

Problem coping skills, psychosocial adversities and mental health problems in children and adolescents as predictors of criminal outcomes in young adulthood

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Abstract The purpose of this study was to test child and adolescent psychosocial and psychopathological risk factors as predictors of adult criminal outcomes in a Swiss community sample. In particular, the role of active and avoidant problem coping in youths was analysed. Prevalence rates of young adult crime convictions based on register data were calculated. Univariate and multivariate logistic regressions were used to analyse the prediction of adult criminal convictions 15 years after assessment in a large Swiss community sample of children and adolescents ($n = 1,086$). Risk factors assessed in childhood and adolescence included socio-economic status (SES), migration background, perceived parental behaviour, familial and other social stressors, coping styles, externalizing and internalizing problems and drug abuse including problematic alcohol consumption. The rate of any young adult conviction was 10.1 %. Besides externalizing problems and problematic alcohol consumption, the presence of any criminal conviction in young adulthood was predicted by low SES and avoidant coping even after controlling for the effects of externalizing problems and problematic alcohol use. The other predictors were significant only when externalizing behaviours and problematic alcohol use were

not controlled. In addition to child and adolescent externalizing behaviour problems and substance use, low SES and inadequate problem-solving skills, in terms of avoidant coping, are major risk factors of young adult criminal outcomes and need to be considered in forensic research and criminal prevention programs.

Keywords Adolescence · Adult crime · Alcohol use · Coping · Externalizing behaviour problems

Introduction

Very often, the roots of adult criminal behaviour lie in childhood and adolescence and therefore, it is an important challenge for child and adolescent psychiatry to serve in a preventive manner. In order to best fulfil this task, a comprehensive understanding of developmental processes of criminal behaviour is warranted. Different trajectories of aggressive and delinquent behaviours in childhood and adolescence have been identified in longitudinal studies based on community samples and birth cohorts [32, 35, 36]. Most notably, a child-onset, life-course-persistent type and an adolescent-limited type have been suggested [31] and confirmed as a valid taxonomy of antisocial behaviour in youth [32, 36]. Whereas in the child-onset, life-course-persistent type, criminal behaviour is associated with psychosocial adversities, neurocognitive deficits, psychopathology and difficult temperament, the adolescent-limited type is conceived as a kind of temporary maladjustment.

Even though these typologies assume cumulative risks, it is also important to focus on the impact of distinct risk factors for adult crime to plan preventive strategies. Throughout various countries and cultures, one of the strongest risk factors for criminal behaviour is a preceding

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psychopathology. Irrespective of differences in design and methodology, several population-based studies were able to consistently link child and adolescent conduct problems to later criminal outcomes in adulthood [4, 8, 10, 15, 16, 22, 29, 36, 39, 44, 51]. Another risk factor was substance abuse, with community-based studies reporting that early drug use, including alcohol use, were related to later criminal outcomes [5, 10, 21, 51]. In addition, the consumption of so-called *hard* drugs predicted persistent criminal offending behaviours even when controlling for other forms of conduct problems [10, 51]. In contrast, the adolescent internalizing disorders do not seem to play an equally important role in the prediction of adult crime. Only one study found anxiety and depression, when comorbid with substance abuse, to be associated with adult crime [10]. However, other studies failed to find a relationship between adolescent internalizing disorders and adult crime when controlling for externalizing disorders [44].

Besides psychopathology, concepts of adult criminal behaviour also emphasize the exposure to childhood psychosocial adversities such as low socio-economic status (SES), criminal neighbourhood, parental criminality, negative bonding to parents, harsh discipline and a lack of parental supervision [14, 17, 19]. Further risk factors include the exposure to extrafamilial stressors like school failure, bullying, rejection by peers or the experiencing of violence [7, 14]. A European study has also shown that migration was associated with criminal behaviours in youths as well as in adults [24]. However, impacts of psychosocial factors are controversial since externalizing psychopathology remained the strongest predictor overruling psychosocial risk factors [15, 16] and psychosocial risk factors and their developmental impact vary substantially in different cultures and countries.

Only a minor part of youth growing up with psychosocial factors will develop criminal behaviours in adulthood. Hence, the question of vulnerability for delinquent behaviour and crime in terms of personality features of youth has to be raised. Among the various features, the ability of young people to cope with external stressors may be a relevant factor in the development of criminal and aggressive outcomes. Coping refers to all strategies an individual uses to manage stress and coping skills encompass active problem-solving strategies as well as emotional and behavioural strategies to tolerate stress [26].

