involvement in 'informal street oriented youth groups' as an alternative approach to account for peer group influence on individual behaviour besides other network information. The informal street oriented youth groups were characterised by members of ages between 12 and 25, existing for more than 3 months, and members spending their a lot of their leisure time in public. The special and interesting aspect of these characteristics is the consideration of (an often neglected facet of) culturally based dimensions for the analysis of peer group influence: the inherent dynamic processes and lifestyle orientations in the context of the peer groups' (leisure time) activities.

### **Key results from previous research**

Given the assumption that reciprocal effects can only be analysed with longitudinal panel data, only such studies can be considered when summarising previous research. Although research has generally improved to account for developmental processes by using longitudinal panel data, only few studies cover time-periods longer than two years, use more than two or three waves of data and are concentrated essentially on the time-lagged effects.

Concerning the difference between influence and selection processes of delinquent peers the results are mixed. Warr (1993) analysed a sample of the National Youth Survey and assumed, that delinquents are introduced to delinquency by their friends. Those who acquire delinquent friends at a young age then tend to have longer friendships as a consequence of the shared behavioural orientation. In an analysis of three waves of the Rochester Youth Development Study Thornberry et al. (1994) could hardly find any cross-lagged reciprocal effects between delinquent peer association,

delinquent beliefs and delinquent behaviour. Menard and Elliott (1994; see also Elliott and Menard, 1996) analysed three waves from National Youth Survey and found reciprocal effects that indicate a moderate lagged effect from delinquent peer group bonding to delinquent behaviour. Especially minor delinquency did not influence delinquent peer group bonding ('everybody does it', Menard & Elliott, 1994: 185). Violent delinquency in turn reciprocally fostered the involvement in delinquent peer group contexts. Aseltine (1995) analysed a sample of public high school students in three Boston area communities and found selection as well as socialisation influences on individual drug use and the formation of peer groups. Matsueda and Anderson (1998) also used three waves of data from the National Youth Survey and found that both, the effect of delinquent behaviour on delinquent peer association and the effect of delinquent peer association on delinquent behaviour, are statistically significant, although the former exceeded the latter in terms of magnitude. Another three wave analysis of National Youth Survey data by Reed & Rose (1998) also reveals that both processes are observable simultaneously. Miller (2000) further pointed out that the susceptibility of adolescents to peer influence enhances the effect of peer association on individual (serious) delinquency. Baerveldt et al. (2008) made use of network analysis techniques to analyse a sample of Dutch high school students. They found both processes to be active simultaneously, but the influence process was the more general mechanism. Selection effects only occurred in dependence on network and school contexts. An overview of studies testing interactional hypothesis (Thornberry, 1996) revealed that most studies find cross-sectional and some even cross-lagged reciprocal effects between delinquent peer group association, delinquent values/norms and delinquent behaviour. However, they do not allow for a clear cut statement either against or in favour of the influence or selection hypothesis. These mixed findings support the concept of reciprocity and simultaneous influence and selection processes outlined by Thornberry's interactional theory.

Other research was concentrated on the effects of attitudes/norms and behaviour of peers on

individual attitudes/norms and delinquency. Warr and Stafford (1991) analysed two waves from the National Youth Survey and found that all of these effects can be significant, but the effects of peers' behaviour usually exceed the effects of peers' and individual attitudes. They conclude that the social transmission of delinquent behaviour through normative socialisation (as stated by Sutherland) is incomplete without taking into account the effect of peers' behaviour as an independent social learning and crime explaining component. Thornberry et al. (1994) showed that individual beliefs are one of the strongest lagged predictors of delinquency and are in turn – albeit only weak – affected by behaviour. An analysis of National Youth Survey data by Reed & Rose (1998) showed that delinquent attitudes are mainly influenced by delinquent peer group association. Attitudes in turn have no considerable effect on either peer group association or serious theft. Rather, theft was reciprocally related to peer group association, although only in a contemporaneous specification. The analysis of five waves from the German 'Crime in the modern Cities' study – although not solely designed to test reciprocal effect structures – by Boers et al. (2010) obtained lagged reciprocal effects from violent delinquency to delinquent peer group involvement (ages 14 to 15) and the acceptance of pro-violent norms (ages 13 to 14 and 14 to 15) as well as from delinquent peer group involvement to violent delinquency (ages 16 to 17). Pro-violent norms were strongly influenced by delinquent peer group contexts in contemporaneous specifications. Further, the individual acceptance of norms was one of the strongest predictors of delinquency throughout adolescence (Boers et al, 2009).

Studies that use alternative forms of peer group measurement, like peer-network data, usually find evidence for longitudinal effects of delinquent peers on delinquent behaviour (Haynie, 2001, 2002; Smith and Ecob, 2013). Weerman (2011) also pointed out a considerable effect of an alternative peer group concept, the involvement in unsupervised street-oriented youth groups. Moreover, a recent analysis with direct measures of peer attitudes and peer behaviour Megens and Weerman (2012) revealed the importance of peer attitudes and the transference of attitudes in the

social transmission of delinquency. Yet, a considerable effect of peer delinquent behaviour remained.

### **The current study**

This paper uses an approach to capture peer group influence on violent behaviour that is based on a 'structural dynamic model' (see also Boers et al., 2010: 500 ff.). It integrates assumptions from anomie, social control and social learning theory with aspects of research on adolescent lifestyles, social milieus and corresponding social value orientations. The model hypothesizes contemporaneous causal implications in crime causation, but also assumes the causal mechanisms to be reciprocal over time (Figure 1). Dashed lines indicate that only bonds with a strong relevance for delinquent behaviour (delinquent peer associations) are assumed to exert a direct (lagged) effect.

*- Figure 1 about here -*

Peer groups take an important position as sources of behavioural and normative models, intrinsic and extrinsic reinforcement and expressive youth-typical lifestyles (Akers, 1998). Due to their increasing relevance during adolescence they are hypothesised to have a strong socialising impact on the development of personal and social identity (Frønes, 1995). Consequently, the more a group focuses its (leisure time) activities towards deviance and delinquency, the more likely the individual associated with the group will accept the norms and behaviours of the group as a consequence of adaption and group dynamic processes and pressures. The inherent group dynamic frees the individual from normative deliberation about the choice of action and directly leads to individual delinquency. In a reciprocal manner the association with a group might also change (be strengthened or weakened) by the individuals' behaviour and normative orientation. Moreover, the normative orientation can be reinforced and further justified through delinquent behaviour.

