# Studies on the Validity and Reliability of the Structured Assessment of Violence Risk in Youth in Finnish institutional settings

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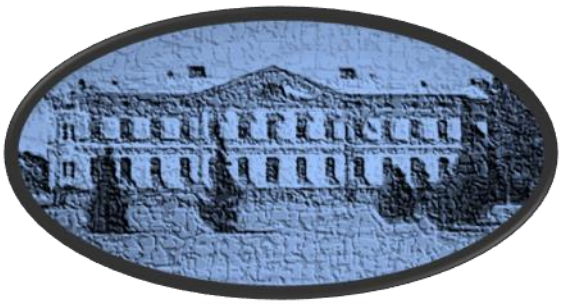

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# Studies on the Validity and Reliability of the Structured Assessment of Violence Risk in Youth (SAVRY) in Finnish institutional settings

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## Abstract

Violent acts perpetrated by minors are topics much discussed in the media. School shootings, young people perpetrating violent acts and randomly victimising others just for fun, and likewise troubling numbers of young people committing suicide due to serious bullying increase the feelings of unease in society, prompting questions regarding an increase in youth involvement in violent crime. At the same time, longitudinal studies on violent crime show declining trends. The discrepancies are confusing, and there is a need to structure the findings.

As one approach to this, the present dissertation attempts a validation of a North American structured professional decision aid, namely the Structured Assessment of Violence Risk in Youth (SAVRY) a decision aid for professionals who in their work encounter the needs of adolescents with violent and severe disruptive behavioural problems. SAVRY was originally developed for assessment in juvenile delinquent populations, and based on empirical data from such settings. It has shown good predictive validity across Western countries and currently represents a best practice approach for meeting the needs of violent and delinquent youth. However, due to legal and official policy, adolescents committing severe violent crimes in Finland will rarely be found in correctional facilities or within the legal system, but rather in the facilities of the Finnish social and health system, for example residing in child welfare units, correctional schools and / or in adolescent psychiatric settings, where the research base on applicability of the SAVRY is still sparse.

To assess the applicability of SAVRY in the Finnish system we collected information on young people (N = 231) in general adolescent psychiatric settings, correctional schools and an adolescent forensic psychiatric unit in Finland. To assess the validity of SAVRY in these settings, we needed to ascertain the base rate of violence in these institutional settings, and the possible impact of gender, age and psychopathological features. For a follow-up in the community additional information was retrieved from the National Register of Criminal Conduct. The results show that there are indeed many incidents of violent and disruptive behaviour on Finnish child welfare and psychiatric wards, especially in the adolescent forensic psychiatric setting. SAVRY served well the purpose of screening for risks and needs at all levels of service. Recognising the impact of gender and psychiatric illness strengthened the outcomes of the assessments even further. SAVRY risk ratings indicating an elevated risk of violence were predictive of institutional violence, self-harm and disruptive behaviours and of violent and non-violent offending four years after the initial assessments. Thus, to reduce the risk of violence, meet the needs of young people with severe behavioural problems and to find ways to build desistance from delinquent and violent behaviour, structured risk and needs assessments ought to be included in all decision-making regarding multi-problem violent youth.

## Tiivistelmä

Nuorten väkivaltainen käyttäytyminen on aihepiiri, joka herättää sekä mielenkiintoa, että huolta laajassa yleisössä. Kouluampumiset, nuoret jotka sattumanvaraisesti pahoinpitelevät ihmisiä kaupungilla, sekä huolestuttavat viestit nuorista, jotka pitkään jatkuneen koulukiusaamisen seurauksena valitsevat tehdä itsemurhan, saavat paljon tilaa mediassa ja niitä verrataan samantyyppisiin ilmiöihin maailmalla, mikä saattaa lisätä mielikuvia että nuorten väkivaltainen käyttäytyminen on lisääntymässä. Samalla pitkäaikaistutkimus osoittaa, että vakava väkivaltakäyttäytyminen viime vuosien aikana ei ole merkitsevästi lisääntynyt. Ristiriitaiset viestit aiheuttavat hämmennystä ja herättää tarpeen selkeyttää ja jäsentää informaatiota. Tutkimus on osoittanut että vaarallisuuden arvioinnissa pelkkä n.s. asiantuntijuus ei riitä luotettavan arvion tekemiseksi vaan parhaimmissakin olosuhteissa arviot ovat haavoittuvia ajatusvirheille. Tästä huolimatta näitä arvioita on aikaajoin tehtävä sekä kriminali huollon, että sosiaali- ja terveyshuollon yksiköissä.

Tämän väitöskirjan tavoitteena on tarkastella Pohjois-Amerikassa 12–18-vuotiaiden nuorisorikollisten arvioimiseen kehitetyn väkivaltariskin arviointimenetelmän (SAVRY; Strukturoitu nuoruusikäisten väkivaltariskin arviointimenetelmä) toimivuutta suomalaisessa sosiaali- ja terveydenhuoltojärjestelmässä. Menetelmä on kehitetty niiden ihmisten käyttöön, jotka jokapäiväisessä työssään joutuvat tekemään arvioita väkivaltariskin esiintyvyydestä ja vaihtelusta niiden nuorten keskuudessa jolla on jonkin asteista väkivaltaproblematiikkaa. Menetelmän pohjautuu empiiriisesti nuorisorikollisten poikien keskuudesta kerättyyn tutkimustietoon. Koska Suomessa vakavalla väkivaltakäyttäytymisellä oireilevia nuoria arvioidaan ensisijaisesti nuorisopsykiatrian piirissä, menetelmän validoimiseksi ja laadullisen käytön varmistamiseksi on tärkeää selvittää, miten suomalaisissa yksiköissä tehdyt arviot vaihtelevat arvioitavien iän, sukupuolen, psykiatrisen oirekuvan ja palvelujärjestelmien välillä.

Tutkimuksen aineisto (N=231) on kerätty nuorisopsykiatrian, koulukotien ja nuorten oikeuspsykiatrian yksiköstä. Arvioita on verrattu laitosolosuhteissa ilmenevään väkivaltaan, itsetuhoiseen käyttäytymiseen ja muuhun vakavaan yksikköä tai hoitoa tuhoavaan käyttäytymiseen sekä rikosrekistereihin ja kuolinsyyrekistereihin neljä vuotta alkuperäisen arvion jälkeen. Tulokset ovat osoittaneet, että SAVRY-menetelmä pystyy erottelemaan eriasteisesti oireilevien nuorten keskuudesta hyvin matalan, kohonneen ja korkean väkivaltariskin omaavat nuoret ja osoittamaan mihin hoidolliset interventiot pitäisi suunnata riskien madaltamiseksi tai ennaltaehkäisemiseksi. Tämän tutkimuksen pohjalta voidaan todeta, että strukturoitu riski- ja tarvekartoitus toimii hyvin suomalaisessa järjestelmässä ja että sen tulisi sisältyä hoidollisiin toimiin silloin, kun hoidon kohteena on väkivaltaisesti oireileva nuori.

