

# Weapon carrying and psychopathic-like features in a population-based sample of Finnish adolescents

Suvi Saukkonen<sup>1</sup> · Taina Laajasalo<sup>2,3</sup> · Markus Jokela<sup>3</sup> · Janne Kivivuori<sup>4</sup> · Venla Salmi<sup>4</sup> · Eeva T. Aronen<sup>1,2</sup>

Received: 15 December 2014 / Accepted: 8 May 2015 / Published online: 19 May 2015  
© Springer-Verlag Berlin Heidelberg 2015

**Abstract** We investigated the prevalence of juvenile weapon carrying and psychosocial and personality-related risk factors for carrying different types of weapons in a nationally representative, population-based sample of Finnish adolescents. Specifically, we aimed to investigate psychopathic-like personality features as a risk factor for weapon carrying. The participants were 15–16-year-old adolescents from the Finnish self-report delinquency study ( $n = 4855$ ). Four different groups were formed based on self-reported weapon carrying: no weapon carrying, carrying knife, gun or other weapon. The associations between psychosocial factors, psychopathic-like features and weapon carrying were examined with multinomial logistic regression analysis. 9 % of the participants had carried a weapon in the past 12 months. Adolescents with a history of delinquency, victimization and antisocial friends were more likely to carry weapons in general; however,

delinquency and victimization were most strongly related to gun carrying, while perceived peer delinquency (antisocial friends) was most strongly related to carrying a knife. Better academic performance was associated with a reduced likelihood of carrying a gun and knife, while feeling secure correlated with a reduced likelihood of gun carrying only. Psychopathic-like features were related to a higher likelihood of weapon carrying, even after adjusting for other risk factors. The findings of the study suggest that adolescents carrying a weapon have a large cluster of problems in their lives, which may vary based on the type of weapon carried. Furthermore, psychopathic-like features strongly relate to a higher risk of carrying a weapon.

**Keywords** Adolescence · Weapon carrying · Psychopathic-like features

**Electronic supplementary material** The online version of this article (doi:10.1007/s00787-015-0724-2) contains supplementary material, which is available to authorized users.

✉ Suvi Saukkonen  
suvi.saukkonen@helsinki.fi

<sup>1</sup> Clinical Institute, Clinic for Children and Adolescents, Child Psychiatry, University of Helsinki, Helsinki University Central Hospital, Tukholmankatu 8 C 613, 00290 Helsinki, Finland

<sup>2</sup> Child Psychiatry, Forensic Psychiatric Center for Children and Adolescents, Helsinki University Central Hospital, Helsinki, Finland

<sup>3</sup> Institute of Behavioural Sciences, University of Helsinki, Helsinki, Finland

<sup>4</sup> Criminological Unit, National Research Institute of Legal Policy, Helsinki, Finland

## Introduction

Weapon carrying among adolescents is a major concern, as it increases the risk of violence and potential for physical injury or death [1, 2]. The bringing of weapons to school is especially alarming, as demonstrated by the violent incidents on school grounds in several countries in recent years. In the 2011 report of the US youth risk behaviour surveillance system, 16.6 % of high school students reported having carried some type of weapon, such as gun, knife or club, in the past month, with 5.1 % reporting having carried a gun in that period [3]. The literature of weapon carrying among European adolescents is scant. In the few European studies, the prevalence of weapon carrying in the preceding 30 days has been lower than in US studies ranging from 5.9 to 10.4 % [4–6]. To date, very little data of the juvenile weapon carrying in Finland exist [7], and no earlier studies

based on a nationally representative sample have been carried out. There is major concern about juvenile weapon carrying in Finland for several reasons. Not least because two major school shootings have taken place in Finland (in 2007 and 2008). These two massacres represent only the most visible form of school violence, as individual killings and near-fatal stabbings have also taken place in Finnish schools [8]. Guns are also involved in adolescent suicides. Finnish adolescent suicide rate is among the highest in the Organization for Economic Cooperation and Development (OECD) countries [9], and the most common method of suicide among male adolescents is shooting (49 %) [10, 11].

Prior research indicates that adolescents who carry a weapon are likely to be male [4, 12] and have a history of delinquent acts, such as peer misbehaviour, drug use and fighting [13–15]. Other risk factors include a lack of strong parental supervision and guardianship [12], lower levels of family attachment [16, 17], previous victimization [18–20], fear [21], living in unsafe surroundings and witnessing violence [22, 23] and poor academic performance [22]. Even though previous studies have established risk factors for weapon carrying among youths, many of the studies have only included US samples. It is therefore unclear if risk factors for juvenile weapon carrying are similar in other countries, especially in less studied European countries. In addition, very few studies have made the effort to distinguish adolescents according to the type of weapon they carry [21, 24, 25]. Those carrying guns and those carrying other weapons may be two different kinds of adolescents [25]. While carrying knives can lead to injuries if the weapon is used, the violent act is often slow and potentially preventable (low level of violence), whereas carrying a gun potentially leads to more instant and lethal violence [25]. Many otherwise law-abiding adolescents may get involved with a low level of violence at some point of their lives but never allow themselves to be intervened in more deadly violence (carrying and using guns) [25]. Thus, it remains uncertain whether different risk factors are differently related to carrying a gun compared to carrying other weapons.