Whereas the role of coping skills has been extensively studied with regard to emotional disorders and school performance [9], relatively few studies have addressed the role of coping in relation to externalizing problems and criminal behaviours. Sociological theories have conceptualized crime as a response to problems involving frustration and adverse social environments [2]. Individuals who are able to cope with socio-emotional problems by seeking

help, talking to others and actively looking for solutions will be more successful at school, at work and with social relationships. This, in turn, will lead to fewer experiences of being emotionally frustrated. Consequently, individuals with adequate coping skills will be less prone to develop aggression and criminal behaviours. In contrast, individuals with an avoidant coping style may be inclined to distract themselves from actual problems with criminal behaviours and/or substance abuse.

Several studies suggest that inadequate coping is related to delinquent behaviours in youths [12, 20, 42]. For instance, in a controlled study from Russia [42], juvenile detainees more frequently reported avoidant coping (e.g. distraction, emotional desistance) when compared with non-delinquent controls. Further studies found that avoidant coping was associated with drug abuse and dependency in incarcerated youths [12] and with delinquency in a school-based sample of youths in Australia [20]. The latter study suggested that coping skills training could be an effective intervention against delinquent behaviour. Indeed, problem-solving skills have been included in forensic treatment programs for youth and adult offenders (e.g. [30, 41]).

Criminality is a challenging phenomenon to study because it evades scrutiny [44]. Self reports of offending, victim reports and official police or court statistics are the most common methods of collecting data on criminal behaviours. However, none of these methods will provide a complete picture of crime. In previous studies, self-reported delinquency questionnaires [8, 14, 16, 29, 36, 39, 51], police reports [22, 44], official charges [10] or convictions [14, 22, 36] were used to measure criminal outcomes in adulthood. Few studies have reported both self-reported and official information on criminal behaviours [14, 36]. Victim reports have been used only in one previous study to measure partnership violence in adulthood [36]. Self reports probably provide the most detailed information on criminal behaviours but are limited to offenders who are willing to report their crimes. In contrast, official data are limited to offenses that have been reported to the police and/or by offenders who were found guilty by a court. Even in crime conviction records, certain crimes like serious driving offenses may be represented more frequently than in other sources of information.

The present study was based on data from the Zurich Adolescent Psychology and Psychopathological Study (ZAPPS) that addressed several risk and vulnerability factors impacting mental health problems [46]. Findings based on the ZAPPS provided evidence that within the underlying multivariate model of mental health problems, coping deficits play a significant role [46]. The present contribution expands the scope of the ZAPPS from adolescent mental health problems to criminal outcomes in adulthood with several aims.

First, with the attempt to replicate previous international studies, the impact of psychosocial and psychopathological risk factors on adult criminal outcomes was analysed in a Swiss community sample. Due to socio-economic and cultural differences, psychosocial risk factors including SES, migration background, familial and other social stressors and child rearing styles may have a different impact in various countries. Given the findings of previous international studies, it was hypothesized that problematic alcohol use, drug abuse and externalizing mental health problems constitute universal risk factors for later criminal behaviour [4, 8, 10, 15, 16, 22, 29, 36, 39, 44, 51]. We also analysed the interaction between sex of the proband and other predictors and then tested an abbreviated externalizing problem scale without the items indicating a specific relationship to criminal behaviours. Second, within this multivariate model of the origins of adult crime, the role of active and avoidant coping as an additional predictor for adult criminal outcomes was of particular interest. Because males and females have similar risk factors for later criminal outcomes [4], data from both sexes were included in the analyses. Official reports of criminal convictions were used as an objective, but rather conservative measure, of criminal behaviour that may underreport the true number of crimes.

Materials and methods

Sample and study design

The study design and basic demographic features of the ZAPPS have been described in detail in a previous publication [50]. Subjects were studied longitudinally at four times between 1994 and 2006. For the present study, data were based on 1,086 students who took part in the first wave of the ZAPPS. The original sample consisted of 1,964 pupils between 6 and 17 years of age who attended the first to the ninth grade in various types of schools in 1994. The sample was representative of the residents in the Canton Zurich in terms of gender, the twelve regional counties and the proportion of child and adolescents living in rural versus urban areas. Out of this sample, a total of 1,239 children and adolescents from the fifth to the ninth grade responded to various self-report instruments (see below) whereas children from the first to the fourth grade were considered too young for responding to self reports. Among the 1,239 youths, 153 (12.3 %) did not respond to the questionnaires or had more than 10 % missing items in one or more of the instruments so that they were excluded from the present study. Thus, the final sample consisted of 1,086 students aged between 10.7 and 17.9 years.