Peer group associations and normative beliefs are also hypothesised to be largely influenced by characteristics of the social structure. While classical social structural characteristics usually imply a

vertical continuum of differentiation (e.g. income, social class, social status) social value-orientations are conceptualized as horizontal distal dimensions of the social structure. They allow a side by side differentiation of ideas about desirable goals (Kluckhohn, 1967). They are further conceptualized as macro characteristics, because they arise and are socially transmitted from different entities (e.g. social milieus) of the social macro structure (Durkheim, 1982; Hradil, 1987), even though they are measured as characteristics at the individual level. Value orientations help the individual to structure its meso social environment and they exert direct influence on the bonds the individual develops to school, parents and peer groups. But since values are relatively unspecific directions of the modes of behaviour towards sets of desirable goals (Parsons, 1960: 171 f.), they are assumed to have only small or even no considerable direct influence on violent delinquency. This in turn does not mean that distal dimensions are irrelevant for the explanation of violent behaviour. Even though not explicitly tested in this analysis, their influence is hypothesised to be mediated by the proximate dimensions association with delinquent peers and the acceptance of pro-violent norms.<sup>1</sup>

Moreover, the model assumes a dynamic perspective and reciprocal relations between the macro, meso and individual level dimensions over time. The dynamic aspect of the model refers to the possibility of development and change in behavioural and the social dimensions over the course of adolescence. That means bonds, attitudes and behaviours are hypothesised not to be static over time. They might change as a consequence of changes in life circumstances and other important events in the life-course (Elder, 1998; Laub & Sampson, 1993; Sampson & Laub, 2003). The aspect of reciprocal interaction refers to the bidirectional character of the relationship between the dimensions of the model. While violent behaviour is influenced and transmitted by peers and certain normative orientations, behaviour itself exerts an influence on peers and normative beliefs, implying 'an interactively self-reinforcing constellation of delinquent communication' (Boers et al., 2010: 502; see also Thornberry, 1987). Behaviour is thus hypothesised to be both, cause and



consequence of the social conditions. The same reciprocity can be assumed between the other dimensions of the model.

The above outlined interrelations and lagged reciprocal effects between the association with peer groups primarily engaging in activities that result in deviance and delinquency, the acceptance of pro-violent norms and violent delinquency are analysed over a period covering ages 14 to 17 with four waves of panel data (since information on the acceptance of norms is not available for age 13, this year is not considered in the analysis). In addition to the reciprocal effects, the influence of social structural covariates will be tested. Besides two almost classic vertical criteria of social differentiation (educational level and migration history), traditional as well as hedonistic value-orientations will be considered as horizontal dimensions. While a traditional value orientation emphasises the stake in conformity as well as conservation of traditions (women should stay at home and men should go to work; honour your parents), a hedonistic value orientation focuses on enjoyment, excitement and consumption as immediate gratifications of short-term desires. Traditional values were found to be associated with a 'pathway into conformity'. Hedonistic values marked a 'pathway into violent delinquency' (Boers et al. 2009, 2010). Furthermore, the analysis will be controlled for gender effects. Males are assumed to be generally more involved with delinquent peer groups, are more in favour of pro-violent norms and report more violent delinquency than females.

## **Data, methods and models**

### *Data*

Data for the current analysis come from the German longitudinal sociological and criminological study 'Crime in the Modern City (Crimoc)' funded by the German Research Foundation (Deutsche Forschungsgemeinschaft). In 2002 the ongoing prospective panel study was initiated in the German industrial city of Duisburg (approx. 500,000 inhabitants) in the Ruhr area. The initial cohort sample

of 3,411 students came from 7th grades in all available school types with a mean age of 13. In 2013 the 10th wave of data has been collected.<sup>2</sup>

The longitudinal panel data set used for this paper covers ages 13-17 and includes 1,552 adolescents who have permanently participated during the first five year of the study (no wave non-responses). The reduced number of respondents and attrition in the panel data set can be attributed partly to normal panel dropouts (Reinecke, 2013) and partly to the code-based anonymized panel construction procedure. The self-generated code consists of six time invariant personal characteristics and is used to assign data of an individual anonymously from wave to wave. A considerable proportion of the respondents does not reconstruct it correctly over the years. Consequently, the panel data contains less males, less respondents from lower school types and to a certain extent lower prevalence and incidence rates of self-reported (violent) delinquency than the cross-sectional samples (Table 1). Whereas the differences appear to be small in terms of absolute numbers, the relative loss of prevalence and incidence rates is more profound. Prevalence rates of total delinquency are between 13 percent and 18 percent lower on average in the panel data. Incidence rates in the panel data reach about two third of the cross-sectional data level. For violent delinquency the prevalence rates are between 16 and 27 and the incidence rates between 24 and 40 percent lower on average. This indicates that the loss of males and lower educated respondents in the panel is accompanied by a certain reduction in the distribution and intensiveness of offending in the panel data. Hence, delinquency rates tend to be underestimated. However, the loss seems to be acceptable as there still remains a considerable proportion of reported (violent) offences in the data. Additionally, especially for those who can be considered intensive offenders the loss in the incidence rates is even less serious (Boers et al., 2010: 504). Still, the descriptive biases might have certain consequences for the generalizability of the findings in this study. Since the initial cross-sectional sample ought to be representative for a German urban cohort, the panel population has to be considered as slightly biased. However, on an analytical level results show no severe

differences between cross-sectional and panel data.<sup>3</sup>

- Table 1 about here -

Measures of association with delinquent peer groups are taken from a scale asking respondents to rate whether the peer group they hang out with is involved in different activities. The scale ranges from 'don't agree' (1) 'totally agree' (5).<sup>4</sup> Exploratory factor analysis reveals, that besides a conventional and a consumption and fun oriented dimension, a delinquency and violence oriented peer group dimension can be identified. The three items that best represent the delinquency and violence oriented peer group dimension ask for the *use of violence* to enforce group interests (1), engaging in *fights* with other groups (2) and *breaking rules* to have fun (3). The resulting dimension implies that such groups spend most of their time unsupervised with non-conventional activities.

The acceptance of pro-violent norms is measured by the respondents approval or disapproval of different offences (violent, property and vandalism offences) on a scale ranging from 'totally harmless' (1) to 'very bad' (5).<sup>5</sup> Three items can be used to represent the acceptance of pro-violent norms: *hit a person* in the face, *provocation/intimidation* and *extortion*. Descriptive results indicate a decrease for the delinquency and violence related dimensions during adolescence (Table 2).