Personality features as risk factors for adolescent weapon carrying have received very little attention in previous studies; yet, personality may predispose to delinquent behaviour when combined with other risk factors [26]. Psychopathy is a form of personality disorder that strongly associates with particularly violent, criminal behaviour [27]. The construct of psychopathy refers to a constellation of interpersonal (e.g. glibness, egocentricity, manipulativeness), affective (e.g. lack of empathy or guilt, shallow emotions) and behavioural (e.g. impulsivity, irresponsibility, persistent violation of societal norms) features [28]. Prior studies suggest that adolescents

with psychopathic-like features have an early on-start for criminal activities and they commit more violent and nonviolent crimes [29–31]. Adolescents involved in delinquent acts are generally more likely to carry weapons than nondelinquent adolescents [32]. Although both psychopathic-like features and weapon carrying have been shown to relate to violent behaviour, the association between psychopathic-like traits and weapon carrying in adolescents has remained unexplored. We are aware of no previous studies investigating the relationship between psychopathic-like features and weapon carrying among adolescents. Better understanding of both psychosocial and personality-related risk factors associated with weapon carrying should aid in prevention efforts to reduce serious youth violence.

The aim of the present study was to examine self-reported weapon carrying among Finnish adolescents. Our research addressed the following questions: (1) what is the prevalence of weapon carrying in a large, nationally representative Finnish sample of community youth? (2) Is weapon carrying in Finnish adolescents associated with delinquent behaviour, victimization, family and peer relationships, academic performance and fear or feelings of insecurity? (3) In particular, do psychopathic-like features relate to carrying a weapon after controlling for other risk factors mentioned above? Finally, are these associations different for carrying a gun compared to carrying other weapons?

## Method

### Procedure and sample

The data were collected as part of the Finnish self-report delinquency study (FSRD-12), which is a series of nationally representative self-report surveys of juvenile delinquency. The survey covers a wide variety of questions related to delinquency and a set of background factors including both individual and family level variables as well as personality features. The FSRD-2012 was conducted randomly in 51 municipal comprehensive schools in 2012. Classifications criteria consisted geographical area and community residential density. Of the targeted students ( $n = 6089$ ), 80 % ( $n = 4855$ , boys 2378, girls 2477) completed the questionnaire, which was anonymous and done via computer during a regular class supervised by a trained teacher. Reasons for non-response were an absence for personal reasons (e.g. illness, athletic meets, special needs education, family vacation or truancy) and a poor net connection randomly occurring in some school. In accordance with the regulations of the Finnish advisory board of research integrity, the parents' ethical approval was not

required for the study. A more detailed description of the survey system, procedure and sampling is presented elsewhere [33, 34].

## Measures

Weapon carrying was assessed with the following survey item: “Have you carried a weapon or an object you intended as a weapon, such as knife, chain or gun, in the past 12 months? (Do not consider carrying or using a weapon for the purpose of hunting or hobby such as shooting or archery sports)” (yes/no). If the participant reported having carried a weapon, then additional questions concerning the type of weapon were asked with response options: (1) knife, pocket knife or other edged weapon, (2) gun (firearm) or (3) other object you intended as a weapon. The response option “other object you intended as a weapon” was further itemized with a question of “What object?”, and the respondent was asked to fill in the name of the object that he/she intended as a weapon. The motivations for carrying a weapon (response options: “self-protection”, “intention to use the weapon against someone” or “other reason”) and if the weapon had been taken to school (yes/no) were also asked.

Based on previous studies [12, 13, 16, 18, 21, 22] of the risk factors for juvenile weapon carrying, six predictor variables were formed as described below. Table 1 presents the specific items included in the predictor variables in more detail.

### *Delinquency*

The participants reported whether they had committed different types of prohibited or criminal acts in the past 12 months (e.g. burglary, fighting, using drugs). A sum variable of seven dichotomous (yes/no) items was formed by adding up the responses (Cronbach’s  $\alpha = 0.73$ ).

### *Victimization*

The participants were asked about different types of victimization (e.g. bullying, physical and sexual abuse). A sum variable of six dichotomous (yes/no) questions was formed by adding up the responses (Cronbach’s  $\alpha = 0.64$ ).

### *Perceived peer delinquency*

Participants were asked how many of their friends had engaged in a variety of delinquent acts (shoplifting, using drugs, fighting) on a 3-point scale: 0 = none, 1 = one, 2 = more than one. One sum variable reflecting the circle of friends with antisocial behaviour was formed by summing the responses (Cronbach’s  $\alpha = 0.81$ ).

### *Family functioning*

The survey included 11 questions measuring parental supervision, parent–child communication and the quality of the parent–child relationship. Answers were given on a five-point scale from 1 (“never”) to 5 (“very often”), and four of the questions were reverse coded. One sum variable was formed by summing the responses (Cronbach’s  $\alpha = 0.76$ ). Higher score indicated better family functioning.

### *Academic performance*

A sum variable of academic performance was formed by adding up self-reported grades (4–10) in Mathematics, Finnish and literature and English (Cronbach’s  $\alpha = 0.80$ ).

### *Sense of security*

The participants were asked six questions about how safe they feel in different situations, for example, in the town centre in the evening or on the way to school or at home. Answers were given on a four-point scale from 1 (“very unsafe”) to 4 (“very safe”). One sum variable reflecting the sense of security was formed by summing the responses (Cronbach’s  $\alpha = 0.83$ ).