## Abstrakt

Våldsbrott utförda av unga människor är ett ämne som effektivt väcker allmänhetens intresse och skapar debatt. Skolskjutningar, grupper av sysslolösa ungdomar som slumpmässigt misshandlar människor på staden, och rapporter om ungas självmord till följd av långvarig mobbning frekventeras i media och väcker oro och otrygghetskänslor på såväl individ som samhällsnivå. Den ökade synligheten i media, samt paralleller som dragits till liknande fenomen internationellt, väcker tankar om en ökning av våld bland ungdomar över lag. Samtidigt visar den longitudella forskningen på området att mängden av grova våldsbrott bland ungdomar hållits ganska stabil över de senaste 30 åren. Diskrepansen väcker ett behov att klarifiera och strukturera fenomenet.

Forskningen har visat att s.k. "farlighetsbedömning", eller förutsägandet av risk för våld enbart på basen av "sunt förnuft" eller "kliniskt kunnande" också i de bästa förhållanden är gravt missvisande och ytterst sårbart för tankefel och yttre påtryckning. Trots detta hamnar människor i social och hälsovårdssektorn, och inom barnskyddet och kriminalvården, att ta ställning till dessa frågor i sin vardag. Därför har det utvecklats strukturerade ansatser för dessa bedömningar vilka påvisligen har ökat tillförlitligheten för dylika bedömningar i ansatsen att minska risken för grova våldshandlingar och återfall i våldsbrott bland ungdomar.

Den aktuella avhandlingen avser att bedöma relevansen och tillförlitligheten av den finska översättningen en sådan strukturerad metod, "SAVRY" (Structured assessment of violence risk in youth), ett beslutsstöd för bedömningen av risk för återfall i våldsamt beteende för ungdomar i åldrarna 12-18 år. Metoden är utarbetad för de människor som i sin vardag möter ungdomar med utagerande problematik och baserar sig på forskning bland ungdomsbrottslingar. Metoden har visat goda psykometriska egenskaper internationellt, men då ungdomar med våldsamt beteende i Finland ofta hänvisas till ungdomspsykiatrin för bedömning är det motiverat att undersöka hur väl metoden fungerar beaktande en möjligt begynnande psykopatologisk process. Vidare beaktas de bedömdas kön, ålder och aktuella vårdinstans för att bedöma inverkan av dessa på riskbedömningen samt för potentiella indikationer på förestående vårdbehov. Avhandlingens material består av 231 ungdomar från ungdomspsykiatrin, skolhem och en rättspsykiatrisk enhet för ungdomar och deras SAVRY-resultat har jämförts med såväl utfall i våldsamt eller ickeönskvärt beteende under institutionsvården som i en studie av nationella brottsregister fyra år efter den ursprungliga bedömningen. Resultaten stöder antagandet att SAVRY kunde tillföra också den finländska beslutsfattningen något värdefullt och stöda i ansatsen att förebygga framtida våldsbrott bland ungdomar.

## Abbreviations

| | |
|---|---|
| SPJ | Structured Professional Judgement |
| SAVRY | Structured Assessment of Violence Risk in Youth |
| SOAS-R | Staff Observation Aggression Scale- revised |
| CBCL | Child Behavior Checklist |
| BPRS | Brief Psychiatric Rating Scale |
| SSI | The Beck Scale for Suicidal Ideation |
| HS | Beck Hopelessness Scale |
| GAP | General Adolescent Psychiatry |
| AFP | Adolescent Forensic Psychiatry |
| CS | Correctional School facilities |
| HCR-20 | Historical Clinical Risk – 20 assessment sceeme |
| SRR | Savry Summary Risk Rating |
| TS | Savry Total Score |

## List of original papers

The present thesis is based on the following original papers, which will be referred to in the text by the Roman numerals I–V.

I Gammelgård M, Koivisto A, Eronen M & Kaltiala-Heino R (submitted). Violent and disruptive behaviours among institutionalised youth. Journal of European Child and Adolescent Psychiatry.

II Gammelgård M, Koivisto A, Eronen M & Kaltiala-Heino R (2008) The predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY) among institutionalised adolescents. Journal of Forensic Psychiatry and Psychology 19(3): 352–370.

III Gammelgård M, Koivisto A, Eronen M & Kaltiala-Heino R (2010) Violence risk and psychopathology in institutionalised adolescents. Journal of Forensic Psychiatry and Psychology 21(6): 933–949.

IV Gammelgård M, Weizmann-Henelius G, Koivisto A, Eronen M & Kaltiala-Heino R (2012) Gender differences in violence risk profiles. Journal of Forensic Psychiatry and Psychology 23(1):76–94.

V Gammelgård M, Koivisto A, Eronen M & Kaltiala-Heino R (2014) Predictive validity of the Structured Assessment of Violence Risk in Youth a 4 year follow-up. Criminal Behavior and Mental Health [Epub ahead of print, July 5th, 2014].

# 1. Introduction

In Finland a homemade bomb carried in the rucksack of a young man detonated in a shopping mall in Vantaa, a community near the capital city of Helsinki, in 2002 killing and injuring several peolple. Five years later, in 2007, another young man walked into the high school of the community of Jokela and shot and killed eight people before taking his own life (2009). In 2008, less than a year later, a second school massacre was perpetrated by another young man in a vocational school in the community of Kauhajoki (2010), a small municipality town in the west of Finland killing eleven, including the shooter himself. Finland as a nation was profoundly shaken.

These were not the first devastating incidents in Finnish history as there had been somewhat similar cases earlier, but the incidents listed above came out of the blue, with seemingly "normal" young men perpetrating seemingly unprovoked violence. Within hours the incidents caused tabloids all over the world to link these tragedies to international cases like the Columbine school shootings in 1999, and violent communities on the internet. The media focused extensively on descriptions, eye-witness reports and possible explanations all the way from perpetrator personality traits and negative life events to pondering upon links between the use of antidepressants and violent acts seeking for an understanding of events that could never be completely understood (Backholm, 2012; Hakala, 2009; Ministry of Justice, 2009, 2010; Punamäki, Tirri, Nokelainen, & Marttunen, 2011) .