- Table 2 about here -

Violent delinquency is a composite measure of annually self-reported frequencies of violent offences (assault with and assault without a weapon, robbery and purse-snatching).<sup>6</sup> The distribution of the composite index is skewed and likely to produce bias in parameter estimates, standard errors and fit statistics. Therefore, a transformation of the non-normal variable as a solution to parameter estimation within structural equation models is used here (Montfort et al., 2009). The best suitable transformation is the natural logarithm of the violence index. The remaining levels of skewness are not considered as problematic for normal theory full information maximum-likelihood estimation procedures (Andreassen et al. 2006; Enders, 2001; Enders & Bandalos, 2001; Olsson et al. 2000). Although the transformation basically creates a new variable,

the covariance pattern between the log-transformed outcome and the rest of the variables resembles that of the original variable. The development of the means (Table 3) indicates a decreasing mean level of violent delinquency during adolescence (age-crime curve).

- Table 3 about here -

The structural covariates educational level and migration history are recoded as binary variables (0/1) for the current analyses. For the educational level this means the highest possible school type is tested against all others. Respondents with a migration history are tested against those without. In the panel-sample 25% of the respondents visit the highest possible school type and 26% report a migration history.<sup>7</sup>

Value-orientations are measured by a multiple-item scale consisting of 29 items to capture different facets of a value-continuum that includes traditional, religious, technology focused, hedonistic and deprivative orientations. The items representing traditional and hedonistic value-orientations are indexed and dichotomised (0/1) with data for age 14. As a result 71% of the respondents can be interpreted as agreeing to traditional and 52% as agreeing to hedonistic values.

### *Methods and Models*

The statistical analyses presented in this paper are based on structural equation models (Bollen, 1989; Hancock & Mueller, 2006; Kaplan, 2000; Long, 1983) with longitudinal data. The combination of confirmatory factor analysis with path and regression analysis allows the representation of complex relations between exogenous (explaining) and endogenous (explained) as well as observed and unobserved (latent) variables within a single statistical model. Minimizing the discrepancy between model-implied and observed covariances leads to an iterative estimation of the model parameters. Based on the approximately  $\chi^2$ -distributed value of the discrepancy-function (here: full information maximum-likelihood; Finkelstein, 1979) a series of statistics can be used to assess overall model fit and statistical inference for parameter estimates (Bollen & Long, 1993).

The use of normal theory robust full information maximum-likelihood instead of categorical or weighted least square methodology seems appropriate, because the item scales have at least 5 categories (Rhemtulla et al., 2012) and levels of skewness are acceptable (see above).

Three different model specifications are presented in this paper. First, the basic structure of relations between *delinquent peer group association*, the *acceptance of pro-violent norms* and *violent delinquency* is estimated as a 3-variable 4-wave cross-lagged panel model covering ages 14 to 17.

Second, *gender*, *educational level* and *migration history* are introduced as covariates to capture the influence of vertical social criteria on the latent dimensions and the violence index at age 14.

Third, *traditional* and *hedonistic value orientations* are further introduced to represent milieu-based horizontal characteristics of the social macro structure.

The measurement models of the latent variables delinquent peer group association and pro-violent norms are restricted to be equal across time with respect to factor loadings and residual covariances to assure at least weak factorial invariance (Widaman et al., 2010). The index of violent delinquency does not require such a restriction. Additional to the lagged effects, contemporaneous relations between the dimensions are captured by residual covariances at each time point. Due to missing values on the covariates, the number of respondents reduces to 1,511 resp. 1,507 for Models 2 and 3.

Figure 2 illustrates the full hypothesised model structure (Model 3) with the structural parameters of interest. Measurement models and the single paths from the covariates to the latent dimensions and the violence index at age 14 are not displayed for reasons of clarity.

- Figure 2 about here -

## Results

The overall fit for all models can be considered as good, indicating that the proposed model

structures represent the empirical data (see Table 4 for all results). Values for RMSEA range from 0.023 to 0.030, CFI from 0.958 to 0.979 and SRMR from 0.040 to 0.047.

- Table 4 about here -

### *Model 1*

The stabilities are all substantive in terms of magnitude and significance. Nevertheless, the non-behavioural dimensions delinquent peer group association and especially the acceptance of pro-violent norms appear to be far more stable than the measure of violent behaviour. Respondents who report the highest level of acceptance for pro-violent norms at time t-1 are likely to report the highest level of acceptance for pro-violent norms at time t. This probability is at about the same level for delinquent peer group association but considerably lower for violent behaviour. Considering stability measures as indicators of the maintenance of a covariance pattern across time, this finding raises doubt about the assumption of a highly stable potential of serious problematic behaviour, especially in non-stratified samples where violent offences are reported more seldom than in stratified ones (e.g. prison populations, gang members). Violent delinquency – once established – can thus hardly be seen as a self-preserving behavioural mode.

The cross-lagged estimates mostly confirm the assumed interactional relationships between the latent dimensions and violent delinquency. In terms of a causal explanation, the association with delinquent peer groups and the acceptance of pro-violent norms can be interpreted as reciprocally related predictors of violent delinquency over the course of adolescence.

Regarding the selection and influence assumptions the results do not allow a clear statement. Both peer group association and pro-violent norms exert positive lagged influences on each other, although the peer group effect on the acceptance of norms from age 15 to 16 only reaches a tolerant level of significance ( $p = 0.059$ ). This means, while peer group association to a considerable degree enhances the acceptance of pro-violent norms, the shared normative orientation in turn moderately reinforces the bond to the peer group. However, the estimates indicate that the (selection) effects

from the normative dimension to peer group association tend to be slightly stronger than vice versa.

Additionally, both dimensions have considerable and partly moderate positive stimulating effects on violent behaviour over time. Especially the effects of peer group association from age 16 to 17 and of norm acceptance from age 15 to 16 are remarkable and indicate that the effects of norms is stronger during mid-adolescence and the peer group effect gets more important during the end of adolescence. In turn, the reciprocal effects of violent behaviour on the acceptance of norms and peer group association are rather weak and inconsistent. Nevertheless, two effects are noteworthy. First, violent behaviour only has a weak (and hardly significant) effect on delinquent peer group association from age 14 to 15. Second, violent behaviour reinforces the pro-violent normative orientation from age 14 to 15. This means that (collectively) committed violent crimes strengthen the bond to the peer group and the (possibly shared) normative orientation, but only in early and middle adolescence. A selection process might thus be limited to this earlier phase of adolescence since both of these effects lack consistency over time.

### *Model 2 and 3*

The introduction of gender, educational level, migration history and traditional and hedonistic value orientations as covariates is done stepwise in Model 2 and 3 due the differentiation between vertical and horizontal structural characteristics. Although the results between Model 2 and 3 do not substantially differ, once the value orientations are introduced, the effects of educational level and migration history clearly decrease at age 14 in magnitude and significance.

