

The stability of externalizing behavior in boys from preschool age to adolescence: A person-oriented analysis¹

Mark Stemmler² & Friedrich Lösel³

Abstract

The continuity of externalizing behaviors such as aggression, delinquency and hyperactivity has been noted by many researchers. There is also increasing knowledge on different developmental subtypes of problem behavior. In previous person-oriented analyses we found two types of externalizing problems in boys (Stemmler et al., 2005, 2008; Stemmler & Lösel, 2010). One pattern contained externalizing problems only, whereas the other type showed both externalizing and internalizing problems. The present study addressed these two groups in an extended prospective longitudinal design. It was investigated whether the groups remained stable over time and whether the two types of antisociality were related to offending in adolescence. The sample consisted of 295 boys from the Erlangen-Nuremberg Development and Prevention Study (Lösel et al., 2009). Social behavior was rated by mothers, kindergarten educators, and school teachers; offending was self-reported by the adolescents. The time lag between the first and last data assessment was more than eight years.

Approximately nine percent of the boys revealed stable externalizing behavior problems over the entire assessment period. Criminal behavior correlated positively with externalizing problems and negatively with internalizing problems. In a person-oriented Prediction-Configural Frequency Analysis (P-CFA; von Eye, 2002) the ‘externalizing only’ pattern could be replicated and suggested high stability over time. Moreover, this pattern was clearly related to self-reported delinquent behavior. In contrast to our previous studies with shorter follow up periods, the ‘combined externalizing and internalizing’ pattern did not appear as a type. It was also not significantly related to juvenile offending. Potential explanations for these findings are discussed.

Key words: Prediction-Configural Frequency Analysis (P-CFA), proactive and reactive aggression, delinquency, longitudinal research

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² Correspondence concerning this article should be addressed to: Mark Stemmler, PhD, University of Erlangen-Nuremberg, Institute of Psychology, Nögelsbachstr. 49c, 91052 Erlangen, Germany; email: mark.stemmler@psy.phil.uni-erlangen.de

³ University of Cambridge and University of Erlangen-Nuremberg, Germany

Introduction

The study of the origins and continuity of aggression, delinquency and other forms of externalizing behavior is one of the most important topics of developmental criminology (Boers, Lösel & Remschmidt, 2009). Externalizing behavior is not only a frequent and serious problem in cross-sectional studies on prevalence, but a substantial number of children with early externalizing symptoms are at risk to enter a pathway of relatively persistent antisocial behavior (e.g., Loeber & Farrington, 1998; Lösel & Bender, 2003). Therefore, the persistence and aggravation of externalizing problems over time is not only an important issue of basic research, but also highly relevant for approaches to prevention (Farrington & Welsh, 2007; Lösel & Bender, 2012).

Studies on the development of antisociality suggest that one must differentiate between various forms of problem behavior. Loeber and Hay (1997), for example, distinguished between 1) overt antisociality (hitting, bullying, fighting, and cruelty to animals; leading to later assault or rape), 2) covert antisociality (shoplifting, lying, vandalism, and firesetting; leading to burglary, fraud, or serious theft), and 3) authority conflict (stubborn behavior, defiance, or disobedience; leading to truancy, running away, or staying out late). Similar to the first two of these types, other authors differentiated between physical aggression versus relational (social, indirect) aggression or proactive versus reactive aggression (Dodge, Lochmann, Harnish, Bates & Pettit, 1997; Fontaine, 2007; Vitaro, Barker, Boivin, Brendgen & Tremblay, 2006). Although these forms of aggression show substantial overlap, they seem to have partially different origins and developmental trajectories (Vitaro & Brendgen, 2012).