The incidents left people with a collective feeling of insecurity, later reflected in hardening attitudes towards antisocial behaviours among young people in general, and a close to zero-tolerance for violent threats and acting out (Nurmi, 2014). There has been an increase in requests for professionals in the field to perform assessments on the risk of violence. Yet the present situation in the community, with a trend on the one hand for deinstitutionalisations, and on the other hand an ever hardening climate in society manifest in the rejection and exclusion of people who fail to conform to social expectations however causes pressure upon those requested to perform these assessments, rendering necessary the use of valid and reliable instruments for measuring of risk for violence.

## 1.1 Normative and pathological aggression across childhood and adolescence

Adolescence is a developmental phase starting with the onset of puberty (approximately 11–12 years), and ending in young adulthood (approximately 18–20 years). It is a turbulent life phase with changes occurring in hormonal, cognitive and social domains. This is also the period in life where many young people, even those without any history of problematic behaviours, occasionally engage in antisocial behaviours, i.e. rule and norm breaking behaviours ranging from petty theft to seriously violent acts. The official records on participation in criminal activities show that crime curves make a steep rise from early adolescence, peak around the age of 17, and then rapidly decline to settle again in early adulthood (Moffitt, 1993). Criminological research, based on self-report studies, implies that the numbers from official records show only the tip of the iceberg, and that as many as two thirds of all young males at some phase of adolescence engage in some form of antisocial behaviours, thus implying that less severe antisocial acts can even be seen as normative within this age period (Blumstein, Cohen, & Farrington, 1988; Elliott, Ageton, Huizinga, Knowles, & Canter, 1983; Farrington, 1986). Considering severe violent offences, young adult males (< 21) also perpetrate a disproportionately large share of all antisocial acts and violent assaults in society (Junger-Tas, 1994; Oikeuspoliittinen tutkimuslaitos, 2014)

In Finland, longitudinal data based on criminal records are collected and reported yearly by the National Research Institute of Legal Policy for all forms of violent and disrupting behaviours severe enough to have led to legal consequences (Oikeuspoliittinen tutkimuslaitos, 2014). Findings in the national data support the existing data elsewhere well, with the rates of engaging in antisocial activities being more common in adolescence than later in life.

Another national register: the Adolescent Health and Lifestyle (AHLS) monitor health and health behaviours of Finnish adolescents, by using self-report measures. The material is nationwide, targeting youth aged 12–18 years. In 2011, in the aftermath of the school shootings, the two national databases joined forces. The AHLS survey was modified according to the international self-report delinquency study ISRD-2 (Enzmann et al., 2010) to include questions on serious violent offences (participation in fights, carrying weapons, robbery and physical assaults). Data (N = 4566) regarding involvement in violent acts preceding the last 12 months was collected for those aged 12/ 14/ 16 , and 18, and adjusted by age cohort.

The results showed that participation in any form of violence ranged from 12.8–13.7% between groups. Getting into fights was most common in the younger subjects a behaviour which decreased over time, whereas carrying weapons increased. Engaging in acts of serious violence peaked at ages 14 and 18.

Risk factor analyses were consistent with the international evidence base, as male gender, poor self-control, low school performance, lacking family support and societal control and affiliating with antisocial peers were statistically significantly correlated with violent behaviours across cohorts (Kivivuori et al., 2012). However, when looking at official records, the majority of perpetrators of severe violence (homicide) the engagement of adolescents (<18) in more severe acts of violence, is rare (Oikeuspoliittinen tutkimuslaitos, 2014), with a mean rate of homicides of approximately 1.6 incidents per year in the last decade in the age group 15–17 years (Lehti & Kivivuori, 2014).

### 1.1.1 Aggression

Aggression is a complex and multifaceted phenomenon, and the definitions vary over time, due to the context and the research focus. From an evolutionary psychological point of view, interpersonal aggression is not destructive *per se*, but explained by the "theory of survival of the fittest" and reasons such as resource stacking, co-opting, defending against attack, status and power hierarchy, as well as rivalry in intimate relationships (Buss & Shackelford, 1997). Aggression was in the 1930s defined as "an act whose goal is injury to an organism or organism surrogate" and the definition has persisted over time, as it included both the components of deliberate intent and the inflicting of harm on a specific target who is motivated to avoid the behaviour (Anderson & Huesmann 2003). Aggressive behaviour may manifest as direct, i.e. verbal or physical acts inflicting emotional, psychological or physical pain carried out in the presence of the victim, or as indirect behaviour, manifesting as rumour spreading, harassing, or incapacitating an absent target. Aggression is thus not defined by the actual injury caused, but by the intent of the act.

The nature of aggressive behaviours can further be defined as reactive or proactive (Dodge, 1991; Vitiello & Stoff, 1997). Reactive (impulsive) aggression refers to hostile or emotionally driven reactions to an actual or alleged provocation, with emotional relief or the avoidance of negative affect as the goal. Proactive (instrumental) aggression on the other hand is premeditated, non-affective and intended as a means to gain something beyond the inflicting of fear or harm on the victim

Violence represents the extreme level of aggression, manifest in actual potentially dangerous physical acts, aiming to hurt another person with or without an underlying agenda, hence, all violence is aggression, but not all aggression is violence.

### 1.1.2 Developmental aspects of aggressive behaviour

Minor aggressive acts, as a means to active an objective, or avoid unease are by far most common at ages 1–3, after which the aggressive behaviour decreases. Physical aggressive acts such as pushing, hitting or biting are relatively common at this age (Tremblay et al., 1996). However, lack of muscle power makes them "dangerous" at the most to peers or siblings in the sense that they may cause accidental harm. The behaviour also lacks the crucial component of premeditation and does not include aiming to inflict serious harm.

In criminology, Gottfriedson & Hirschi (1990) emphasise the importance of the development of self-regulation and the interplay of internal and external regulation of the self as protective factors. The first years in a child's life involve little internal and strong external control. At this developmental stage it falls upon the environment to monitor action and teach skills for prosocial interaction. Along with the increasing rate of skills in an individual level, the external control (parent/caregiver involvement) decreases during middle adolescence, to approach a state of autonomy in late adolescence and the transition into adulthood. As the general developmental task in youth is to detach from the primary family and form peer relationships, the young person is especially susceptible to peer group influences, where carrying out antisocial acts on the spur of the moment, due to group pressure, or due to cognitive distortions regarding responsivity may lead to lack of judgement and challenging of normative boundaries (Anderson & Bushman, 2002).