The mean age of the final sample at the first assessment was 13.85 (SD = 1.52) years and the sample consisted of

553 (50.9 %) males and 533 (49.1 %) females. A total of 146 (13.4 %) children and adolescents were of foreign nationality. At the time of the follow-up assessments the mean age was 29.6 (SD = 1.62, range = 26.4–33.7) years.

Instruments

Demographic measures

In agreement with the Swiss Health Survey [53], the SES was based on education (untrained, some vocational training, completed vocational training, completed upper secondary education, completed university education with a master degree) and professional occupation (unemployed, simple employee with no managing responsibility, employed with at least some managerial responsibility, self-employed or a manager with extended responsibility) of the parents and was assigned to five ordinal levels (low, lower medium, medium, upper medium, and high). Because SES was not assessed in the 1994 study, data were obtained 3 years later from the second wave of the study in which 780 adolescents from the original sample were included (36 low SES, 94 lower medium SES, 443 medium SES, 136 upper medium SES and 71 high SES). For the 306 non-participants of the second wave, the median of the sample (medium SES) was entered. Foreign nationality was coded from self reports. The general neighbourhood crime rate was taken from official police records in 1994 [56] and was coded as the average rate for 1,000 citizens separate for the 12 regions of the Canton of Zurich and the 12 urban districts of Zurich city. Neighbourhood crime rates varied between 36 and 117 crimes per 1,000 residents in the Canton Zurich (mean = 77.5, SD = 24.0) and between 93 and 3,121 crimes per 1,000 residents of Zurich city (Mean = 465.3, SD = 863.0).

Objective and subjective stressors

The Zurich life event scale (ZLES) consists of 36 items covering the most relevant domains in the lives of youths (life events in the family, life events at school, life events in friendships, illnesses and accidents) that have an impact on the adaptation of adolescents [48]. The time frame is defined as 12 months prior to filling out the questionnaire. The instrument assesses both objective (number of stressors) and subjective stresses (perceived impact of stressors). The items used as objective stressors had a dichotomous response scale (yes/no). In addition, positive responses had to be rated on a five-point Likert scale (very unpleasant, unpleasant, neutral, pleasant, very pleasant). Internal consistency coefficients for the subjective stress impact score were 0.74 for boys and 0.77 for girls [48]. For the present study, only those 30 items that previously showed a negative impact were considered [48].

Girls, compared to boys, were found to report more stressful life events. For both genders the number of life events, as well as the subjective stress, was related to mental health problems [48]. Considering familial influences on criminal behaviours [14], in the present study the items of the scale were assigned to two new scales named *familial stressors* consisting of 12 items (e.g. alcohol abuse by a family member, familial communication problems, familial health problems, imprisonment of a family member) and external stressors consisting of 18 items (e.g. partnership problems, occurrence of natural disasters, financial problems, school failure).

Perceived parental behaviours

The perceived parental behaviour (PPB) questionnaire measures parental behaviour from the adolescents point of view [40]. The instrument includes 32 items that have to be answered separately for mothers and fathers on a four-point Likert scale (not true, less true, somewhat true, very true). Exploratory factor analyses were performed separately for mothers and fathers and revealed three scales labelled *acceptance* (e.g. “my mother/father praises me when I do something good”), *rejection* (e.g. “my mother/father easily becomes upset if I do not do what she/he says”) and *control* (e.g. “my mother/father has clear rules for my behaviour”). Because the scales were identical for both maternal and paternal behaviour and correlated highly ($r = 0.71\text{--}0.79$), the scores for the two parents were combined. Internal consistencies of the scales were acceptable for the present study ($\alpha = 0.68\text{--}0.89$). Concurrent validity of the scales was also confirmed by showing differential associations with self-esteem and mental health problems that were in agreement with the literature [40].