### *The antisocial process screening device-self-report (apsd-sr)*

The APSD-SR is a 20-item behaviour-rating scale derived from the measure of adult psychopathy, the Psychopathy Checklist [PCL-R, 28], and it was developed to measure early manifestations of the traits associated with psychopathy [35]. Although the APSD is a relatively brief measure, it is one of the most extensively utilized and tested measure of the psychopathic features in children and adolescents [36]. The APSD-SR is a self-report version for youth aged 10–18 years, and it is based on the initial APSD that was developed to be completed by a parent and a teacher of a child aged 6–13 years. Each item on the APSD-SR is scored as follows: 0 = not at all true, 1 = sometimes true and 2 = definitely true. The factorial validity of the instrument was described, and a 3-factor model was found to best fit the data from Finnish adolescents: an 8-item narcissism, a 5-item impulsivity and a 4-item callous–unemotional sub-factor [34]. A more detailed description of the factor analyses is given elsewhere [34]. A total score of APSD-SR can be obtained by summing all the item scores. Neither explicit cut-offs of total score of APSD-SR nor of parent or teacher version of APSD exists for differentiating adolescents with elevated levels of psychopathic-like features from those with low levels or absence of these features. Furthermore, current empirical evidence suggests that psychopathy is

**Table 1** Composition of the predictor variables

| Predictor variable         | Item  |
|----------------------------|---|
| Delinquency                | In the past 12 months have you (yes/no):  |
|                            | Drawn graffiti  |
|                            | Damaged school property or other property <sup>a</sup>  |
|                            | Stolen from a shop, school or vehicle <sup>b</sup>  |
|                            | Broken into a building or warehouse   |
|                            | Taken part in a fight in a public place   |
|                            | Beaten someone up   |
|                            | Used marihuana or hashish   |
| Victimization              | In the past 12 months have you (yes/no):  |
|                            | Been robbed by someone using or threatening to use violence <sup>c</sup>  |
|                            | Been bullied  |
|                            | Experienced threats of physical assault   |
|                            | Been physically attacked  |
|                            | Experienced physical punishment from a parent   |
| Perceived peer delinquency | Experienced a sexual approach or contact from a person 5 years older than you   |
|                            | On a 3-point scale (0 = none, 1 = one, 2 = more than one), how many of your friends have:                                     |
|                            | Used marihuana or hashish   |
|                            | Stolen from a shop  |
| Family functioning         | Taken part in a fight in a public place   |
|                            | On a 5-point scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = always), answer these family and home-related items: |
|                            | When I go out I tell my parents my whereabouts  |
|                            | When I go out my parents ask me who I will be with  |
|                            | My parent know my whereabouts after school  |
|                            | My parents supervise my academic performance  |
|                            | I get along well with my parents  |
|                            | My parents supervise the time when I go to sleep  |
|                            | Our family eats together  |
|                            | I have seen my parents drunk <sup>d</sup>   |
|                            | My parents quarrel <sup>d</sup>   |
|                            | I spend time with my friends in public places after 9 pm <sup>d</sup>   |
|                            | I come home after 10 pm on weekdays <sup>d</sup>  |
| Academic performance       | What is your latest grade (4–10) in:  |
|                            | Mathematics   |
|                            | Finnish and literature  |
|                            | English   |
| Sense of security          | On a 4-point scale (1 = very insecure, 2 = insecure, 3 = secure, 4 = very secure), how secure do you feel:                    |
|                            | In the centre of your town in the evening   |
|                            | In the neighbourhood you live   |
|                            | On your way to school   |
|                            | At school during breaks   |
|                            | On public transport in the evening  |
|                            | In your own house   |

<sup>a</sup> Responses to two dichotomous items were combined together as one dichotomous measure<sup>b</sup> Responses to three dichotomous items were combined together as one dichotomous measure<sup>c</sup> Or experienced such an attempt<sup>d</sup> Reverse coded

**Table 2** Descriptive statistics of the predictor variables of the study subgroups (knife, gun, other weapon, no weapon)

|   | Scale    | Knife <i>n</i> = 341 (230 boys, 110 girls) |     |       | Gun <i>n</i> = 25 (23 boys, 2 girls) |     |       | Other weapon <i>n</i> = 73 (54 boys, 19 girls) |     |       | No weapon <i>n</i> = 4416 (2070 boys, 2346 girls) |     |       |
|---|----------|--|-----|-------|--------------------------------------|-----|-------|--|-----|-------|---|-----|-------|
|   |          | Mean                                       | SD  | Range | Mean                                 | SD  | Range | Mean   | SD  | Range | Mean  | SD  | Range |
| Delinquency, acts/year <sup>a</sup>     | –0 to 7  | –2.9                                       | 2.0 | 0–7   | –4.2                                 | 2.7 | 0–7   | –3.5   | 2.1 | 0–7   | –0.8  | 1.2 | 0–7   |
| Victimization <sup>a</sup>              | –0 to 6  | –1.7                                       | 1.5 | 0–6   | –2.5                                 | 2.6 | 0–6   | –1.5   | 1.6 | 0–6   | –0.6  | 1.0 | 0–6   |
| Family functioning <sup>b</sup>         | 11 to 55 | 36.5                                       | 7.0 | 11–52 | 32.1                                 | 8.7 | 11–44 | 36   | 7.5 | 11–51 | 41.2  | 5.9 | 14–55 |
| Perceived peer delinquency <sup>a</sup> | –3 to 9  | –7.4                                       | 1.9 | 3–9   | –6.4                                 | 2.2 | 3–9   | –7.3   | 2.0 | 3–9   | –5.4  | 2.1 | 3–9   |
| Academic performance <sup>b</sup>       | 12 to 30 | 22.1                                       | 3.3 | 12–30 | 19.4                                 | 4.1 | 12–30 | 21.4   | 3.2 | 15–30 | 23.4  | 3.7 | 12–30 |
| Sense of security <sup>b</sup>          | –6 to 24 | 20.1                                       | 3.1 | 6–24  | 18.0                                 | 5.2 | 6–24  | 19.6   | 4.4 | 6–24  | 20.1  | 2.7 | 6–24  |
| APSD-SR total scores                    | –0 to 40 | 16.1                                       | 5.5 | 3–36  | 21.2                                 | 8.6 | 10–40 | 17.3   | 5.3 | 8–30  | 12.0  | 4.8 | 0–34  |