Regarding the stabilities and cross-lagged effects Model 2 and 3 do not substantially differ from Model 1, except for the now consistently insignificant effects of violent behaviour on delinquent peer group association. The results indicate that the consideration of the structural covariates does not alter the overall effect pattern. The interactive and self-reinforcing constellation between peer groups, normative orientations and behaviour thus is independent from gender, education, migration

and social value orientations in terms of reciprocity.

However, the structural covariates directly influence the characteristics of peer group associations, the acceptance of norms and behaviour at age 14. The educational level has substantive negative effects on all dimensions (Model 2 and 3), indicating that respondents from the highest German school type (Gymnasium) are less bonded to delinquent peer groups, dismissive towards pro-violent norms and less likely to engage in violent delinquency. The effects are moderate and point to certain differences in the abilities to participate in conventional activities. The migration history interestingly has no (Model 3) or nearly no (Model 2) effect on any of the dimensions. The weak and low level significant effect of a migration context on violent behaviour even indicates that respondents of German origin are more involved in violent delinquency. This might be explained by a special situation of especially Turkish migrants in the city of Duisburg.<sup>8</sup> Turkish communities in Duisburg seem well organised in tight-knit ethnic neighbourhoods with well-functioning infrastructures and high levels of informal social controls. Moreover, Turkish migrants are not disproportionately disadvantaged regarding high school graduation. Additionally, Turkish females are among the least delinquent respondents.

As expected, a traditional value-orientation exerts negative influences on all dimensions (Model 3). While the effects on delinquent peer group association and violent behaviour are moderate, the inhibiting effect on the acceptance of pro-violent norms is strong. This is an indication for a general association of traditional values with conventional and conforming lifestyles. Additionally, a goal-orientation towards conventionality and conformity is clearly related to an emphasis on normative obedience.

A hedonistic value-orientation is positively related to all dimensions (Model 3). Especially delinquent peer group association and a pro-violent normative orientation are strongly influenced by a goal-orientation towards enjoyment, excitement and consumption. For individuals prone to their short-term desires, an informal peer group focused on unsupervised and deviant activities might be



a good framework for gratification. Furthermore, for a hedonistic lifestyle to unfold, violence seems to be a very accepted way of conduct.

All gender effects point into the hypothesised direction. They indicate that males are moderately more associated with delinquent peer groups and involved in violent behaviour. The effect on pro-violent norms is quite strong, which means that males are much more likely to accept norms in favour of violent behaviour than females.

The higher magnitude of the covariate effects compared to the cross-lagged effects is based on the (quasi-) contemporaneous character of these parameter specifications. While gender and migration history can be interpreted as time invariant, educational level and value orientations can change over time. Information on these changeable (but usually very stable) dimensions is used for age 14. Given the specification of the covariate effects at only one time, their meaning for the explanation of the time varying dimensions should not be over-interpreted within a longitudinal model.

Even though the cross-lagged effects do not appear to be high in magnitude, the revealed pattern is even more relevant given the complexity of the models, the high stabilities of the latent dimensions and the specification of contemporaneous residual covariances, as it strongly emphasises the theoretical developmental implications behind it.

## **Discussion**

This paper provided a longitudinal view on the interactional relationship between delinquent peer group association, the acceptance of pro-violent norms and violent behaviour within a context of distal and proximate dimensions of crime causation over the course of adolescence. It did not only take into account the simultaneous effects of group, normative and behavioural dimensions. It also considered social structural factors, education and migration as well as traditional and hedonistic milieu-based value-orientations and gender. The consideration of social values as distal covariates

influencing the proximate dimensions can be seen as a by now unexplored expansion of the criminological perspective on structural correlates of peer-group association, normative standards and delinquency.

First, the stability coefficients revealed that generally seldom occurring violent behaviour is less stable than associations with delinquent peers and pro-violent norms. To speak of a self-preserving violent disposition in a non-stratified sample would require more time dependent measurements of violent delinquency. Violent behaviour is thus more dependent on its causal social antecedents than on violent behaviour at earlier points in time.

Second, the reciprocal effect patterns in all models indicated, that the dimensions delinquent peer group association, acceptance of pro-violent norms and (partly also) violent behaviour are embedded in a system of interactive self-reinforcing communication of delinquent content and orientations. The reciprocal relationship between peer groups and norms is clearly visible over time. Delinquent peer groups are a suitable social environment to learn normative orientations that lower the individuals' resentments against the use of violence. In turn, a normative orientation in favour of violent behaviour has a positive impact on the association with such groups that offer gratification for these normative standards (and behaviours). This indicates, that both selection and influence processes are active simultaneously (see Baerveldt et al., 2008: 577).

Further, peer group association and the acceptance of pro-violent norms consistently exert significant effects on violence. However, during the end of adolescence there seems to be a developmental shift in the causation of violence that is indicated by an increase in the effect of peer group association and a (less clear) decrease of the effect of pro-violent norms. This can be interpreted as a developmental change in the individuals mode to engage in violent behaviour from normative orientations to the dynamics within the peer group context. As normative standards are established and internalized during adolescence, deliberation gains less and the influence of peer group dynamics and pressures gains more importance for the explanation of violent behaviour.

Violent behaviour, in turn, is hardly able to influence the other dimensions clearly and lasting. The process of selecting peers on the basis of one's own behaviour seems to be limited to the beginning of adolescence as indicated by the (albeit weak) effect of violence on peer association and normative orientations from ages 14 to 15. Therefore, it can be carefully concluded, that after a more or less initial phase, where the selection of delinquent friends and normative standards is weakly influenced by preceding individual behaviour, the further development of violent behaviour is more notably characterised by the dynamic and binding processes within the peer group and the decisions made about behavioural modes based on the individual normative orientation. Hence, in the course of adolescence violence seems to develop to be more a function of its causal antecedents, than a reciprocal outcome or cause of the proximate dimensions. The presented changes in the importance of the explanatory dimensions also emphasize the need to be careful with interpretations based solely on cross-sectional data. The particular phases of (early, middle and late) adolescence require more age-specific theoretical hypothesis and analyses.

At this point the selection hypothesis can only be clearly confirmed for the normative level. The association with delinquent groups is well predictable by the preceding normative standards throughout adolescence. This is only partly true for the effect of preceding behaviour on the acceptance of pro-violent norms in the earlier phase of adolescence. In turn, the influence hypothesis can be confirmed for the whole observed period. It holds for both the impact of delinquent peer group association and the acceptance of pro-violent norms on violence as well as the impact of delinquent peer group association on the acceptance of pro-violent norms.

Third, the proposed effects of social structural covariates could be partly confirmed. The initial levels of the association with delinquent peer groups, the acceptance of pro-violent norms and violent behaviour at age 14 are to a considerable degree explained by gender, the educational level and traditional as well as hedonistic value-orientations.