The differentiation of subgroups and developmental pathways of antisocial behavior requires person-oriented research strategies (Magnusson & Allen, 1993). In previous studies we applied Configural Frequency Analysis (CFA; Lienert & Krauth, 1975; von Eye, 2002) to investigate different patterns of externalizing problems in the Erlangen-Nuremberg Development and Prevention Study (Stemmler, Lösel, Beelmann, Jaurisch & Zenkert, 2005; Stemmler, Lösel, Beelmann & Jaurisch, 2008; Stemmler & Lösel, 2010). We found two types of externalizing problems that supported the above-mentioned differentiations. One pattern contained externalizing problems only, whereas the other type showed both externalizing and internalizing problems. The first group could be seen as primarily proactive, instrumental and unemotional in their exhibition of aggression, whereas the second group seemed to be more reactive and emotionally driven.

Our previous analyses addressed the time period from preschool to elementary school and did not allow conclusions on the longer-term stability of the two developmental patterns. Therefore, the present study has been carried out. We are now using CFA to investigate the stability of externalizing behavior patterns in boys from kindergarten to secondary school. CFA is a statistical tool for the analysis of multi-way contingency tables of categorical variables (von Eye, Mair & Mun, 2010). Each CFA is based on an underlying null model, usually the model assuming independence among the variables involved. In order to find so-called *types*, that is higher frequencies than expected under the null model, or *antitypes*, that is lesser frequencies than expected under the null model,

the null hypothesis needs to be rejected (Stemmler & Bingham, 2003). Whereas ordinary correlations reveal only bivariate or multivariate relationships, pattern-oriented techniques such as CFA and log-linear models are based on a multinomial statistical model, allowing the detection of interactions of a higher order.

In this paper Prediction-CFA (P-CFA) will be applied (von Eye, 2002). In P-CFA the variables A and B are the predictors for the criterion variable C. The respective log-linear base model is a model which is saturated within each set of predictors and criteria. It looks like the following:

$$\ln e_{ijk} = \lambda_0 + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_{ij}^{AB} \quad (1)$$

In e_{ijk} is the natural logarithm of the expected frequencies, λ_0 is the intercept, λ_i is the parameter of variable A and λ_j is the parameter of variable B (and so on). The lambda parameters can be interpreted similarly to beta weights in a regression equation. For each P-CFA or log-linear model a goodness-of-fit between the null model and the observed model is calculated using the likelihood ratio (LR) and/or the Pearson chi-square statistic (von Eye, 2002). If the null model of the P-CFA in equation (1) does not apply or results in a significant LR or chi-square statistic, interactions between any predictors and the criterion variable are prevalent. The advantage of a P-CFA over the ordinary first order CFA is, that the resulting types or antitypes contain information of a directed relationship (Stemmler et al., 2008). Common types or configurations refer to a class of persons sharing the same characteristics (Stemmler, 2001).

Method

Sample

The data were taken from the Erlangen-Nuremberg Prevention and Development Study (Lösel, Beelmann, Stemmler & Jausch, 2006; Lösel, Stemmler, Jausch & Beelmann, 2009). The original sample of the core study consisted of 675 kindergarten children (336 boys, 339 girls) from 609 families. The project is a longitudinal study that started at preschool age and is now containing seven waves of data collection. The sample was nearly representative to young families living in Erlangen and Nuremberg (Franconia). According to an index of the socioeconomic status (SES; Geißler, 1994) which included income, education, profession, and housing conditions, 13.3% of the families were lower class, 32.3% were lower middle class, 30.6 % middle class, 15.4% upper middle class, and 3.0 % upper class. Approximately 86% of the parents were married at *Time 1*. The retention rates varied over time; in the most recent wave (nearly 10 years after the first one) circa 90% of the original sample participated. The analyses in this paper focused on all boys with available data at three measurement points: At *Time 1* the average age of the boys was $M = 4.93$ years ($SD = 8.9$ months). At *Time 2* the mean age was $M = 10.75$ years ($SD = 9.46$ months). Finally, at *Time 3* the boys were nearly 14 years old ($M = 13.92$; $SD = 10.04$ months). Therefore, the time lag between the first and last time-point

was more than eight years. A total of $N = 295$ boys fulfilled the inclusion criteria. In some statistical analyses the sample size varied a little due to missing data for some variables.