APSD-SR antisocial process screening device-self report

<sup>a</sup> Higher score indicates worse situation

<sup>b</sup> Higher score indicates better situation

better understood as a continuum along which every youth is disposed, i.e. psychopathy is conceptualized as a dimensional construct rather than a taxon [37]. Therefore, in the present study, the APSD-SR total score was used as a continuous measure to reflect psychopathic-like features.

### Statistical analyses

Descriptive analysis was used to determine the prevalence of and motivation for weapon carrying. A multinomial logistic regression analysis was used to examine associations between weapon carrying and each of the predictor variables described previously. The results for weapon carrying in the past 12 months were coded into four groups (0 = no weapon carried (comparison group), 1 = knife, 2 = gun, 3 = other kind of weapon). The APSD-SR total scores were computed into standardized Z-scores (mean = 0, SD = 1) for the multinomial regression analysis. We first assessed the bivariate associations for the predictors by running separate models for each, adjusted for age and gender. The associations between APSD-SR total scores and weapon carrying were then examined more closely by adjusting for all other predictor variables, first separately and then entered simultaneously and therefore controlled for in the analysis. The data were analysed using IBM SPSS version 19 and Stata version 12.1 (Stata Corp, Texas). Appropriate sample weights were used in all analyses to ensure that the sample was representative of Finnish youths [34].

### Results

Of the 4855 adolescents studied, 439 (9 %, (mean age = 15.3 years, SD 1.1) had carried a weapon in the past 12 months, of whom 179 had taken the weapon to

school. The majority of the adolescents who armed themselves were male (*n* = 307, 70 %) and of Finnish origin (*n* = 425, 97 %). Of all weapon carriers, 341 had carried a knife, pocket knife or other edged weapon, 25 had a gun (firearm) and 73 had other object intended as a weapon (majority of these were clubs, chains, knuckledusters, pepper sprays and air pressure functioning weapons). Regarding the motivations for carrying a weapon, the intention to use the weapon against someone was more common among adolescents carrying a gun than among adolescents carrying other weapons [gun: 36 %, knife: 4 %, other kind of weapon: 25 %,  $\chi^2(2) = 50.43$ ;  $p < 0.001$ , respectively], whereas adolescents carrying a knife armed themselves for self-protection more often than adolescents carrying a gun or other kind of weapon [knife: 48 %, gun: 26 %, other kind of weapon: 37 %,  $\chi^2(2) = 7.53$ ;  $p < 0.05$ , respectively].

The descriptive statistics of the predictor variables are presented in Table 2. Delinquency, victimization and perceived peer delinquency were associated with higher odds ratios for carrying any type of weapon (adjusted for age and gender, Table 3). Better family functioning was related to a lower likelihood of carrying any type of weapon. Having good school grades was related to a lower likelihood of carrying a gun or a knife and feeling secure to a lower likelihood of carrying a gun.

A higher APSD-SR total score was associated with higher odds ratios for carrying any type of weapon, most strongly for carrying a gun (Table 4). The association between APSD-SR total scores and weapon carrying remained significant, even after adjusting for other predictor measures separately, and when all other predictor variables were added simultaneously in the multivariate model. However, the magnitude of the relationship between APSD-SR total scores and weapon carrying (as reflected in

**Table 3** Prediction of different type of weapon carrying by psychosocial factors based on logistic regression analyses

|                            | Knife <i>n</i> = 341 (230 boys, 110 girls)<br>OR (95 % CI) | Gun <i>n</i> = 25 (23 boys, 2 girls) OR<br>(95 % CI) | Other weapon <i>n</i> = 73 (54 boys, 19 girls) OR (95 % CI) |
|----------------------------|--|--|---|
| Delinquency                | 2.03*** (1.89, 2.18)                                       | 2.52*** (1.93, 3.29)                                 | 2.23*** (1.87, 2.52)  |
| Victimization              | 1.79*** (1.64, 1.94)                                       | 2.32*** (1.68, 3.20)                                 | 1.68*** (1.44, 1.97)  |
| Perceived peer delinquency | 1.58*** (1.48, 1.69)                                       | 1.24*** (1.00, 1.54)                                 | 1.51*** (1.32, 1.72)  |
| Family functioning         | 0.89*** (0.87, 0.91)                                       | 0.82*** (0.77, 0.88)                                 | 0.90*** (0.86, 0.94)  |
| Academic performance       | 0.92*** (0.89, 0.96)                                       | 0.80*** (0.66, 0.95)                                 | 0.95 <sup>ns</sup> (0.79, 1.15)                             |
| Sense of security          | 0.98 <sup>ns</sup> (0.93, 1.02)                            | 0.84*** (0.76, 0.92)                                 | 0.94 <sup>ns</sup> (0.85, 1.03)                             |