Only and maybe unexpectedly the respondents' migration history has hardly any effects. The

special circumstances of (Turkish) migrant neighbourhoods in Duisburg give rise to the assumption that migration and ethnicity as an explanatory factor must fail as long as social ecological dimensions like neighbourhood social controls or community influences are not controlled.

Most notably a hedonistic value-orientation has stronger positive effects on delinquent peer group associations and a pro-violent normative orientation, while a traditional value-orientation strongly counteracts pro-violent norms and moderately counteracts delinquent peer group associations. This indicates a second, but maybe even more important selection process on the level of the social structural covariates, that help and guide the individual to develop ties to peer groups and normative standards. While respondents from a hedonistic value background are selective in their ways to associate with delinquent peers that share a common pro-violent normative orientation, those from a traditional and/or highly educated background do not engage in delinquent groups and reject pro-violent norms. These milieu-based value backgrounds are thus clearly distinctive in their criminogenic potential.

The effects of gender are among the strongest of the covariates and confirm the expected stronger involvement of males in delinquent groups and violent behaviour as well as the stronger acceptance of pro-violent norms. However, the covariate relationships have not been tested in terms of reciprocity since the structural variables were assumed to be (at least partly) time invariant. The higher magnitude of these effects results from their contemporaneous specification and might not hold in a longitudinal specification.

Finally, these results should be considered on the basis of the already addressed panel attrition. The lower proportion of criminological relevant information in the panel data (fewer males, low educated and delinquent respondents) might be problematic in terms of generalizability. A complete panel data set, that more accurately represents the initial cohort could probably show more clearly the character of the relationship between delinquent peer group association, pro-violent norms and violent delinquency. Some of the lower, hardly significant and inconsistent effects (e.g. selection of

peers on the basis of violent behaviour) might have been more apparent without attrition. In general, the magnitudes of the effects could be underestimated. However, in light of the biases the exposed patterns of effects appear to be rather satisfying, especially under the impression of the overrepresentation of females, high educated and conforming respondents, that entails a generally lower variance in the data.

Methodologically, the analyses in this paper may give rise to criticism regarding the use of a log-transformed outcome. In an alternative approach the untransformed counts can also be analysed with a negative binomial probability model (Cameron & Trivedi, 1998; Hilbe, 2008). But since the assumed negative binomial model with four waves of data and numerous parameters requires a numerical integration algorithm and extreme computational capacities this strategy seems hardly feasible. In a first attempt a reduced model (2 waves, no covariates) was estimated and compared to a normal theory robust full information maximum-likelihood solution. Regarding the effect pattern there were no considerable discrepancies between the negative binomial and normal-theory solution with the log-transformed indices. Additionally, the possibility to fully or partially standardize the path coefficients in the approach used in this paper is a further advantage. However, as soon as the analysis of mean structures is intended, for example with latent growth curve and growth mixture models, the distributional assumption will be of crucial importance for the selection of a model and the interpretation of results (Reinecke & Seddig, 2011).

Some outlines for future research can be given. The interactional relationship between delinquent peer groups, normative orientations and violent behaviour is assumed and has empirically shown to be a primary process for adolescent involvement in violence. With the transition to (young) adulthood people will establish new social bonds (job and marriage), that might alter the relations between peers, a pro-violent normative orientation and violent behaviour and delinquency in general (Laub & Sampson, 1993; Sampson & Laub, 2003).

Moreover, the study of reciprocal effects does not provide insight into the shared dynamics and

development of the variables over time. To test for co-developmental patterns between peer group associations, pro-violent norms and violent delinquency parallel latent growth curve models can be applied to the data (Bollen & Curran, 2006). An analysis of higher order parallel process latent growth models by Seddig (2013) already gave evidence, that the reciprocally related dimensions school-bonds and the acceptance of legal norms share a common developmental pattern over the course of adolescence and that the intercept and slope factors for the two dimensions are highly correlated.

A concluding remark must also be given with reference to the consequences of this research for practical work and crime prevention (at least in Germany). While other research pointed out, that a normative orientation towards conformity is well established and reinforced in school via strong bonds to school and teachers (Boers et al., 2009; Seddig, 2013), school seems hardly able to influence the inherent dynamics in delinquent peer groups that share a pro-violent normative orientation and violent behaviour. Preventive work in this field should probably involve low boundary street work since such groups are assumed to be relatively resistant against outside influences. Moreover, a lot of the delinquent activities of such groups tend to happen out of school in the afternoon. The early end of school around noon (a special feature of the German educational system) increases the likelihood to engage in unsupervised activities.

## Notes

1. The more complex milieu and lifestyle approach intends to modify and differentiate the macro structural perspective of classic anomie theory (Merton, 1968) that is based solely on a vertical class structure. The derivated hypothesis of poverty and deprivation driven higher delinquency rates in lower classes is not well supported (Tittle and Meier, 1990; Dunaway et al., 2000; Ellis and McDonald, 2000) and can be extended to include different value-orientations that are not bound by class limits.
2. Information about the study design, goals, results and references can be found at <http://www.crimoc.org>.
3. Incomplete panel data can also be addressed by different missing data techniques. For an

extensive discussion see Reinecke & Weins (2012).

4. Respondents with no peer group affiliation are generally coded with '1'. Since they are not associated with peers in a group context at all, the proposed activities do not apply to them.
5. Items were recoded to indicate that a high value represents high approval of the offence.
6. Since extortion, robbery and purse-snatching are conducted with the use of force, these offences are considered as violent offences by German law.
7. 'Gymnasium' is the highest secondary school type in Germany. 'Realschule' and 'Hauptschule' are the second and third types. 'Gesamtschule' is a mixed type. The migration history is based on the country of origin of the respondents' parents.
8. 26% of the respondents in the sample report a family migration history. 58% of the migrants are of Turkish origin.