Measures

Child's social behavior. The children's social behavior in kindergarten and at school was assessed by our German adaptations of the Social Behavior Questionnaire (SBQ; Tremblay et al. 1987; Tremblay et al., 1992). The SBQ is available in several versions. Here, kindergarten educators', school teachers', and mothers' ratings were used (Lösel, Beelmann & Stemmler, 2002). The mother's ratings were used when the children were in secondary school. The content and format of the teacher's SBQ versions are identical and consist of 46 items. The mother's version has two additional items. The teacher's version item 'stealing things' is divided for the mothers' version into 'stealing things at home' and 'stealing things outside home'. Each item is rated on a 3-point scale ranging from '0' = never/not true to '2' = almost always/true most of the time. Two scales of the SBQ were used. The *Externalizing Problems* scale is a second order scale consisting of four primary scales: *Physical Aggression*, *Hyperactivity/Attention Problems*, *Destroying Things/Delinquency* and *Indirect Aggression*. The reliabilities for the different informants were $\alpha = .89$ (preschool teachers/kindergarten nurses), $\alpha = .91$ (school teachers), and $\alpha = .74$ (mothers). The second scale on Emotional Problems/Anxiousness addressed internalizing behavior problems; $\alpha = .75$ (kindergarten); $\alpha = .78$ (school), and $\alpha = .63$ (mothers).

Offending in adolescence. The adolescent's delinquent behavior was assessed by a German delinquency self-report scale (DBS; Lösel, 1975). The DBS-scale, which was filled in by the youngsters themselves, consists of a total score and various subscales. The *Total Scale* is a summary of all 28 items. Its reliability in various studies varied between $\alpha = .77$ and $.89$. In addition, we used the subscales *Property Crimes* ($\alpha = .60 - .78$) and *Violent Offenses* ($\alpha = .56 - .74$) for our analyses. Each item is answered according to whether the delinquent act under question was ever been committed, and if yes, how often in the last year.

Results

Table 1 shows the correlations between the kindergarten educators' SBQ ratings (*Time 1*), the elementary school teacher's rating (*Time 2*), the mothers' SBQ ratings of the boys and the boys' self reports in the DBS at *Time 3* (secondary school). The longitudinal correlations for externalizing problems were significant, even from *Time 1* to *Time 3* ($r = .24$), suggesting some stability in the rank order of problem behavior over more than eight years. The longitudinal correlations for internalizing problems were lower, but still significant: i.e., $r = .13$ between *Time 1* to *Time 2*; $r = .20$ from *Time 2* to *Time 3*, and $r = .18$ between *Time 1* and *Time 3*. The cross-sectional correlations revealed that externaliz-

ing problems correlated significantly with internalizing problems (ranging from $r = .12$ at *Time 1* through $r = .28$ at *Time 3*). This suggests some co-occurrence between these two types of problem behaviors. Self-reported offending correlated significantly with externalizing problems across all three time-points (ranging from $r = .20$ at *Time 2* and *Time 3* through $r = .28$ at *Time 1*), but negatively with internalizing behavior (ranging from $r = -.08$ at *Time 3* through $r = -.19$ at *Time 2*). With one exception (i.e., *Time 1* to *Time 3*: $r = .14$), there were no significant longitudinal correlations between externalizing and internalizing behavior.

In order to investigate the long-term stability of problem behavior patterns, three individual characteristics were selected for Prediction-Configural Frequency Analysis (P-CFA): Externalizing behavior in kindergarten, and externalizing and internalizing behavior in secondary school. All variables were dichotomized close to the 75th percentile. Table 2 shows the observed and expected frequencies for the P-CFA as well as the z -values based on the standardized residuals, which are basically the normal approximation of the χ^2 -component.

From kindergarten to secondary school nine percent ($n = 26$) of the sample stayed in the upper quarter of the distribution for externalizing problems. The base model for the P-CFA provided a non-satisfactory fit ($LR = 13.21$, $df = 3$, $p = .00$) suggesting an interaction between the *Time 1* predictor (i.e., externalizing) and any of the *Time 3* criterion variables (i.e., externalizing and internalizing). One externalizing pattern turned out to be significant over the eight-year period: The *type* ‘+ – +’ representing high externalizing behavior at *Time 1* and *Time 3*, but no internalizing problems. The ‘combined externalizing and internalizing’ pattern did not appear as a type.