All odds ratios are adjusted for age and gender, comparison group = non-weapon carriers

OR odds ratio, CI confidence interval, *ns* not significant

\*\*\*  $p < 0.001$

**Table 4** Prediction of different type of weapon carrying by APSD-SR total scores (Z-scores) based on logistic regression analyses

|   | APSD-SR Total Score                                     |  |   |
|---|---|--|---|
|   | Knife <i>n</i> = 341 (230 boys, 110 girls) OR (95 % CI) | Gun <i>n</i> = 25 (23 boys, 2 girls) OR<br>(95 % CI) | Other weapon <i>n</i> = 73 (54 boys, 19 girls) OR (95 % CI) |
| Adjusted for                                |   |  |   |
| Age, gender                                 | 2.02*** (1.79, 2.28)                                    | 3.75*** (2.25, 6.22)                                 | 2.30*** (1.88, 2.80)  |
| Age, gender, and delinquency                | 1.36*** (1.18, 1.56)                                    | 2.41** (1.40, 4.16)                                  | 1.46** (1.16, 1.84)   |
| Age, gender, and victimization              | 1.74*** (1.53, 1.98)                                    | 3.17*** (1.66, 6.05)                                 | 2.06*** (1.69, 2.52)  |
| Age, gender, and perceived peer delinquency | 1.61*** (1.41, 1.84)                                    | 3.60*** (2.18, 5.95)                                 | 1.92*** (1.54, 2.39)  |
| Age, gender, and family functioning         | 1.68*** (1.46, 1.93)                                    | 2.71*** (1.68, 4.36)                                 | 2.01*** (1.58, 2.55)  |
| Age, gender, and school performance         | 1.98*** (1.75, 2.24)                                    | 3.40*** (2.09, 5.51)                                 | 2.28*** (1.84, 2.83)  |
| Age, gender, and sense of security          | 2.02*** (1.79, 2.28)                                    | 3.60*** (1.98, 6.53)                                 | 2.28*** (1.87, 2.78)  |
| Age, gender, and all above <sup>a</sup>     | 1.21** (1.05, 1.40)                                     | 2.17** (1.33, 3.52)                                  | 1.42** (1.10, 1.82)   |

Comparison group = non-weapon carriers

APSD-SR antisocial process screening device-self report, OR odds ratio, CI confidence interval

\*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

<sup>a</sup> Delinquency, victimization, perceived peer delinquency, family functioning, school performance, and sense of security

the odds ratios) attenuated for most of the predictor measures when they were added altogether in the multivariate model.

## Discussion

The present population-based study found that overall 9 % of Finnish adolescents had carried a weapon during the past year. Adolescents with a history of delinquency, victimization and antisocial friends were more likely to have carried a weapon, whereas better family functioning and academic performance were associated with a lower likelihood of weapon carrying. Adolescents with psychopathic-like

features were more likely to carry a weapon, even after controlling for other risk factors. Delinquency, victimization and psychopathic-like features were most strongly associated with gun carrying, whereas perceived peer delinquency (antisocial friends) most strongly correlated with carrying a knife.

The prevalence of carrying a weapon in Finnish adolescents based on the present study results is in line with previous research in other European countries [4, 5]. In the present study, half of the weapon carriers had brought the weapon to school. The result is surprising since according to the Finnish legislation it is prohibited in public places to possess any object or material, use of which could lead to a severe injury of a person. These objects or materials



include among others: guns, air guns, knives, blades, chains, knuckledusters, bats, clubs, corrosive sprays or sprays that could injury or paralyse a person. This same legislation concerns schools also. Regarding the type of weapon, carrying a knife was common while carrying a gun was not (the overall prevalence was 0.5 %).

We found that self-protection was the primary motivation for carrying a knife, while among adolescents arming themselves with a gun, the intention to use the weapon against someone was more common than a desire for self-protection. This was surprising since self-protection has previously been reported as the primary motivation for carrying a weapon in general [38–40]. Our results suggest that the motivations for carrying a gun compared to other weapons may be different, with gun carrying associated with more violent intentions.

The present study showed that risk factors for carrying weapons in general among Finnish adolescents were similar to those reported in previous studies [13, 14, 18], in terms of delinquency, victimization and perceived peer delinquency. In accordance with other studies, better family functioning and academic performance were factors that reduced the likelihood of weapon carrying [12, 16]. One limitation of prior research is that the measure of weapon carrying has mainly concerned either weapons in general or only guns. Very few studies have separated gun carrying from carrying other weapons while evaluating the risk factors for carrying a weapon [21, 24, 25].