Coping style

The coping across situations questionnaire (CASQ) is a self-report style instrument for youths to assess various strategies of problem-solving behaviour [43]. A shortened version of the CASQ was used in the ZAPPS and was based on 80 dichotomous items. *Proactive coping* (e.g. “I discuss the problem with my parents”) and *avoidant coping* (e.g. “I try not to think about the problem”) was measured across four age-specific problem areas in adolescence (school, parents, peers, and opposite gender). Reliability and external validity of the instrument were assessed in a previous study and were found sufficient [55].

Alcohol and other drug use

The substance use questionnaire (SUQ) was designed by Müller and Abbet [33] in collaboration with the World

Health Organization for a nationwide Swiss survey. It covers 22 items that deal with the consumption of both legal and illegal drugs. A previous study based on the longitudinal data of the ZAPPS confirmed the discriminant validity of four types of adolescent drinkers, namely, abstainers, social drinkers, heavy drinkers and problem drinkers [47]. Problem drinkers were found to differ from other types of adolescent drinkers and showed the highest level of mental health problems and the most negative psychosocial outcomes. Based on the findings of a former study [47], we decided to use the criterion of a problem drinker as a predictor for adult criminal outcomes. Accordingly, problematic alcohol use was defined as consumption of alcohol in the last month when feeling bad because of problems or when feeling lonely. This definition includes younger adolescents at risk for later alcohol abuse and dependency but who have not yet started using alcohol regularly. Other drug abuse was coded as present when the subject used any kind of illegal drugs in the last 3 months.

Internalizing and externalizing mental health problems

The youth self report (YSR) [1] is a common measure of assessing self-reported behavioural and emotional problems in children and adolescents during the past 6 months. This instrument consists of 118 items that can be scored on a 3-point rating scale (0 not true, 1 somewhat true and 2 very true) and was leading to a total problem scale, two second-order scales (internalizing and externalizing) and eight empirically derived first-order syndrome scales (withdrawn, anxious/depressed, somatic problems, social problems, thought problems, attention problems, aggression, and delinquent behaviours scales). Reliability and validity have been shown to be good for the original YSR versions in the US [1] as well as for the corresponding Swiss YSR version [49]. In the present study, the internalizing and externalizing problem scales of the YSR were used. In addition, an abbreviated YSR-externalizing problem scale excluding items 72 (fire setting), 81 (steals at home) and 82 (steals outside home) was tested. Internal consistency coefficients for the YSR-internalizing problem scale, the YSR-externalizing problem scale and the abbreviated YSR-externalizing problem scale were 0.86, 0.84 and 0.83, respectively.

Attrition analyses showed that the 153 drop-outs in comparison to the remaining participants were slightly though significantly younger (mean = 13.41 vs. 13.87 years, $t = 3.40$, $df = 1237$, $p < 0.05$), more frequently males (60.8 vs. 50.9 %, $\chi^2 = 5.23$, $df = 1$, $p < 0.05$) and more often of non-Swiss nationality (28.1 vs. 13.4 %, $\chi^2 = 22.30$, $df = 1$, $p < 0.001$). However, both groups did not differ in terms of criminal convictions (13.7 vs. 10.1 %, $\chi^2 = 1.84$, $df = 1$, $p \geq 0.05$).

Criminal records

Official records were reviewed for each of the study subjects in November 2009. Subsequently, data were anonymised to secure data confidentiality. Because juvenile offenses are not registered in Switzerland, only the number and penal codes of the adult crime convictions (18 years of age and older) were included in the present study. Misdemeanours and minor offenses with fines of less than 5,000 Swiss Franks were not included in the official data set. Furthermore, due to official regulations, the records of convictions with punishments of less than 1-year imprisonment were no longer available after 10 years. Thus, these convictions for minor crimes were not considered in the analyses.

Statistical analyses

First, univariate logistic regression analyses (LR) were performed with psychosocial risk factors, substance use and internalizing and externalizing mental health problems as predictor variables and the presence of adulthood criminal convictions as a dichotomous outcome variable. Second, Pearson correlations of the significant predictor variables were performed. Third, two multivariate prediction models with criminal convictions as a dichotomous outcome variable were conducted by considering all significant variables from the previous univariate analyses. Male gender was included as a control variable in the multivariate analyses. In the first prediction model, coping was not considered as a predictor whereas the second prediction model included *avoidant coping* as a significant univariate predictor in the analysis. Nagelkerke R^2 as a measure of the explained variance was compared. None of the predictors showed multi-collinearity (variance inflation factor >10) [34]. All statistics were calculated using SPSS 20.