In the general population, direct physical aggression as an attempt to resolve social conflicts decreases from early to middle to late adolescence, as the adolescent in line with rapid cognitive development learns self-inhibition, and more sophisticated problem solving, gains increasing control over emotional turmoil and thus finds a more favourable behavioural balance (Hammond, Potenza, & Mayes, 2012). Sometimes, however, a young person fails to benefit from external support. This may be due to for example neurocognitive deficits, neuropsychiatric states, lifetime stress, or to the support failing to meet the needs of the child, i.e. inadequate or excessive parental involvement, substance abuse or, mental health problems. This may cause the young person to fail to achieve the self-regulation skills needed to cope, thus possibly leading to severe problematic behaviours (Moffitt, Caspi, Rutter, & Silva, 2001). As the majority of young people find their place

in society, and go on to desist from antisocial activities, a small group of young people persist in their criminal careers (Farrington, 1986; Moffitt, 1993), actually then accounting for the majority of all serious crime among adult perpetrators.

Based on longitudinal studies on antisocial development, the New Zealand psychologist Terrie Moffit (1993) and colleagues identified two distinct paths into antisocial behaviours. The first one emerges and develops rapidly from early adolescence, peaks around 17 years of age, and then decreases and reverts to desistance from antisocial behaviours (Loeber & Farrington, 2001; Moffitt, 1993). The second path starts early in life as a challenging temperament, increases the antisocial behaviours during adolescence, and continues them into adulthood, subsequently developing into an antisocial personality disorder. This subgroup, characterised by early initiation of antisocial behaviours, more often perpetrate their violent acts alone, are more often involved in sexual crimes, and comorbid mental disorders then go on perpetrating the majority of all serious crime in society (Loeber et al., 2001; Moffitt, Caspi, Harrington, & Milne, 2002; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Vermeiren, De Clippele, & Deboutte, 2000a).

### 1.1.3 Sex differences in violent behaviours among youth

In violence risk research, women and girls have traditionally been a neglected group, partly because the need to assess risk for violent behaviour has been more urgent in male dominated settings. The same is evident in adolescence; in the community, boys still commit three quarters of all violent acts. The evidence base for the structured violence risk assessment also comprises data from predominately male samples. The current debate regarding increasing numbers of girls perpetrating violent behaviour in society is so far not backed up by longitudinal reports based on register data (Oikeuspoliittinen tutkimuslaitos, 2014). The phenomenon presumably arises from the increase of girls showing up in police records, and the increased visibility given to girls' violent acts by the media. This again may not so much imply an increase in violent acts as a visualising of a shift in attitudes towards girls' aggressive behaviour in general (Odgers & Moretti, 2002; Salmi, 2008). Overt violent behaviour among females has traditionally been seen mainly as an anomaly, and subsequently young female perpetrators have been more frequently referred to treatment than to correctional settings (Kaltiala-Heino, 2010; Lodewijks, Doreleijers, de Ruiter, & Borum, 2008; Pajer, 1998). However, opinion seems currently to be shifting from a more traditional attribution of "madness", i.e. explained in terms of experienced maltreatment, reaction to trauma, mental illness or self-defence (Chesney-Lind & Pasko, 2003; Chesney-Lind & Shelden, 1998; Lodewijks,

Doreleijers, et al., 2008; Motz, 2001; Rappaport & Thomas, 2004) towards the concept of "bad" - implying a deliberate choice of disruptive behaviours. The attitudes are reflected in a lowered threshold of reporting on female violence and more harsh punishments seen in an increase in adult females being committed to closed facilities (Odgers & Moretti, 2002). The low base rate of severe violent behaviour among female subjects, however, makes it hard to generalise findings or to identify patterns of risk factors specific to girls. From the research regarding female violent offenders, we have learnt that female violence is more relational in nature, and often perpetrated in domestic settings, or in institutional settings (Archer, 2000; Krakowski & Czobor, 2004; Motz, 2001; Weizmann-Henelius & Suutala, 2000). It has also been argued that female violent perpetrators in the high risk range with comorbid substance abuse and personality problems resemble their male counterparts more than they resemble other females (Putkonen, Komulainen, Virkkunen, Eronen, & Lönnqvist, 2003). Similar findings seem to apply to youth populations: in dating violence and institutional aggression, girls' involvement in overt behaviours, especially violent acts of a less severe nature (i.e. slapping, or pushing or throwing objects) is indeed as frequent as among boys (Archer, 2000; Fagerlund, Peltola, Kääriäinen, Ellonen, & Sariola, 2014; Gammelgård, Koivisto, Eronen, & Kaltiala-Heino, 2008; Gjerstad, 2011; Hickman, Jaycox, & Aronoff, 2004; Krakowski & Czobor, 2004; Moretti & Odgers, 2002; Skeem et al., 2005; Wekerle & Wolfe, 1999). The existing data regarding the applicability of risk assessment methods suggest that a majority of risk items operate similarly regardless of gender (Borum, Bartel, & Forth, 2002; Kaltiala-Heino, Eronen, & Putkonen, 2014; Moffitt et al., 2001). Nonetheless, Moretti and Odgers (2002) suggested that in violence risk assessment, there may be gender differences in the impact of individual risk items on assessment outcome, and that there are several issues beyond those listed for boys that should be taken into account when assessing the risk of violence in girlhood. They also stress the importance of studying well-defined focus groups, as girls prone to violent behaviour may differ not only from violent boys, but also from boys and girls who do not engage in violent behaviours.

### 1.1.4 Psychopathology and violent behaviours in children and adolescents

Many psychiatric disorders have been associated with an elevated risk of violence. Among youth in correctional settings prevalence rates for any psychiatric disorder range from three or four to as much as 10 times higher rates than in general population samples (Abram, Teplin, McClelland, & Dulcan, 2003; Fazel, Långstrom, Grann, & Fazel, 2008; Manninen, 2013; Teplin et al., 2002).