One of the few studies separating gun carrying from carrying other weapons examined bringing weapons to school among Israeli students in grades 7 to 11 and found that victimization, fear and lower socio-economic status (SES) were associated with carrying weapons in general to school [21]. However, victimization and fear were most strongly associated with carrying a gun and lower SES to carrying a knife. Another study by DuRant et al. [24] reported that adolescents (6th to 8th grade students) who carried a gun to school had some similar characteristics (male gender, smoking and alcohol use) compared to those who carried other weapons to school, but differences also appeared; for instance, victimization, fighting and suicidal plans were only related to carrying other weapons, not to carrying a gun. Cao, Zhang and He [25] found that among 12–18-year-old adolescents fighting, peer's carrying guns and gender were associated with both carrying a gun and other weapons to school. Factors such as other's drug use, gangs at school, skipping school, perception and age were associated with carrying other weapons to school but not with carrying a gun to school. The three aforementioned studies have some limitations as they only concern carrying weapons on school property and examine a limited number of factors contributing to weapon carrying.

The present study investigated a wider range of individual-, family, peer- and school-level factors in juvenile weapon carrying, while distinguishing between weapon types, than the above-mentioned studies. We observed that although some of the characteristics of adolescents who carry different types of weapons were similar (e.g. history of delinquent behaviour, victimization, antisocial friends, psychopathic-like features), differences also appeared; that is, better academic performance reduced the likelihood of carrying a gun and knife but had no effect on the probability of carrying another type of weapon, and feeling secure only reduced the likelihood of carrying a gun, while it had no effect on carrying the other types of weapon investigated here. The strongest associations were observed with gun carrying. These results support the use of the distinction between different types of weapons in further research into juvenile weapon carrying.

We found that psychopathic-like features (as measured with APSD-SR total score) were associated with a higher likelihood of carrying a weapon, particularly a gun. Even when a variety of risk factors were controlled in the analysis, this association remained significant suggesting that psychopathic-like features are strongly related to a higher risk for carrying a weapon, especially a gun. In adult samples, weapon carrying and weapon use have been found to associate with psychopathy within some [41, 42] but not all studies [43]. We found no previous reports of the association between psychopathic-like features and adolescent weapon carrying, which makes comparison with earlier results difficult. However, a study by Barlas and Egan [26] examined personality (as measured with the 'big five' model-instrument) of adolescents who armed themselves with weapons. The authors discovered that an irresponsible personality style of the adolescents was found to relate to carrying weapons. Interestingly, some adolescents with irresponsible personality style had carried weapons but had no history of other delinquent behaviour. Loeber et al. [44] reported that gun carrying was significantly associated with conduct disorder diagnosis in a clinical subsample of adolescents. However, their study did not report on the personality style or psychopathic-like features of these conduct-disordered adolescents. A significant minority of conduct-disordered adolescents score high on psychopathic-like features [45]. It is possible, therefore, that part of their result might in fact be explained by the psychopathic-like features of this population.

Our results support the view that psychopathic-like features may increase the risk of weapon carrying also in adolescents as well as in adults [41, 42]. A possible explanation for our findings is that psychopathic-like features are associated with instrumental violence, where the goal is to obtain some tangible goal or objective, such as sex, money or revenge [46]. It has been proposed that psychopathic

individuals recognize the effectiveness of weapons in achieving these goals, yet they ignore the potentially grave consequences of weapon carrying and weapon use, such as more severe punishments [47, 48]. Our findings add to previous knowledge about the characteristics of adolescents carrying a weapon and thus have relevance both for identifying adolescents who are at risk of carrying and possibly using a weapon and also for planning interventions to prevent weapon carrying and use.

The findings from this study need to be interpreted in the light of some limitations. First, the data used in the analysis were based on self-reports, inherent in which is the risk of under-reporting or over-reporting. However, to reduce the motivation for misreporting, the questionnaire was completed anonymously, and participation was voluntary. In addition, there is evidence that the reliability and validity of self-reports assessing psychopathology, especially maladaptive affective styles that are not always evident for others, increase in adolescence [49]. Many studies provide support for the reliability and validity of self-report in adolescent psychopathy research [50–52]. However, the present study is limited by the fact that we used information from only one respondent and future studies should consider using questionnaire and interview information from multiple respondents (self-report, parents or teachers, clinical interviews) when assessing psychopathic-like features in adolescents. Second, a total score of APSD-SR was used to reflect psychopathic-like features of adolescents. In the next step, the specific associations between different facets of psychopathic-like features (narcissism, impulsivity and callous–unemotional traits) and weapon carrying should be addressed. Third, the question of motivations for carrying a weapon included only three categories, and the “other reason” was not specified further. Therefore, we have no information on what the “other reasons” were (for example, if the suicidal intentions were included in this category). Fourth, the sample was age homogenous, as it was solely composed of 15- to 16-year-old adolescents; thus, the findings cannot be generalized to other age groups. Fifth, the number of adolescents who had carried a gun was small, which may limit the generalization of the results concerning gun carrying. Finally, because of the cross-sectional nature of the study, causal conclusions regarding weapon carrying and its correlates cannot be drawn.

The present results suggest that adolescents carrying a weapon have a large cluster of problems in their lives, which may vary based on the type of weapon carried. If weapon carrying is identified, a comprehensive assessment of the adolescent’s psychosocial situation including a measure of psychopathic-like traits is warranted. Preventive interventions focused on the psychosocial risk factors such as victimization and promoting prosocial behaviour and

concern for others in adolescents could possibly diminish weapon carrying and weapon use.

**Acknowledgments** The study was supported by grants from the Päivikki and Sakari Sohlberg Foundation, Helsinki University Grants and Helsinki University Central Hospital Research Grants (TYH 2012139, 2013207).

**Conflict of interest** The authors declare that they have no conflict of interest. The manuscript does not contain clinical studies or patient data.