Table 1:

Longitudinal and cross-sectional correlations for boys’ externalizing and internalizing behavior from kindergarten (T_1) via elementary school (T_2) to secondary school (T_3) and the correlation with delinquent behavior (T_3)

		Kindergarten (T1)		Elementary School (T2)		Secondary School (T3)	
		Ext	Int	Ext	Int	Ext	Int
T_1	Ext						
	Int	.12*					
T_2	Ext	.34***	-.02				
	Int	-.02	.13*	.21**			
T_3	Ext	.24***	.14*	.13**	.06		
	Int	-.05	.18**	-.04	.20*	.28***	
	DB	.28***	-.10 ⁺	.20**	-.19**	.20***	-.08

Note: ⁺ $p < .10$, * $p < .05$, ** $p < .01$. The sample sizes for the bivariate correlations varied from $n = 259$ through $n = 298$. T_1 = kindergarten teachers’ ratings, T_2 = elementary school teachers’ ratings, and T_3 = mothers’ ratings; DB = delinquent behavior; DB is children’s self-report.

Table 2:
Prediction-CFA for externalizing problems in kindergarten (ExtT₁) and externalizing and internalizing in secondary (Ext/IntT₃)

Cell Index			P-CFA		
ExtT ₁	IntT ₃	ExtT ₃	f(o) _{ijk}	f(e) _{ijk}	z _{ijk}
-	-	-	148	140.82	0.61
-	-	+	23	32.91	-1.73
-	+	-	31	29.08	0.36
-	+	+	23	22.19	0.17
+	-	-	36	43.18	-1.09
+	-	+	20	10.09	3.11 T
+	+	-	7	8.92	-0.64
+	+	+	6	6.81	-0.64

Note: $N = 294$. T = Type, A = Antitype. z_{ijk} = z-approximation of the chi-square statistic. ‘-’ = below the 75th percentile; ‘+’ = above the 75th percentile. The listed z-value is based on the *standardized residuals* in the SPSS printout.

Table 3 contains the relationship of different behavioral patterns with offending at Time 3. As the sizes of the subsamples with different patterns of problem behavior were rather small, we restricted our analysis to the configurations of *Time 3*. We entered the *Total Scale* of the self-report delinquency scale and the two subscales in oneway-ANOVAs

Table 3:
One-way ANOVAs comparing the four patterns of externalizing and internalizing behavior regarding to adolescent delinquent behavior in secondary school (cross-sectional analyses)

	Behavior Pattern				<i>F</i> (<i>df</i>)
	i + e + (<i>n</i> = 30)	i – e + (<i>n</i> = 43)	i- e – (<i>n</i> = 181)	i + e – (<i>n</i> = 35)	
Delinquency Scales	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Total Score	1.94 ^b (2.11)	3.84 ^a (3.80)	2.18 ^b (2.49)	2.14 ^b (2.71)	4.82** (3,285)
Violent Offenses	0.37 ^b (0.89)	0.93 ^a (1.28)	0.45 ^b (0.87)	0.51 ^{a,b} (0.95)	3.26* (3,285)
Property Crime	1.08 ^b (1.18)	2.05 ^a (2.00)	1.21 ^b (1.35)	1.11 ^b (1.41)	4.50** (3,285)

Note: * $p < .05$; ** $p < .01$. $N = 208$. Means with different indices were significantly different (post hoc comparisons). For the post hoc comparison the least significant difference (LSD) was applied. Delinquency ratings were based on children’s self-report. Behavior ratings were based on mother’s report.

with four behavior patterns based on the combination of externalizing and internalizing behavior. The behavior patterns were distributed as follows: 'i + e +' ($n = 30$), 'i - e +' ($n = 43$), 'i - e -' ($n = 181$), 'i + e -' ($n = 35$). The *Total Scale* and the subscale *Property Crime* revealed significant mean differences among the four behavior patterns involved. The highest values were found in the 'externalizing only' pattern 'i - e +'. This configuration was significantly different from the patterns with no externalizing behavior (i.e., 'i - e -' and 'i + e -') and also showed a clear tendency to enhanced scores in the scale on *Violent Offenses*. The means for the 'combined externalizing and internalizing' pattern were not higher than the patterns with no externalizing problems, suggesting that 'i - e +' is the only group with a deviant behavior pattern.