Mental disorders are particularly common in young people starting their antisocial careers early, in those who repeatedly re-offend and in those who perpetrate antisocial acts alone (Moffitt et al., 2002; Teplin et al., 2002; Vermeiren, de Clippele, & Deboutte, 2000b). During adolescent development and in early adulthood, particularly psychoses (Arseneault, Moffitt, Caspi, Taylor, & Silva, 2000; Brennan, Mednick, & Hodgins, 2000; Clare, Bailey, & Clark, 2000), ADHD and autism spectrum disorders (Mannuzza, Klein, & Moulton, 2009; Siponmaa, Kristiansson, Jonson, Nyden, & Gillberg, 2001; Sourander et al., 2006; Söderström, Nilsson, Sjödin, Carlstedt, & Forsman, 2005), conduct disorder (Loeber, Burke, Lahey, Winters, & Zera, 2000) and emerging personality pathology such as callous-unemotional and narcissistic traits have been associated with increasing risk of violence (Barry, Frick, & Killian, 2003; Bushman & Baumeister, 1998; Frick, Cornell, Barry, Bodin, & Dane, 2003). However, associations have also been found for internalizing disorders such as depression, anxiety and eating disorders (Arseneault et al., 2000; Marmorstein, 2007; Thompson, Wonderlich, Crosby, & Mitchell, 1999; Tuisku et al., 2006). In youth, violence towards others often correlates with self-directed violent behaviour (Abram et al., 2008; Becker & Grilo, 2007; Kaltiala-Heino et al., 2014; Turecki, 2005; Vermeiren et al., 2003) especially among girls (Flannery, Singer, & Wester, 2001; Kataoka et al., 2001). Mental disorder being a highly dynamic variable forms a crucial treatment target as physical wellbeing and well monitored treatment efforts increase the responsivity factor for risk reduction, management and prevention.

### 1.1.5 Institutional violence

Adolescents who repeatedly display severe violent and disruptive behaviours and who do not respond to treatment efforts may end up in institutions that, depending on the legislation, may operate in the context of psychiatry, social welfare or prison and probation services (Kuula, Pitts, & Marttunen, 2006). Several studies in adult psychiatric settings have reported no gender differences in the overall incidence of aggression in inpatient settings (Abderhalden et al., 2007; Barlow, Grenyer, & Ilkiw-Lavalle, 2000; Chou, Lu, & Mao, 2002; Mellesdal, 2003; Nijman, Allertz, àCampo, & Ravelli, 1997). However, the greater physical power of male perpetrators causes more significant adverse outcome. There are some indications that in institutional settings the gender differences in aggressive behaviour (i.e. verbal, physical, sexual, destroying property may abate (Nicholls, Brink, Greaves, Lussier, & Verdun-Jones, 2009), and yet others have reported greater severity of incidents caused by female inpatients (Grassi, Peron, Marangoni, Zanchi, & Vanni, 2001; Mellesdal, 2003; Weizmann-Henelius & Suutala, 2000). As is apparent in society, so also on

the wards it seems as if it is a small group of patients who perpetrate the majority of all violent incidents, and the same seems to be apparent in adolescent settings; recently two papers on girl violence reported findings that a small group of girls perpetrated most of the violent incidents during adolescent forensic treatment care (Hill, White, Lolley, Sidki-Gomez, & Williams, 2012; Kaltiala-Heino, Putkonen, & Eronen, 2013).

## 1.2 Societal control of severe youth violence

In Western countries, aggressive and severe noncompliant behaviour among young people is among the most common reasons for out-of-home placement and referral to child and adolescent psychiatric services (Garland et al., 2001; Kaltiala-Heino & Kahila, 2006; Kuula et al., 2006).
Research findings emphasise the importance of early interventions and focusing on juvenile violent behaviours, even targeting small children potentially at risk of developing severe behavioural problems (Borum, 2000; Frick, Bodin, & Barry, 2000; Loeber & Farrington, 2001; Moffitt & Caspi, 2001). The best practice requires structured risk and needs assessment for decisions regarding service security level and intervention planning for juvenile delinquents, aggressive adolescent psychiatric patients, and difficult-to-place child welfare clients (Borum, 2000; Grisso, 2005; Penn & Thomas, 2005). The Finnish judicial system enables several approaches of intervention to severe juvenile delinquency. Criminal law sets the age limit for criminal responsibility at 15 years (Finlex, 1982) and a young person in the judicial system is an individual under the age of 21. Young persons committing a crime prior to the age of 15 will be subjected to measures taken by child welfare authorities with interventions ranging from family interventions to placement in foster homes, and further to state correctional institutions (Finlex, 2007). The state correctional schools are closed facilities, representing the tertiary service within the child welfare services. Treatment can be carried out regardless of the subject's or his /her parents' or caregivers' consent. Young people (aged 15–17) may be subject to a combination of criminal law measures alongside the child welfare interventions according to the best interests of the child (fine, community service/ mediation, juvenile punishment, conditional imprisonment and unconditional imprisonment). Sentencing to prison is extremely rare, and in 2013 the total number of adolescents (<18years) in prison was seven (Rikosseuraamuslaitos, 2014). Finnish mental health law (Finlex, 2009) enables the option of psychiatric treatment regardless of the will of young people who (1) are diagnosed with a mental illness; (2) that if left untreated, would become considerably worse, or severely endanger the person's health or safety or the health or safety of others and; (3) where all other mental health

services are inapplicable. In minors the Mental Health Act is further extended to include serious mental disorders (954/1992) which enable treatment of a wider range of severe disorders that, if left unattended, would severely endanger the safety of the individual concerned or others or their own development. As severe violent offending in young people is seen as an anomaly, the assessment of risk and needs is currently carried out mainly within the frame of adolescent psychiatric settings, whereas similar behaviours in most European countries would be a matter for child welfare or the juvenile courts (Kuula et al., 2006).

# 2. Assessing for "Dangerousness"

Assessing the risk of severe violent behaviour is a much researched field. The necessity for structured assessment approaches was already demonstrated in the early 1970s, when researchers in social and behavioural sciences awoke to institutions being filled with people labelled as dangerous to society and at the same time realising the inadequacy of the basis for psychiatric assessments of risk for reoffending in violent crime in forensic and prison settings. An early naturalistic sociological study, following a court order (U.S. Supreme Court, 1966) causing the mass release the community of nearly a thousand offenders classified as mentally ill and dangerous revealed the shortcomings in risk assessment of the assessments performed by clinicians in the forensic fields (Steadman, 1978). The unstructured clinical approach was found to be severely affected by both internal and external biases, and therefore the ethical advice among psychologists and psychiatrists alike was for clinicians to abstain from making estimates of risk for violent behaviours (American Psychiatric Association, 1974; Steadman, 1978).