## References

1. Durant RH, Getts AG, Cadenhead C, Woods ER (1995) The association between weapon carrying and the use of violence among adolescents living in and around public housing. *J Adolesc Health* 17:376–380
2. Lowry R, Powell KE, Kann L, Collins JL, Kolbe LJ (1998) Weapon-carrying, physical fighting, and fight-related injury among US adolescents. *Am J Prev Med* 14:122–129
3. Centers for Disease Control and Prevention (2012) Youth Risk Behavior Surveillance—United States, 2011. *MMWR Morb Mortal Wkly Rep* 61:1–168
4. Pickett W, Craig W, Harel Y, Cunningham J, Simpson K, Molcho M, Majur J, Dostaler S, Overpeck MD, Currie CE, Violence and injuries writing group HBSC (2005) Cross-national study of fighting and weapon carrying as determinants of adolescent injury. *Pediatrics* 116:e855–e863
5. Smith-Khuri E, Iachan R, Scheidt PC, Overpeck MD, Gabbainn SN, Pickett W, Harel Y (2004) A cross-national study of violence-related behaviors in adolescents. *Arch Pediatr Adolesc Med* 158:539–544
6. Junger-Tas J, Marshall IH, Enzmann D, Killias M, Skeketee M, Gruszczynska B (2010) Juvenile delinquency in Europe and beyond. Results from the second international self-report delinquency study. Springer, Berlin
7. Elonheimo H (2014) Evidence for the crime drop: survey findings from two Finnish cities between 1992 and 2013. *J Scand Stud Criminol Crime Prev* 15:209–217
8. Oksanen A, Nurmi J, Vuori M, Rasanen P (2013) Jokela: The social roots of school shooting tragedy in finland. In: Böckler N, Seeger T, Sitzer P, Heitmeyer W (eds) School shootings: International research, case studies, and concepts for prevention. Springer Science+Business Media, New York, pp 189–215
9. OECD factbook 2013: Economic, environmental and social statistics [e-publication]. [http://www.oecd-ilibrary.org/sites/factbook-2013-en/12/01/03/index.html?itemId=/content/chapter/factbook-2013-97-en&\\_csp\\_=bfa7a496998c3e64f37b5a14676aaaad](http://www.oecd-ilibrary.org/sites/factbook-2013-en/12/01/03/index.html?itemId=/content/chapter/factbook-2013-97-en&_csp_=bfa7a496998c3e64f37b5a14676aaaad). Accessed 15 Nov
10. Lahti A, Rasanen P, Riala K, Keranen S, Hakko H (2011) Youth suicide trends in Finland, 1969–2008. *J Child Psychol Psychiatry* 52:984–991
11. Lahti A, Keranen S, Hakko H, Riala K, Rasanen P (2014) Northern excess in adolescent male firearm suicides: a register-based regional study from Finland, 1972–2009. *Eur Child Adolesc Psychiatry* 23:45–52
12. Vaughn MG, Perron BE, Abdon A, Olate R, Groom R, Wu LT (2012) Correlates of handgun carrying among adolescents in the United States. *J Interpers Violence* 27:2003–2021
13. Ferguson CJ, Meehan DC (2010) Saturday night’s alright for fighting: antisocial traits, fighting, and weapon carrying in a large sample of youth. *Psychiatr Q* 81:293–302