Discussion

As we set our cutoff point of externalizing problems around the 75th percentile of the sample's distribution, 23% and 24% fell in this category at *Time 1* and at *Time 3*. Such point-prevalence rates are above the rates of clinically relevant behavior problems, but only slightly above the broader definition in the nationwide German Child and Youth Health Survey of the Robert Koch Institute (Hölling, Erhart, Ravens-Sieberer & Schlack, 2007). Contrary to the latter survey, the present paper provides data on the stability of externalizing behavior for boys from kindergarten through secondary school. There are about nine percent of the boys who remained in the highest quarter of externalizing behavior for more than eight years. The majority of this subset of boys consists of the 'externalizing only' pattern (20 out of 26). This group of approximately 7% of early starting and relatively persistent antisocial youngsters is in accordance with international findings on the prevalence of problem stability (Loeber & Farrington, 1998; Lösel & Bender, 2003).

Stability of externalizing behavior was also found in the longitudinal correlations of our study. The correlations were significant over time, although for each measurement time different raters were used. The latter usually leads to relatively small inter-correlations (Achenbach, 2006; Lösel, Stemmler, Beelmann & Jaurisch, 2005). The correlations between different informants in cross-sectional studies are even smaller than the longitudinal correlations of behavior ratings by the same informant (Lösel, 2002). As expected, the broader characteristic of externalizing problems was significantly and substantially related to offending behavior at *Time 3* (correlations between $r = .20$ and $.28$). This could be seen as a further indicator of measurement validity as the criminal behavior was assessed via self-report. In contrast to the externalizing problems, internalizing behavior at all three measurement times correlated negatively with juvenile delinquency. This result is in line with research suggesting that internalizing problems may protect children from aggression and delinquency (Loeber, Farrington, Stouthamer-Loeber & White, 2008; Lösel & Farrington, 2012; Tremblay, Pihl, Vitaro & Dobkin, 1994). However, some findings also suggest that internalizing problems may increase the risk of continuity/aggravation when youngsters already developed antisocial problems (Donker, 2004; Loeber et al., 2008; Lösel & Farrington, 2012).

The risk aspect of internalizing problems had been suggested in our previous finding of an ‘externalizing only’ and an ‘externalizing plus internalizing’ type of problem behavior. Our application of Prediction-Configural Frequency Analysis (P-CFA) was able to detect a three-way interaction between externalizing and internalizing variables which could not be found in a variable-oriented approach (Stemmler et al., 2005). This underlines the importance of a person-oriented research strategy (Magnusson & Allen, 1983). However, we now only found a significant pattern of ‘externalizing only’ problems and no longer a type of ‘combined externalizing and internalizing’ problems. The first longitudinal pattern indicates the more proactive, instrumental and overt type of antisociality (Dodge et al., 1997; Fontaine, 2007; Loeber & Hay, 1997; Vitaro & Brendgen, 2012). It goes along with physiological under-arousal in the respective individuals (Raine et al., 1998). In contrast, the reactive type involves more emotions such as angry outbursts, anxiousness, and impulsive reactions to perceived provocation that go along with enhanced physiological arousal (Scarpa & Kolko, 1994).