## 2.1 The actuarial approach

Even though the call to abstain from making clinical estimates regarding violence risk was empirically established, the field still needed to meet the needs of society and perform estimates on risk for violent reoffending and the pressure yielded a large body of knowledge based on criminogenic research. Therefore, in the aftermath of the New York and Pennsylvania findings, two approaches to risk assessment emerged. On the one hand the focus was set on the impact of decision-making biases (Tversky & Kahneman, 1974) and on the other an approach aiming at simple heuristic decision-making using decision-making trees and algorithms to compute estimates based on empirically derived risk factors associated with increased risk of violent behaviours in forensic and prison settings (Monahan, 1981; Monahan et al., 2001; Quinsey, Harris, Rice, & Cormier, 1998). The later was quickly adapted for prison and legal decision-making, and was referred to as the actuarial approach to violence risk assessment.

In this approach to violence risk assessment, the risk estimate was derived from mathematical formulas transformed into percent rates of risk and compared against the base rate of violent incidents in a specific subgroup of individuals with a criminal or violent past. It comprised static variables (e.g. gender and history of violence), variable markers (such as age) and variable

risk factors (marital or employment status). The approach yields good predictive estimates on group level, identifying groups of people at increased risk of violent reoffending i.e. "which offender would commit at least one violent act, given the opportunity" (Harris & Quincey, 1993), and lowering the rates of people institutionalised due to erroneous assumptions. The actuarial approach is still efficient for singular event decisions, where there is no realistic opportunity to modify the assessment over time (Monahan & Skeem, 2014). However, in forensic and psychiatric settings, the static assessments were less useful for the clinicians trying to cope with violence risk on the individual level, as it did not provide the information needed for intervention planning or risk reduction (Bonta, Law, & Hanson, 1998).

## 2.2 Structured professional judgement

As research yielded more empirical data increasing the knowledge regarding concepts such as "change over time" as well as contextual features having an impact on violent behaviour, a modest cautious optimism regarding the possibility of risk reduction emerged. The new approach recognised both the crucial work regarding empirically derived risk factors related to relapse into violent offences by Monahan, Steadman and the MacArthur group (Monahan et al., 2001) and the work on risk assessment in prison settings by (VRAG; Quinsey et al., 1998), and the potential of the clinically anchored "salient knowledge" of professionals in the forensic field.

The new effort was referred to as the structured professional judgement approach and it shifted the focus of the decision-making from the concept of "predicting dangerousness" towards that of "mapping risk behaviours" in an effort to manage and prevent relapses into violent behaviour. The approach merged the empirical knowledge on static risk factors, added empirically derived dynamic factors (individual features and states, and contextual frames causally related to an increased risk of relapse into violent reoffending) and knowledge on decision-making and biases. The first of the structured professional judgement (SPJ) methods was the Historical, Clinical Risk- by Webster et al. (1997b; 1995). This was a 20-item structured list of empirically derived factors based on solid evidence regarding risk of violent offence made for people in the field who were to make statements regarding patients' risk of violently reoffending.

The dynamic approach, including the element and possibility of change over time, and as risk reduction cannot be reduced by assessment alone, this approach also required appropriate treatment settings and efforts for developing of skills for the reducing of risk as well as pondering

upon questions concerning risk, recovery and the formulating of possible solutions for reducing risk (Webster et al., 1997b).

Violent acts are defined in the HCR-20 as: Actual attempted or threatened physical or sexual harm to a person or persons that are clearly stated or displayed, fear inducing and or potentially harmful to the victim. The actual violent behaviour or threat is rated by intent, and not actual outcome (Webster, Douglas, Eaves, & Hart, 1997a, pp. 24-25). The overall consensus is that risk is a dynamic concept and varies according to the mental and emotional state, situational factors, context and time. Therefore when reporting risk, all these potentially contributing concepts should be taken into consideration and the risk statement should be clear and communicated respectfully.

For the last 20 years, the SPJ approach has been applied to a vast field of risk situations in different settings and subgroups now targeting a wide scale of behaviours ranging from risk of violence between intimate partners (Kropp & Hart, 2005; Kropp, Hart, Webster, & Eaves, 1995), to stalking and sexual violence (Boer, Hart, Kropp, & Webster, 1997; Kropp, Hart, & Lyon, 2008) , to workplace violence (Bloom, Eisen, Pollock, & Webster, 2000; Bloom, Webster, & Eisen, 2002), school massacre and to terrorist threat (Borum, Fein, Vossekuil, & Berglund, 1999; Pressman, 2009). There have emerged additions to improve the risk assessments of female offenders (de Vogel, de Vries Robbé, van Kalmthout & Place, 2012), methods to assess the impact of protective factors (SAPROF; de Vogel, de Ruiter, Bouman & de Vries Robbé, 2009), and methods for assessing treatability and other risks than violence against others (START; Webster, Martin, Brink, Nicholls, & Desmarais, 2009).

Research has shown that as the assessment focus narrows down to specific subgroups of offenders the assessments become more accurate (Singh, Grann, & Fazel, 2011). Risk assessment, however, remains an ever evolving field of research and as the last three decades have focused on risk and needs, the new trend leans towards an active approach of prevention, informed treatment planning and recovery focus by not only reducing risk but by the acknowledgement and utilising of strengths and protective factors (de Vogel et al., 2009; de Vogel et al., 2012; Nicholls, Viljoen, Cruise, Desmarais, & Webster, 2010) and involving service users in treatment planning (Webster et al., 2009). After serving the field well for nearly two decades, the HCR-20 was recently revised and modified into the new HCR Version3 (Douglas, Hart, Webster, & Belfrage, 2013). The updated approach has crystallised into an approach including developmental span, empirical knowledge on risk factors as well as protective factors and both inner state, surroundings, and time as contexts. The emphasis is on the process of decision-making on the one hand and on a strong focus on scenario planning on the other.

## 2.3 Violence risk assessments in youth settings

Due to the wavering phases of development, young people are moving targets in the process of risk assessment. This requires that the assessor have specialist knowledge of normal and abnormal development as well as a general knowledge of aggression, gender differences, group-processes, developmental contexts and factors possibly interfering with development, base-rates for violence in the assessment settings and, for that matter, resilience and factors buffering against negative development

As situations may change rapidly on all levels of evaluation, the relevance of long-term risk prediction is more limited than among adults, in whom the environmental influence affects less and the features of personality are more persistent (Farrington, 1995; Seagrave & Grisso, 2002), therefore a timeframe or a clear description of when, or under what circumstances a new assessment should be conducted should always be included in the risk communication (Borum et al., 2002, p. 19).