Ethical approval

The ZAPPS community study was approved by the local school authorities of the government of the Canton Zurich, Switzerland, at a time when there was not yet an existing official ethical committee for scientific studies. In addition, the study was based on informed consent of all participating adolescents and their parents. In 2009, the study concept was presented to the Swiss Federal Office of Justice in connection with the request for information from the criminal records. The study was approved and supported.

Results

Descriptive findings

A total of 110 (10.1 %) subjects of the present sample had been convicted of some type of crime. In terms of the

distribution of crimes, traffic and drunk driving offenses were the most frequent ($n = 75$, 68.2 % of all crimes), followed by violent crimes ($n = 12$, 10.9 %), drug-related crimes ($n = 12$, 10.9 %) and crimes against property such as theft, burglary, and fencing ($n = 10$, 9.1 %). There were 38 cases (34.5 %) of other crimes (damage to property, breach of domestic peace, illegal pornography, etc.) that did not fit into any of the categories mentioned above. Among these 110 subjects, 82 (74.5 %) had one conviction, 22 (20.0 %) had two convictions, 3 (2.7 %) had three convictions, another 3 (2.7 %) had more than three convictions in adulthood and 29 (26.4 %) committed offenses from multiple categories. Some probands who committed traffic and drunk driving offenses also committed drug-related crimes ($n = 8$, 10.7 %) and/or violent crimes ($n = 7$, 9.3 %). Overlaps between other offense categories were more seldom.

Descriptive information on the predictor variables and sex differences are shown in Table 1. Boys more frequently were of foreign nationality, showed higher parental rejection scores, had higher externalizing problem scores and presented with more avoidant coping than girls. In contrast, girls showed higher parental acceptance scores, higher numbers of stressors, higher scores of subjective stress, higher internalizing problem scores and more active coping than boys.

Univariate predictors of criminal outcomes in adulthood

The results of the univariate LR predicting any adult criminal conviction are shown in Table 2. Male gender was a positive predictor of adult convictions whereas age was not significant. Furthermore, SES, perceived parental rejection, number of familial stressors, problematic alcohol use, other drug abuse and YSR-externalizing problems were significant predictors for any criminal conviction in young adulthood. The number of external stressor and the subjective measures of stress were not related to adult criminal outcome. Furthermore, avoiding coping significantly predicted later adult convictions. In contrast, active coping was not related to adult convictions. The correlation matrix of the predictor variables is presented in Table 3. Almost all predictors were significantly correlated with each other. SES and avoidant coping showed a less consistent pattern.

Psychosocial and psychopathological factors as multivariate predictors of criminal outcomes in adulthood

The demographic, psychopathology, and substance use variables that were identified as significant predictors of

Table 1 Descriptive findings and sex differences of the predictor variables

Predictors	Female sample (<i>n</i> = 533)	Male sample (<i>n</i> = 553)	Test statistics ¹	Total sample (<i>n</i> = 1,086)
Mean age in years (SD)	13.83 (1.53)	13.92 (1.70)	−0.89 n.s.	13.88 (1.62)
Psychosocial factors				
Mean rank of SES	557.13	530.37	140'110 n.s.	543.50
Foreign nationality (%)	60 (11.3 %)	86 (15.6 %)	4.30*	146 (13.4 %)
Mean neighbourhood crime rate	102.23	104.59	−0.27 n.s.	103.43 (142.36)
Mean parental acceptance (SD)	25.99 (5.72)	25.15 (5.81)	2.37*	25.56 (5.78)
Mean parental rejection (SD)	6.64 (4.32)	8.00 (4.80)	−4.92***	7.34 (4.62)
Mean parental control (SD)	10.86 (3.41)	10.95 (3.47)	−0.44 n.s.	10.91 (3.44)
Mean no. of external stressors (SD)	3.90 (2.77)	3.47 (2.61)	2.35*	3.66 (2.70)
Mean no. of familial stressors (SD)	2.04 (1.89)	1.69 (1.59)	3.34**	1.86 (1.75)
Mean subjective external stress (SD)	4.63 (4.06)	3.77 (3.58)	3.68***	4.19 (3.85)
Mean subjective familial stress (SD)	2.51 (2.84)	1.89 (2.34)	3.94***	2.20 (2.62)
Substance use				
Problematic alcohol use (%)	25 (4.7 %)	34 (6.1 %)	1.12 n.s.	59 (5.4 %)
Drug abuse (%)	23 (4.3 %)	32 (5.8 %)	1.22 n.s.	55 (5.1 %)
Psychopathology				
Mean YSR-externalizing (SD)	9.05 (5.74)	10.61 (6.47)	−4.21***	9.84 (6.17)
Mean YSR-internalizing (SD)	10.48 (7.39)	8.44 (6.09)	4.95***	9.44 (6.83)
Coping				
Mean active coping (SD)	5.30 (1.36)	4.89 (1.51)	4.68***	5.09 (1.45)
Mean avoiding coping (SD)	2.97 (1.65)	3.23 (1.75)	−2.51*	3.11 (1.70)