We can only speculate why the latter type could not be replicated in our long-term assessment from preschool to adolescence. In our former article (Stemmler & Lösel, 2010) investigating the time from kindergarten to elementary school both types were significant and they encompassed 27 boys (18 boys in pattern ‘i- e+’; 9 boys in pattern ‘i+ e+’). In the present article both patterns contained (almost) the same number of boys, that is 26 boys (20 boys in pattern ‘i- e+’; 6 boys in pattern ‘i+ e+’). They are, however, mixed differently, with more boys in the ‘externalizing only’ group and less boys in the ‘combined externalizing and internalizing’ group. Some boys from the comorbide type moved to the proactive type because they did not reach the high level of the 75th percent cut-off for internalizing. Due to small numbers, the minor reduction from nine to six boys resulted in a significant loss of power in the ‘i- e+’ pattern. In addition to this random explanation one must also take into account that internalizing problems are generally less stable over time than antisocial behavior (Robins & Price, 1991). They are also less visible for informants and therefore more difficult to assess (Lösel et al., 2005). This would explain the minor differences between our previous and current findings. One must also take into account changes in social contexts over time. With regard to school bullying, for example, the ‘i+ e+’ pattern can be interpreted as the group of bully-victims, whereas the ‘i- e+’ pattern indicates the group of typical proactive bullies (Lösel & Bliesener, 2003; Olweus, 1993). As longitudinal studies have shown, bullying perpetration is relatively stable and predicts antisocial outcomes such as offending and violence (Ttofi, Farrington, Lösel & Loeber, 2011a). Although bullying victimization is a significant predictor of internalizing problems, it seems to be less stable and more weakly related to later behavioral outcomes (Ttofi, Farrington, Lösel & Loeber, 2011b). This has also been observed in the Erlangen-Nuremberg Development and Prevention Study (Lösel & Bender, 2011). The change from primary to secondary schools and also psychological processes of puberty may have contributed to our finding that the combined ‘externalizing and internalizing’ group became less concise than in our previous shorter follow-up studies.

The disappearance of the second antisocial type is also reflected in the relations between the developmental patterns and offending in adolescence. Only the more ‘cold-blooded’

behavioral pattern of 'i- e+' showed clearly enhanced criminality. In contrast, the 'i+ e+' pattern revealed similar mean scores of self-reported offending as the large non-deviant 'i- e-' group. Together with the variable-oriented findings in Table 1, this suggests a moderate protective effect of emotional problems such as anxiousness, depressive mood and social withdrawal.

The particular relevance of the 'externalizing only' pattern and its relationship to delinquency is in line with other studies, suggesting the high predictive validity of proactive aggression for later externalizing behavior and delinquency. Vitaro, Gendreau, Tremblay & Olin (1997), for example, investigated proactively and reactively aggressive twelve-years old boys from a low SES. Only the proactive boys revealed high delinquency rates and behavior problems such as conduct problems at the age of 15. Similarly, in a study by Pulkkinen (1996) proactively but not reactively aggressive male adolescents committed crimes during adulthood. Such findings may be due to more peer rejection and less social-cognitive skills in reactively aggressive boys (Dodge, Lochman, Harnish, Bates & Pettit, 1997). Subsequently, reactively aggressive males revealed significantly lesser friends and therefore lesser delinquents peers than their proactive aggressive counterparts with whom criminal acts are usually committed. In our study the 'combined externalizing and internalizing' group also showed the lowest quality of social information processing from all boys in elementary school (Stemmler & Lösel, 2010).

Although the above findings underline the particular criminological relevance of the small group with stable externalizing problems one has to bear in mind the following issues: The average age of the boys at *Time 3* was approximately 14 years and the majority of scores on self-reported offending were rather low. As offending increases during adolescence and reaches its peak at about 17 to 18 years (Farrington, Coid & West, 2009), one may expect larger variance and stronger statistical relationships when the boys become older. Another limitation of our study is related to the cutoff at the 75th percentile of the SBQ distributions. This suggests that the 'externalizing only' subgroup must not have been particularly low in the scale on emotional problems. Therefore, we should only assume some overlap but not identity with the callous-unemotional type of antisociality that has been described by Frick, Cornell, Barry, Bodin and Dane (2003). Further data waves in our study may help to clarify this relation.

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