## References

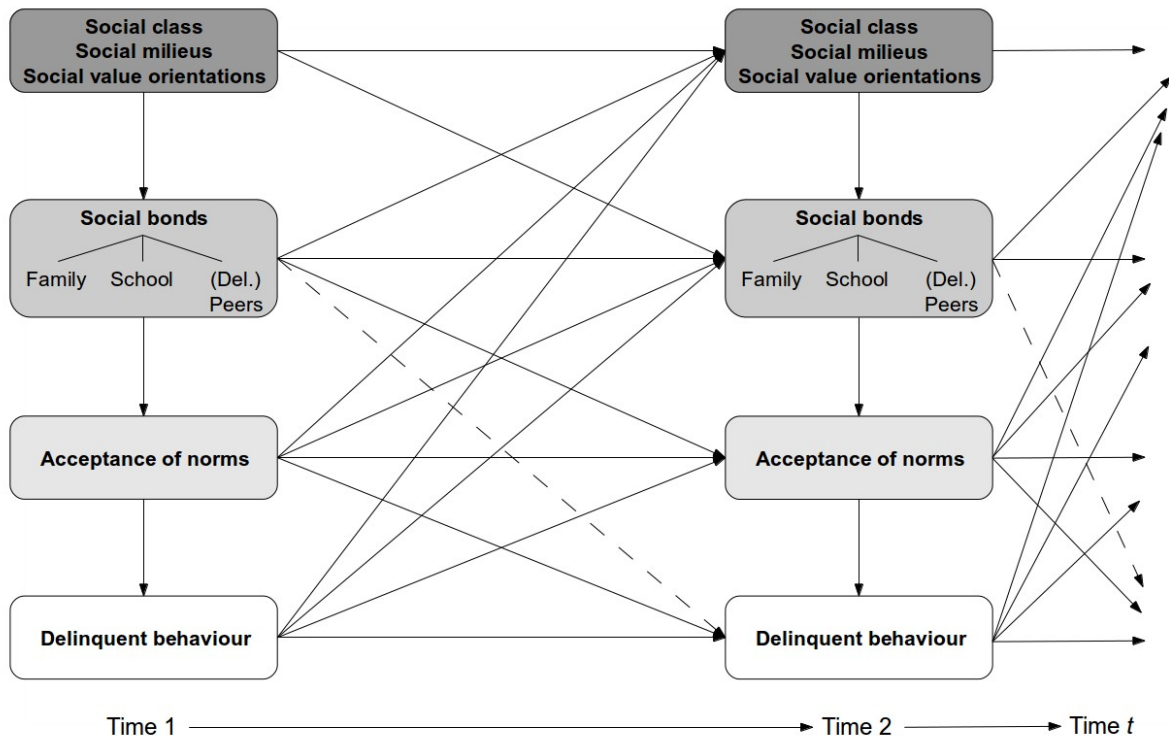
- Akers RL (1998) *Social Learning and Social Structure: A General Theory of Crime and Deviance*. Boston: Northeastern University Press.
- Andreassen TW, Lorentzen BG and Olsson UH (2006) The impact of nonnormality and estimation methods in SEM on satisfaction research in marketing. *Quality & Quantity*, 40: 39–58.
- Aseltine RH (1995) A reconsideration of parental and peer influences on adolescent deviance. *Journal of Health and Social Behavior*, 36(2):103–121.
- Baerveldt C, Völker B and Rossem R van (2008) Revisiting selection and influence: An inquiry into the friendship networks of high school students and their association with delinquency. *Canadian Journal of Criminology and Criminal Justice*, 50:559–587.
- Boers K, Seddig D and Reinecke, J (2009) Sozialstrukturelle Bedingungen und Delinquenz im Verlauf des Jugendalters: Analysen mit einem kombinierten Markov- und Wachstumsmodell. *Monatsschrift für Kriminologie und Strafrechtsreform*, 92(2/3): 267–288.
- Boers K, Reinecke J, Seddig D and Mariotti L (2010) Explaining the development of adolescent violent delinquency. *European Journal of Criminology*, 7(6): 499–520.
- Bollen KA (1989) *Structural Equations with Latent Variables*. New York: Wiley.
- Bollen KA and Long JS (1993) *Testing Structural Equation Models*. Newbury Park: Sage.
- Bollen KA and Curran PJ (2006). *Latent Curve Models: A Structural Equation Perspective*. New York: Wiley.
- Cameron AC and Trivedi PK (1998) *Regression Analysis of Count Data*. Cambridge: Cambridge University Press.
- Dunaway RG, Cullen FT, Burton Jr VS and Evans TD (2000) The myth of social class and crime

- revisited: An examination of class and adult criminality. *Criminology*, 38 (2): 589–632.
- Durkheim E (1982) *The Rules of Sociological Method*. Lukes S (ed), New York: Free Press.
- Elder GH (1998) The life course as developmental theory. *Child Development*, 69 (1): 1–12.
- Elliott DS and Menard S (1996) Delinquent friends and delinquent behavior: Temporal and developmental patterns. In: Hawkins DJ (ed) *Delinquency and Crime: Current Theories*. New York: Cambridge University Press, 28–67.
- Ellis L and McDonald JN (2000) Crime, delinquency and social status: A reconsideration. *Journal of Offender Rehabilitation*, 32 (3): 23–52.
- Enders CK (2001) The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychological Methods*, 6: 352–370.
- Enders CK and Bandalos DL (2001) The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*, 8(3): 430–457.
- Finkbeiner C (1979) Estimation for the multiple factor model when data are missing. *Psychometrika*, 44: 409–420.
- Frønes I (1995) *Among Peers. On the Meaning of Peers in the Process of Socialisation*. Oslo: Scandinavian University Press.
- Glueck S and Glueck E (1950) *Unraveling Juvenile Delinquency*. London: Oxford University Press.
- Gottfredson MR and Hirschi T (1990) *A General Theory of Crime*. Stanford: Stanford University Press.
- Hancock GR and Mueller RO (2006) *Structural Equation Modeling. A Second Course*. Greenwich, Connecticut: Information Age Publishing.
- Haynie DL (2001) Delinquent peers revisited: Does network structure matter? *American Journal of Sociology*, 106(4): 1013–1057.
- Haynie DL (2002) Friendship networks and delinquency: The relative nature of peer delinquency. *Journal of Quantitative Criminology*, 18(2):99–134.
- Hilbe JM (2008) *Negative Binomial Regression*, 2nd edn. Cambridge: Cambridge University Press.
- Hirschi T (1969) *Causes of Delinquency*. Berkeley: University of California Press.
- Hradil S (1987) *Sozialstrukturanalyse in einer fortgeschrittenen Gesellschaft. Von Klassen und Schichten zu Lagen und Milieus*. Opladen: Leske + Budrich.
- Kaplan D (2000) *Structural Equation Modeling. Foundations and Extensions*. Thousand Oaks: Sage.