SES socio-economic status

¹ Test *t* test for continuous variables, Mann–Whitney for SES, χ^2 for dichotomous variables

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

later crime in univariate analyses were entered as independent variables in a multivariate model. In this complex model, criminal activity was predicted by SES, problematic alcohol use and YSR-externalizing problems as shown in the left column of Table 4. Nagelkerke R^2 indicated that approximately 19 % of the variance of adult criminal outcomes was explained by these predictors.

Additional exploratory analyses with the inclusion of interaction terms between sex and the predictor variables revealed no significant gender interactions. After inserting the modified YSR-externalizing problem scale (without items that were directly related to criminal behaviours) instead of the original YSR-externalizing scale, similar results were found (Nagelkerke $R^2 = 0.19$; YSR-externalizing modified: OR = 1.08, CI = 1.04–1.13, $p < 0.001$).

Furthermore, adding avoidant coping to the model resulted in an increase of Nagelkerke R^2 as a measure of the explained variance from 0.19 to 0.20. Despite this rather small increase, the model was improved significantly in comparison to the previous model ($\chi^2 = 6.28$, $df = 1$, $p < 0.05$). In fact, avoidant coping became a significant multivariate predictor in addition to SES, problematic alcohol use and YSR-externalizing problems which all remained significant as shown in the right column of

Table 4. Because active coping failed to be significant in univariate LR analyses, it was not included in the multivariate prediction model.

Discussion

The present study is based on a large community sample with long-term follow-up information over 15 years on young adult crimes as documented in official registers. The study integrated multiple psychosocial and psychopathological risk factors for adult crime that have been reported in previous international studies. The replication analysis used a community sample from Switzerland which is a rather wealthy country without strongly deprived urban neighbourhoods and with a well-developed social service system. Furthermore, within a multivariate model of the origins of adult crime, the role of deviant coping processes was analysed for the first time.

In terms of prevalence, the study found that 10.1 % of the former children and adolescents aged 10.7–17.9 years had any conviction for crimes in young adulthood between the ages of 18.0 and 33.7 years with males having a five times higher risk of being convicted of an adult crime than

Table 2 Univariate associations of predictors with adult crime ($n = 1,086$)

Control variables	OR	CI (95 %)
Male gender	4.99***	3.02–8.23
Age	1.03 n.s.	0.91–1.16
Predictors		
Psychosocial factors		
Socio-economic status (SES)	0.65*	0.46–0.91
Foreign nationality	1.50 n.s.	0.89–2.52
Neighbourhood crime rate	1.00 n.s.	1.00–1.00
Parental acceptance	0.98 n.s.	0.95–1.02
Parental rejection	1.08***	1.03–1.12
Parental control	1.01 n.s.	0.95–1.07
No. of external stressors	1.07 n.s.	1.00–1.14
No. of familial stressors	1.12*	1.01–1.24
Subjective external stress	0.99 n.s.	0.94–1.04
Subjective familial stress	1.04 n.s.	0.97–1.12
Substance use		
Problematic alcohol use	4.89***	2.72–8.79
Drug abuse	2.66**	1.36–5.21
Psychopathology		
YSR-externalizing	1.11***	1.08–1.14
YSR-internalizing	1.02 n.s.	0.99–1.04
Coping		
Active coping	0.89 n.s.	0.78–1.01
Avoiding coping	1.28***	1.14–1.43

OR odds ratio, CI confidence intervals

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

females. About two-thirds of the criminal convictions were due to serious offenses or drunk driving offenses. Comparisons with other studies are hampered by the fact that most studies have been based on rather selected samples without any proof of representativeness and mostly consist of males only. The observed prevalence rate of 16.3 % in the present sample for males was to some extent lower than the 21.2 % conviction rate in former child and adolescent psychiatric patients and the 20.0 % rate in their controls in

an older cohort of males all born in 1952 [45]. A recent US study found even higher rates of convictions (31.5 %) when considering crimes between 16 and 21 years of age [10]. In general, the comparability of conviction rates in different nations is limited due to cultural and juridical differences, varying time frames and specific cohort effects. Furthermore, as convictions for misdemeanours and minor offenses were not registered, the present findings relate to rather serious criminal outcomes.