14. Williams SS, Mulhall PF, Reis JS, DeVille JO (2002) Adolescents carrying handguns and taking them to school: psychosocial correlates among public school students in Illinois. *J Adolesc* 25:551–567
15. Walsh SD, Molcho M, Craig W, Harel-Fisch Y, Huynh Q, Kukawadia A, Aasvee K, Várnai D, Ottova V, Ravens-Sieberer Pickett W (2013) Physical and emotional health problems experienced by youth engaged in physical fighting and weapon carrying. *PLoS One* 8:e56403
16. Bailey SL, Flewelling RL, Rosenbaum DP (1997) Characteristics of students who bring weapons to school. *J Adolesc Health* 20:261–270
17. Henrich CC, Brookmeyer KA, Shahar G (2005) Weapon violence in adolescence: parent and school connectedness as protective factors. *J Adolesc Health* 37:306–312
18. Muula A, Rudatsikira E, Siziya S (2008) Correlates of weapon carrying among high school students in the united states. *Ann Gen Psychiatry*. doi:10.1186/1744-859X-7-8
19. Rudatsikira E, Singh P, Job J, Knutsen S (2007) Variables associated with weapon-carrying among young adolescents in Southern California. *J Adolesc Health* 40:470–473
20. van Geel M, Vedder P, Tanilon J (2014) Bullying and weapon carrying: a meta-analysis. *JAMA Pediatr* 168:714–720
21. Khoury-Kassabri M, Astor RA, Benbenishty R (2007) Weapon carrying in Israeli schools: the contribution of individual and school factors. *Health Educ Behav* 34:453–470
22. Simon TR, Richardson JL, Dent CW, Chou CP, Flay BR (1998) Prospective psychosocial, interpersonal, and behavioral predictors of handgun carrying among adolescents. *Am J Public Health* 88:960–963
23. Molnar BE, Miller MJ, Azrael D, Buka SL (2004) Neighborhood predictors of concealed firearm carrying among children and adolescents: results from the project on human development in Chicago neighborhoods. *Arch Pediatr Adolesc Med* 158:657–664
24. DuRant RH, Krowchuk DP, Kreiter S, Sinal SH, Woods CR (1999) Weapon carrying on school property among middle school students. *Arch Pediatr Adolesc Med* 153:21–26
25. Cao L, Zhang Y, He N (2008) Carrying weapons to school for protection: an analysis of the 2001 school crime supplement data. *J Crim Just* 36:154–164
26. Barlas J, Egan V (2006) Weapons carrying in British teenagers: the role of personality, delinquency, sensational interests, and mating effort. *J Forensic Psychi Ps* 17:53–72
27. Hart SD, Hare RD (1997) Psychopathy: Assessment and association with criminal behaviour. In: Stoff D, Breiling J, Maser J (eds) *Handbook of antisocial behavior*. Wiley & Sons, New York, pp 22–35
28. Hare RD (1991) *The Hare Psychopathy Checklist-Revised*, 1st edn. Multi-Health Systems, Toronto
29. Caputo A, Frick PJ, Brodsky S (1999) Family violence and juvenile sex offending. *Crim Justice Behav* 26:338–356
30. Forth A (1995) *Psychopathy and young offenders*. Ministry of the solicitor general of Canada, Ottawa
31. Kruh I, Frick PJ, Clements C (2005) Historical and personality correlates to the violence patterns of juveniles tried as adults. *Crim Justice Behav* 92:69–96
32. Brown B (2004) Juveniles and weapons: recent research, conceptual considerations, and programmatic interventions. *Youth Violence Juv Justice* 2:161–184
33. Kivivuori J, Bernburg JG (2011) Delinquency research in the nordic countries. In: Tonry M, Lappi-Seppälä T (eds) *Crime and Justice in Scandinavia, Crime and Justice- A Review of Research*. University of Chicago Press, Chicago, pp 405–478
34. Laajasalo T, Saukkonen S, Kivivuori J, Salmi V, Lipsanen J, Aronen ET (2014) Brief report: self-reported psychopathic-like features among Finnish community youth: investigation of the factor structure of the antisocial personality screening device. *J Adolesc* 37:1185–1188
35. Frick PJ, Hare RD (2001) *Antisocial process screening device (APSD)*, 1st edn. Multi-Health Systems Inc, Canada
36. Kotler JS, McMahon RJ (2005) Child psychopathy: theories, measurement, and relations with the development and persistence of conduct problems. *Clin Child Fam Psychol Rev* 8:291–325
37. Murrie DC, Marcus DK, Douglas KS, Lee Z, Salekin RT, Vincent G (2007) Youth with psychopathy features are not a discrete class: a taxometric analysis. *J Child Psychol Psychiatry* 48:714–723
38. Kingery PM, Pruitt BE, Heuberger G (1996) A profile of rural Texas adolescents who carry handguns to school. *J Sch Health* 66:18–22
39. McNabb SJ, Farley TA, Powell KE, Rolka HR, Horan JM (1996) Correlates of gun-carrying among adolescents in South Louisiana. *Am J Prev Med* 12:96–102
40. Webster DW, Gainer PS, Champion HR (1993) Weapon carrying among inner-city junior high school students: defensive behavior vs aggressive delinquency. *Am J Public Health* 83:1604–1608
41. Hare RD, McPherson LM (1984) Violent and aggressive behavior by criminal psychopaths. *Int J Law Psychiatry* 7:35–50
42. Michie C, Cooke DJ (2006) The structure of violent behavior: a hierarchical model. *Crim Justice Behav* 33:706–737
43. Williamson S, Hare RD, Wong S (1987) Violence: criminal psychopaths and their victims. *Can J Behav Sci* 19:395–412
44. Loeber R, Burke JD, Mutchka J, Lahey BB (2004) Gun carrying and conduct disorder: a highly combustible combination? implications for juvenile justice and mental and public health. *Arch Pediatr Adolesc Med* 158(2):138–145
45. Frick PJ, Cornell AH, Barry CT, Bodin SD, Dane HE (2003) Callous-unemotional traits and conduct problems in the prediction of conduct problem severity, aggression, and self-report of delinquency. *J Abnorm Child Psychol* 31:457–470
46. Blais J, Solodukhin E, Forth AE (2014) A meta-analysis exploring the relationship between psychopathy and instrumental versus reactive violence. *Crim Justice Behav* 41:797–812
47. Brennan IR, Moore SC (2009) Weapons and violence: a review of theory and research. *Aggress Violent Behav* 14:215–225
48. Patrick CJ, Zempolich KA (1998) Emotion and aggression in the psychopathic personality. *Aggress Violent Behav* 3:303–338
49. Kamphaus RW, Frick PJ (1996) *Clinical assessment of child and adolescent personality and behavior*. Allyn and Bacon, Boston
50. Vaughn MG, Howard MO, Delisi M (2008) Psychopathic personality traits and delinquent careers: an empirical examination. *Int J Law Psychiatry* 31:407–416
51. Munoz LC, Frick PJ (2007) The reliability, stability, and predictive utility of the self-report version of the antisocial process screening device. *Scand J Psychol* 48:299–312
52. Vahl P, Colins OF, Lodewijks HP, Markus MT, Doreleijers TA, Vermeiren RR (2014) Psychopathic-like traits in detained adolescents: clinical usefulness of self-report. *Eur Child Adolesc Psychiatry* 23:691–699