As young people are also still heavily dependent on their environment, first the primary caregivers and family and then peers, the assessment is to consider not only the individual but also the family and living context. Hence the focus of the assessment will shift over time, from attention to indicators such as aggressive thoughts and anger rumination, adopting models of aggressive behaviour, secure attachment and accessibility of support from prosocial adults for children aged 5–12, to factors related to violence risk later during adolescence, such as social skills, peers and social relations and the impact of environmental factors (Borum, 2000).

Risk assessment methods for minors vary according to the assessment means and focus. In screening, for example, anamnestic data is collected using a wide range of questions related to problematic situations or phenomena the purpose being to include those in need of extra attention. This approach supplies a general overview and may indicate areas for intervention, but its predictive value is limited. The BARO (Doreleijers, Boonmann, van Loosbroek, & Vermeiren, 2011) for example, translated and validated for use in the Finnish social services by Leo Heikkilä (2008), aims to screen the needs of young people in contact with the authorities, is a semi-structured interview format targeting a wide range of criminogenic and / or child welfare needs, as well as responsivity and victimisation features that need to be considered. However, it is not designed to assess future risk of violence.

Then there is the risk, needs and responsivity approach, building on an actuarial model, where the recognition, measurement and combining of empirically supported risk factors yield a good predictive value, and imply amendable areas of risk reduction but do not necessarily indicate

what to focus on in individual cases. In social or juvenile detention settings one might, for example, use the Youth Level of Service/Case Management Inventory (Hoge, Andrews, & Leschid, 2002) which is a 42-item judgement aid, arranged into eight domains, namely antisocial behaviour, personality features, cognition and associates, as well as social, occupational, recreational context and substance use problems. The "central eight" are approached in a structured decision tree approach yielding a numerical score indicating the level of risk. The YLS-CMI has been proven to be a valid tool for assessing risk of reoffending among juvenile delinquents.

There are also assessment approaches focusing on specific features of an individual that might exacerbate criminal conduct and / or violent offending such as the Psychopathy Checklist Youth Version (PCL-YV; Forth, Kosson, & Hare, 2003) designed to pinpoint psychopathic features associated with an increase in risk of violent offending in young people, or offender specific assessment methods such as the Estimate of Risk for Adolescent Sexual Offence Reconviction (Worling & Curwen, 2001) or the Juvenile Sexual Offence Assessment Protocol (Prentky & Righthand, 2003). These, however, are not specifically aimed at estimating risk of violent reoffending.

Last, there is the SPJ approach, where the first assessment tools for use among young persons were the Early Assessment for Risk List for Boys (Augimeri, Koegl, Webster, & Levene, 2001) and girls (Levene et al., 2001), which assesses risks in children aged 6–12, whereas the Structured Assessment of Risk and Treatability – Adolescent Version (Nicholls et al., 2010) assesses a wide range of risk behaviours among young people in treatment facilities and includes protective factors and key items for targeting traits and factors especially responsive to treatment efforts.

## 2.5 Structured Assessment of Violence Risk in Youth

When it comes to SPJ approaches to violence risk assessment in youth, the Structured Assessment of Violence Risk in Youth (SAVRY) by Borum, Bartel and Forth (2003) represents the current best practice approach to assessments in forensic or juvenile detention settings (Grisso, 2005; Kraus et al., 2011; Penn & Thomas, 2005). SAVRY is designed for the prediction of severe violent relapse into violence in young people aged 12–18 but even more so for giving indications for managing and reducing such risk.

Considering the nature of the phenomenon assessed, SAVRY should always be based on multiple source information. This becomes especially important in juvenile forensic and /or

correctional settings. The information gathering should include interviewing the subject and self-report it may include information from primary caregivers, teachers, and social workers and from medical records as well as psychometric test information.

In the best practice of the SPJ approach, each individual item should be considered on a case-by-case basis to evaluate the applicability and the severity in each individual case. All information should be considered for credibility and more weight should be given to more credible sources of information such as official records as violent incidents and aggressive behaviour may be underreported due to shame or fear of stigma, or exaggerated as an attempt to cope.

SAVRY comprises 24 risk and six protective factors. Items are derived from vast empirical and longitudinal data on developmental psychology and delinquent youth and organised according to the SPJ approach to violence risk assessment into an historical, a social/contextual, and an individual / clinical subdomain and a protective domain. Items (FIG 2) are derived from the existing research concerning youth violence.

Violence is in the SAVRY manual defined as: "*an act of battery or physical violence that is sufficiently severe to cause injury to another person or persons (i.e. cuts, bruises, broken bones, death etc.), regardless of whether injury actually occurs; any forcible act of sexual assault; or a threat made with a weapon in hand*" (Borum et al., 2002, p. 15).

The manual guides the assessor to also consider the quality and nature of the violent behaviour to discriminate between different types of violent or aggressive behaviours, as the SAVRY assessment should give directions on what kind of possible disruptive behaviour may occur and to guide risk reducing interventions. When scoring SAVRY, frequency and seriousness for each item are considered separately before a consensus statement regarding the overall level of risk is made.

Also, the manual guides the assessor to pinpoint what are referred to as "critical items" that may be of a crucial importance. This may be an item that may not be currently present, but if it were, would essentially increase the individual risk level (Borum et al., 2002, p. 18).