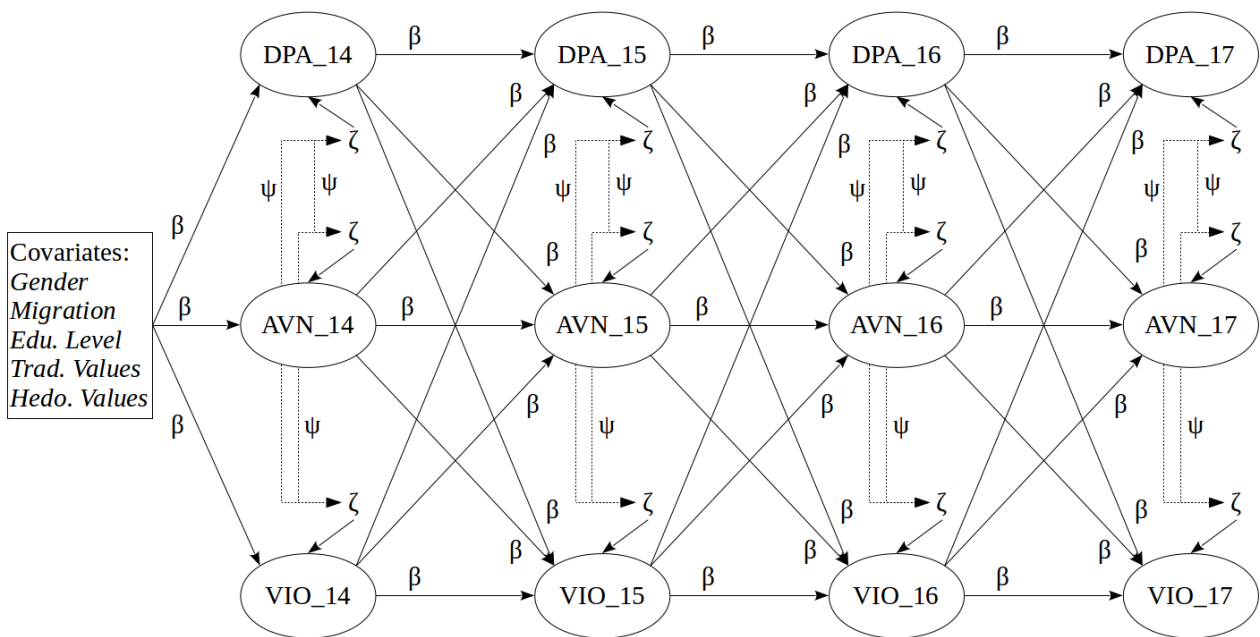


- Kluckhohn C (1967) Values and value orientation in the theory of action. An exploration in definition and classification. In: Parsons T and Shils E (ed) *Toward a General Theory of Action*. Cambridge: Harvard University Press, 388–433.
- Laub JH and Sampson RJ (1993) Turning points in the life course: Why change matters to the study of crime. *Criminology*, 31(3): 301–325.
- Long JS (1983) *Covariance Structure Models. An Introduction to LISREL*. Newbury Park: Sage.
- Matsueda RL and Anderson K (1998) The dynamics of delinquent peers and delinquent behavior. *Criminology*, 36(2): 269–306.
- Megens KCIM and Weerman FM (2012) The social transmission of delinquency: Effects of peer attitudes and behavior revisited. *Journal of Research in Crime and Delinquency*, 49(3): 420–443.
- Menard S and Elliott DS (1994) Delinquent bonding, moral beliefs, and illegal behavior: A three-wave panel model. *Justice Quarterly*, 11(2): 173–188.
- Merton RK (1968). Social structure and anomie. In: Merton RK (ed.) *Social Theory and Social Structure*. New York: Free Press, 185–214.
- Miller HV (2010) If your friends jumped off of a bridge, would you do it too? Delinquent peers and susceptibility to peer influence. *Justice Quarterly*, 27(4): 473–491.
- Montfort K van, Mooijaart A and Meijerink F (2009) Estimating structural equation models with non-normal variables by using transformations. *Statistica Neerlandica*, 63: 213–226.
- Olsson UH, Foss T, Troye SV and Howell RD (2000) The performance of ML, GLS, and WLS estimation in structural equation modeling under conditions of misspecification and nonnormality. *Structural Equation Modeling*, 7: 557–595.
- Parsons T (1960) *Structure and Process in Modern Societies*. New York: Free Press.
- Reed MD and Rose DR (1998) Doing what simple Simon says? Estimating the underlying causal structures of delinquent associations, attitudes, and serious theft. *Criminal Justice and Behavior*, 25(2):240–274
- Reinecke J (2013) Growth curve models and panel dropouts: Applications with criminological panel data. *Netherlands Journal of Psychology*, 67: 122–131.
- Reinecke J and Seddig D (2011) Growth mixture models in longitudinal research. *Advances in Statistical Analysis*, 95(4): 415–434.
- Reinecke J and Weins C (2012) The development of delinquency during adolescence: A methodological analysis of missing data techniques. *Quality & Quantity* (in press).
- Rhemtulla M, Brosseau-Liard PÉ and Savalei V (2012) When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods*, 17(3): 354–373.

- Sampson RJ and Laub JH (2003) Life-course desisters? Trajectories of crime among delinquent boys followed to age 70. *Criminology*, 41(3): 555–592.
- Seddig D (2013) Crime inhibiting, interactional and co-developmental patterns of school bonds and the acceptance of legal norms. *Crime and Delinquency* (in press).
- Smith DJ and Ecob R (2013) The influence of friends on teenage offending: How long does it last? *European Journal of Criminology* 10(1): 40–58.
- Sutherland EH (1947) *Principles of Criminology*, 4th edn. Philadelphia: J. B. Lippincott.
- Thornberry TP (1987) Toward an interactional theory of delinquency. *Criminology*, 25(4): 863–891.
- Thornberry TP (1996) Empirical support for interactional theory: A review of the literature. In: Hawkins DJ (ed) *Delinquency and Crime: Current Theories*. New York: Cambridge University Press, 198–235.
- Thornberry TP, Lizotte AJ, Krohn MD, Farnworth M and Jang SJ (1994) Delinquent peers, beliefs, and delinquent behaviour: A longitudinal test of interactional theory. *Criminology*, 32(1): 47–83.
- Tittle CR and Meier RF (1990) Specifying the SES/delinquency relationship. *Criminology*, 28 (2): 271–299.
- Warr M (1993) Age, peers and delinquency. *Criminology*, 31(1): 17–40.
- Warr M (2002) *Companions in Crime: The Social Aspects of Criminal Conduct*. Cambridge: Cambridge University Press.
- Warr M and Stafford M (1991) The influence of delinquent peers: What they think or what they do? *Criminology*, 29(4): 851–866.
- Weerman FM (2011) Delinquent peers in context: A longitudinal network analysis of selection and influence effects. *Criminology*, 49(1): 253–286.
- Widaman KF, Ferrer E and Conger RD (2010) Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives*, 4(1): 10–18.