The findings on the impact of the various risk factors in the present study again mirror the complexity of the development of adult criminal behaviour. First, and as expected, externalizing psychopathology, problematic drinking behaviour, and low SES were relevant childhood and adolescent predictors of young adult crimes. Second, and reflecting a controversial discussion in the literature, it was observed that avoidant coping was also an independent risk factor for adult criminality.

So far, no study has addressed the role of coping in the development of adult criminal outcomes. The present study revealed that avoidant coping exerted long-term effects on criminal behaviour independent of externalizing problems and substance use. The present finding expands previous results on avoidant coping in delinquent youths [20, 42] so that the implications need to be reflected.

Children and adolescents who frequently show avoidant coping will have fewer abilities to reflect their problems and will often make others responsible for their situation. Avoidant coping, as measured by the CASQ [43], includes both cognitive and emotional avoidance. Both types of avoidance will not change or solve existing problems. If the problems persist, in the long run avoidant coping will lead to increased rather than reduced stress levels. The inability or failure to manage stress and negative affects in a socially accepted way may lead to illegitimate modes of adaptation including delinquent behaviour [2, 25]. Furthermore, high chronic stress levels eliciting symptoms of irritable mood has been identified as a risk factor for both affective disorders [52] and impulsive aggression [6]. To some extent these inadequate stress mechanisms may also

Table 3 Bivariate correlation matrix of the predictor variables ($n = 1,086$)

Predictors	1	2	3	4	5	6	7
(1) Socio-economic status (SES)	1	-0.07*	0.01	-0.02	-0.05	-0.04	-0.10**
(2) Parental rejection		1	0.21***	0.12***	0.08**	0.44***	0.26***
(3) Number of familial stressors			1	0.15***	0.17***	0.31***	0.02
(4) Problematic alcohol use				1	0.28***	0.28***	0.03
(5) Drug abuse					1	0.35***	0.04
(6) YSR-externalizing problems						1	0.22***
(7) Avoiding coping style							1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 Multivariate associations of predictors and criminal convictions in adulthood ($n = 1,086$)

Nagelkerke R ²	Model 1 without coping		Model 2 with coping	
	OR	CI (95 %)	OR	CI (95 %)
Control variable				
Male gender	4.67**	2.76–7.89	4.57***	2.70–7.72
Predictors				
Psychosocial factors				
Socio-economic status (SES)	0.73*	0.55–0.97	0.74*	0.55–0.98
Parental rejection	0.99	0.95–1.04	0.98 n.s.	0.94–1.03
No. of familial stressors	1.06	0.94–1.21	1.07 n.s.	0.95–1.22
Substance abuse				
Problematic alcohol use	2.58**	1.27–5.25	2.81**	1.38–5.72
Drug abuse	1.14	0.51–2.54	1.11 n.s.	0.50–2.47
Psychopathology				
YSR-externalizing	1.08***	1.04–1.12	1.07***	1.03–1.11
Coping				
Avoiding coping style			1.18*	1.04–1.34

* $p < 0.05$. ** $p < 0.01$,*** $p < 0.001$

explain the high rates of psychopathology found in detained juveniles [37].

Avoidant coping implies a lack of problem-solving skills that might be addressed in prevention and intervention programs. So far, social skills training in combination with parent and teacher counselling was effective in the prevention of criminal outcomes in a sample at risk from the Montreal Longitudinal Experimental Study [4]. However, a recent meta-analysis found only moderate effect sizes from child prevention programs on criminal outcomes in adulthood [11]. Since these programs mainly target parental behaviour and child conduct problems, an additional focus on improving adolescent problem-solving skills resulting in more appropriate coping may also increase the effects on preventing later criminal behaviour. The avoidant coping style may also be linked to an anti-social personality style deserving more attention in future forensic research.