**Figure 1.** Distal and proximate dimensions in a socio-etiological model of delinquency



DPA: Delinquent peergroup association  
 AVN: Acceptance of pro-violent norms  
 VIO: Incidence rate of individual violent delinquency

**Figure 2.** Full hypothesised model structure

**Table 1.** Comparison of cross-sectional and panel data information

Year	Wave	% male		% low school type		Prevalence total (%)		Incidence total (Ø)		Prevalence Vio. (%)		Incidence Vio. (Ø)	
		Cross-section	Panel	Cross-section	Panel	Cross-section	Panel	Cross-section	Panel	Cross-section	Panel	Cross-section	Panel
2002	t1	50.7	41.4	22.0	17.4	29.57	25.02	4.37	2.69	13.37	11.23	0.84	0.64
2003	t2	50.2	41.9	24.6	17.8	37.65	31.10	9.04	6.23	18.23	14.72	1.46	0.87
2004	t3	49.0	41.5	22.6	17.8	33.68	28.54	9.18	5.20	14.57	11.08	1.42	0.81
2005	t4	50.4	41.7	21.7	17.3	27.09	23.66	7.48	4.16	12.38	9.84	1.23	0.77
2006	t5	49.8	41.8	0.3	0.6	22.79	17.71	6.00	4.12	10.18	7.41	0.95	0.65

**Table 2.** Description of peer group and norm items

Items 'Delinquent peer group association'	Age	% Approval <sup>a</sup>	Items 'Acceptance of pro-violent norms'	Age	% Approval <sup>b</sup>
Use of violence	14	12.1	Hit a person	14	19.0
	15	10.9		15	17.1
	16	10.9		16	14.9
	17	9.2		17	11.0
Fights	14	10.4	Provocation/Intimidation	14	30.8
	15	9.5		15	28.3
	16	10.3		16	25.8
	17	8.5		17	20.4
Breaking rules	14	30.7	Extortion	14	5.5
	15	32.5		15	5.2
	16	26.8		16	4.2
	17	26.0		17	3.9

<sup>a</sup> Percentages based on the categories 'partly agree', 'rather agree' and 'totally agree'.

<sup>b</sup> Percentages based on the categories 'rather harmless' and 'totally harmless'.

**Table 3.** Description of transformed violent delinquency indices

Age	Mean	Skewness
14	0.21	3.48
15	0.17	4.23
16	0.16	4.30
17	0.11	5.59

**Table 4.** Standardized robust FIML estimates for the structural models<sup>a</sup>

	Model 1 (n=1,552)		Model 2 (n=1,511)		Model 3 (n=1,507)	
<b>Stabilities</b>	$\beta$	z	$\beta$	z	$\beta$	z
DPA_14 → DPA_15	0.463	9.205	0.467	9.092	0.466	9.041
DPA_15 → DPA_16	0.413	8.366	0.411	8.291	0.408	8.216
DPA_16 → DPA_17	0.396	7.382	0.394	7.235	0.391	7.120
AVN_14 → AVN_15	0.477	9.035	0.521	9.160	0.529	9.404
AVN_15 → AVN_16	0.649	12.504	0.668	12.494	0.669	12.319
AVN_16 → AVN_17	0.592	11.418	0.602	11.223	0.614	11.293
VIO_14 → VIO_15	0.292	5.049	0.267	4.992	0.265	4.914
VIO_15 → VIO_16	0.278	4.670	0.260	4.377	0.260	4.370
VIO_16 → VIO_17	0.151	2.386	0.130	2.146	0.130	2.134
<b>Cross-lagged effects</b>	$\beta$	z	$\beta$	z	$\beta$	z
DPA_14 → AVN_15	0.121	2.852	0.108	2.437	0.107	2.381
DPA_15 → AVN_16	0.090	1.891	0.082	1.713	0.083	1.702
DPA_16 → AVN_17	0.163	3.230	0.159	3.073	0.149	2.846
DPA_14 → VIO_15	0.152	3.140	0.154	3.147	0.152	3.114
DPA_15 → VIO_16	0.122	2.258	0.127	2.335	0.124	2.277
DPA_16 → VIO_17	0.232	4.104	0.242	4.224	0.240	4.165
AVN_14 → DPA_15	0.173	4.249	0.182	4.391	0.181	4.371
AVN_15 → DPA_16	0.198	4.876	0.198	4.808	0.201	4.840
AVN_16 → DPA_17	0.175	4.252	0.183	4.381	0.189	4.431
AVN_14 → VIO_15	0.103	3.035	0.111	3.231	0.112	3.226
AVN_15 → VIO_16	0.167	4.004	0.166	3.896	0.170	3.941
AVN_16 → VIO_17	0.131	3.277	0.128	3.141	0.130	3.122
VIO_14 → DPA_15	0.079	1.798	0.064	1.436	0.064	1.431
VIO_15 → DPA_16	0.060	1.385	0.064	1.452	0.065	1.455
VIO_16 → DPA_17	-0.027	-0.641	-0.027	-0.638	-0.028	-0.670
VIO_14 → AVN_15	0.156	4.528	0.136	3.954	0.136	3.941
VIO_15 → AVN_16	0.017	0.509	0.009	0.256	0.009	0.267
VIO_16 → AVN_17	-0.027	-0.760	-0.035	-0.964	-0.038	-1.034
<b>Covariate effects<sup>b</sup></b>	$\beta$	z	$\beta$	z	$\beta$	z
Gender → DPA_14			-0.374	-6.599	-0.363	-6.536
Gender → AVN_14			-0.634	-10.357	-0.626	-10.473
Gender → VIO_14			-0.262	-4.896	-0.259	-4.870
Migration → DPA_14			-0.045	-0.700	-0.014	-0.212
Migration → AVN_14			-0.041	-0.574	0.021	0.301
Migration → VIO_14			-0.138	-2.417	-0.111	-1.947
Edu. Level → DPA_14			-0.283	-5.040	-0.250	-4.438
Edu. Level → AVN_14			-0.145	-2.455	-0.124	-2.140
Edu. Level → VIO_14			-0.211	-4.283	-0.186	-3.760
Tradition → DPA_14					-0.285	-4.470
Tradition → AVN_14					-0.465	-7.544
Tradition → VIO_14					-0.215	-3.562
Hedonism → DPA_14					0.416	8.649
Hedonism → AVN_14					0.450	8.270
Hedonism → VIO_14					0.297	6.984
RMSEA		0.023		0.030		0.030
SRMR		0.040		0.047		0.045
CFI		0.979		0.961		0.958

<sup>a</sup>DPA: Delinquent peer group association; AVN: Acceptance of pro-violent norms; VIO: Incidence rate of individual violent delinquency.

<sup>b</sup>Covariate effects standardized with respect to the dependent Y-variables only.