The present findings are in accordance with previous community-based studies underlining the role of externalizing psychopathology and substance abuse in adolescence as major predictors of criminal convictions in adulthood [8, 10, 15, 16, 22, 29, 36, 39, 44, 51]. These studies also indicate that, besides criminal behaviours (e.g. stealing or fire setting), other externalizing problems without a direct relation to crime such as lying, temper tantrums, and swearing are also related to adult crimes. Furthermore, as shown in a previous study [44], internalizing problems did not predict later criminal behaviours. Problematic alcohol use during adolescence tripled the risk of committing any adult crime so that it may well play a pivotal role in the development of later criminal outcomes in various ways. Firstly, alcohol may serve as a starter drug for the consumption of further illegal substances [23]. Secondly, the

disinhibitory effects of alcohol may lower the thresholds for criminal behaviours [27, 28]. Thirdly, alcohol use may reflect an inadequate coping strategy which increases the possibility of delinquent behaviours [3]. However, the finding that other drug use was not an independent predictor of criminal behaviour in the present community-based sample is in contrast to recently obtained results on drug-related criminality in detained youth and young adults with substance use disorders [38]. The difference in findings may be due to the marked differences of sample origins and the rather low prevalence of illegal drug abuse in the present cohort. Due to a lack of statistical power, no separate analyses were possible to test for the impact of various types of criminal outcomes (e.g. violent crimes). Although it has been found that most risk factors serve as generic correlates of crimes [13], the impact of some psychosocial risk factors may differ between different types of offense. For example, it has been found that Finnish boys who had an early move away from their family were specifically at risk to commit violent crimes [13].

Our results showing that both low SES and externalizing problems were independent risk factors are in accordance with a study of Finnish boys [44]. Alternatively, this result is in contrast to the Christchurch Health and Development Study from New Zealand which did not find SES to hold up in multivariate analyses [18]. One explanation might have to do with the assumption that there is less social permeability in European countries like Switzerland and Finland compared to a typical migration country like New Zealand. Therefore, adolescents and young adults more frequently remain in low SES strata with the corresponding risk for criminal behaviours. In these countries, the specific environmental hazards of low income family offspring for the

development of adult criminality need more special attention in juvenile crime prevention campaigns.

Finally, and in accordance with previous research, other psychosocial risk factors in childhood and adolescence, such as inadequate parenting behaviours and familial stressors, were correlated with mental health problems and significantly predicted later criminal outcomes [14]. However, these risk factors did not hold up in multivariate analyses and were mediated by conduct problems and substance abuse. In contrast, other factors such as criminal neighbourhood and foreign nationality were not relevant for later criminal outcomes in the present study from Switzerland. This could possibly be due to the fact that Switzerland is a country with well-developed social service systems and few areas with a high crime rate.

Limitations

Although the present study was based on a large community sample [50] and sampling was controlled for gender and regional counties of the Canton Zurich, various limitations have to be addressed regarding the generalization of the findings. Males and adolescents with migrant backgrounds were underrepresented in the final sample. The latter fact may be relevant because migrant origins have been identified as risk factors for criminality in Switzerland [24]. Furthermore, original SES data were missing for 342 cases and had to be replaced by the median of the sample. Unfortunately, other psychosocial factors such as parent criminality and delinquent peers have not been addressed by the ZAPPS and could not be included in the analyses.

Another limitation is the lack of official records for juvenile offenses so that the role of preceding adolescent offenses for young adult crime could not be analysed in the present study. Furthermore, no information on previous incarcerations of the probands who were convicted in adulthood was available. As with register-based data in most counties, a large number of delinquent activities, particularly by young people, never came to the attention of the authorities. Therefore, the present study may also underestimate the total number of convictions due to insufficient official registrations. Due to the rather small sample size of convicted juveniles and the consequence of limited statistical power, no separate analyses examining the impact of specific offense types were possible. Furthermore, most of the predicting variables of the present study were based on adolescents' self reports. Probably, parent and teacher reports would have been less biased by social desirability than self reports in certain behaviour domains. For example, one study suggests that parent information is more reliable in the domain of externalizing

behaviour whereas adolescents are more reliably reporting internalizing problems [54].

Finally, the focus on a variety of selected risk variables does not imply that the model under study is complete in terms of a full explanation of the developmental pathways into young adult crime. The restriction of the most complex model of prediction of young adult crime becomes most obvious when we consider that only 20 % of the variance of young adult convictions was explained by the adolescent risk variables of the present study.

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Conflict of interest The authors declare that they have no conflicts of interest.

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