Table 1. SAVRY items

| Historical Subscale | Social/Contextual Subscale | Individual Subscale | Protective Subscale |
|---|---|---|---|
| History of violence | Peer delinquency | Negative attitudes | Pro-social involvement |
| History of non-violent offending | Peer rejection | Impulsivity and risk-taking | Strong social support |
| Early initiation of violence | Stress and poor coping-skills | Substance use difficulties | Strong attachments and bonds |
| Past supervision or intervention failures | Poor parental management | Anger management problems | Positive attitude to intervention/authority |
| History of self-harm or suicide attempts | Lack of personal/social support | Lack of empathy and remorse | Strong commitment to school |
| Exposure to violence in the home | Community disorganization and violence | ADHD | Resilient personality |
| History of childhood maltreatment | | Poor compliance | |
| Parental/caregiver criminality | | Lack of interest for schoolwork | |
| Early caregiver disruption | | | |
| Poor school adjustment | | | |

Table 2. SAVRY muuttujat (Finnish translation of the table above)

| Historialliset riskitekijät | Sosiaaliset riskitekijät | Yksilölliset riskitekijät | Suojaavat tekijät |
|---|---|---|---|
| Aikaisempi väkivaltakäyttäytyminen | Epäsosiaalinen toveripiiri | Negatiiviset asenteet | Pro-sosiaalinen käyttäytyminen |
| Aikaisempi- ei väkivaltainen rikoskäyttätyminen | Toverien hyljeksimäksi joutuminen | Riskinotto/ impulsiivisuus | Vahva sosiaalinen tuki |
| Varhainen väkivaltakäyttäytymisen aloittaminen | Stressi ja heikot selviytyminkeinot | Päihdeongelmat | Voimakkaat kiintymyssuhteet |
| Aikaisempi valvonnan/intervention epäonnistuminen | Vanhemmuuden puuttuminen | Vaikeus hallita vihan tunteita | Positiiviset asenteet interventioita ja auktoriteetteja kohtaan |
| Itsetuhoisuus tai itsemurhayritykset | Sosiaalisen tuen puute | Kyvyttömyys tuntea empatiaa /katumusta | Voimakas sitoutuminen kouluun |
| Altistuminen väkivallalle kotona | Vieraannuttava elinympäristö | Tarkkaavaisuus/ hyperaktiivisuus | Joustavat piirteet persoonallisuudessa |
| Lapsuudenaikainen kaltoinkohtelu | | Huono hoitomyöntyvyys | |
| Vanhemman /huoltajan rikostausta | | Vähäinen mielenkiinto/ sitoutuminen kouluun | |
| Varhainen hoivasuhteen katkeaminen | | | |
| Heikko koulumenestys | | | |

### 2.5.1 The historical items

The historical domain comprises items regarding past events that are firmly associated with later violent offending. The empirical data rests on a basis of longitudinal studies of trajectories and developmental paths into delinquency, learning psychology, attachment theory. Items comprise violent and antisocial developmental paths (Farrington, 1991; Hawkins et al., 1998; Lipsey & Derzon, 1998; White, Moffitt, Earls, Robins, & Silva, 1990), adverse experiences in the early childhood years (Rivera & Widom, 1990; Smith & Thornberry, 1995; Widom, 1998), disruptive and insecure early relationships (Farrington, 1991; Henry, Caspi, Moffitt, & Silva, 1996) and experiencing neglect (Rivera & Widom, 1990) or exposure to antisocial models (Baker & Mednick, 1984; Cloninger, Christiansen, Reich, & Gottesman, 1978) or problems in cognitive functioning (Farrington, 1991; Maguin & Loeber, 1996). They also include information regarding response to earlier interventions (Andrews & Bonta, 1998; Swartz et al., 2001) and on self-harming behaviours (Apter et al., 1995; Marttunen, Aro, Henriksson, & Lönnqvist, 1994). The terms are quite static in nature and subsequently not as receptive to interventions aiming at change.

### 2.5.2 The social/ contextual subdomain

The social domain considers relationships ranging from family support (Estroff, Zimmer, Lachicotte, & Benoit, 1994; Maguin et al., November 1995) and relationships with siblings, to peers and groups of peers (Battin, Hill, Abbott, Catalano, & Hawkins, 1998; Coie, Lochman, Terry, & Hyman, 1992; Keenan, Loeber, Zhang, Stouthamer-Loeber, & Van Kammen, 1995; Moffitt, 1993) , and further into a wider concept including the impact of environmental risk factors and community exposure (Thornberry, Huizinga, & Loeber, 1995) to poverty, drugs and violence.. It also considers lifetime stress and skills in coping with traumatic events (Guerra, Huesmann, Tolan, Van Acker, & Eron, 1995).

The subscale is highly dynamic in nature; the younger the child, the greater the impact of the family and social support. The impact of peers and community grows along with the increasing autonomy during adolescence. The item severe lifetime stress and coping is merged from two items and thus requires the assessor to consider two separate but related items simultaneously. The timeframe of “recent” herein urges the assessor to ponder upon the young person’s subjective experience.

### 2.5.3 Individual/ clinical items.

The clinical subscale comprises items such as personality features and styles specific to delinquent and violent youth. One could divide the factors into problems related to lack of skills (Furlong & Smith, 1994; Novaco, 1994) or motivation (Andrews & Bonta, 1998; Farrington, 1989; Maguin et al., November 1995) on the one hand and on the other core personality traits and neuropsychiatric deficits such as lack of empathy (Kaukiainen et al., 1999; Kruh, Frick, & Clements, 2005), impulsivity (Augimeri et al., 2001; Farrington, 1989; Rutter, Giller, & Hagell, 1998), attention deficits and hyperactivity (Hawkins et al., 1998; Loeber, Green, Keenan, & Lahey, 1995) , as well as antisocial cognition and attributional style (Hawkins et al., 1998; Zhang, Loeber, & Stouthamer-Loeber, 1997). Substance abuse problems are also rated in this subscale (Loeber & Hay, 1997). The timeframe "current" refers to a trait or behaviour that has been present within weeks or months, including at the time of the assessment. As in the social subscale, the individual risk factors are also markedly dynamic in nature and thus receptive to corrective interventions. Item ratings may also vary according to the phase of development, as for example a modest level of narcissism and self-centredness may be within the normative range in one phase, but not in the next one.

### 2.5.4 The protective subscale

SAVRY was the first of the SPJ risk assessment schemes to add protective factors to their checklist to reflect activities, relationships and personality features that are incompatible with antisocial attitudes and behaviours. The protective items are factors that generally decrease the risk of violent behaviour and promote psychological wellbeing as well as buffering the negative impact of present risk factors (Rutter, 1990). These items can serve as antidotes to aggression as traits of "likeability", and ability to bond with a prosocial adult (Fonagy, Target, Steele, & Steele, 1997; Stouthamer-Loeber, Loeber, Farrington, & Zhang, 1993) promote the forming of peer (Caprara, Barbaranelli, & Pastorelli, 2001; Hoge, Andrews, & Leschied, 1996) or social relationships that may offer support and guidance (Cauce, Mason, Gonzales, Hiraga, & Liu, 1996; Dubow & Reid, 1994). Other features, such as openness and positive attitudes and expectations (Hoge et al., 1996) as well as resilient personality traits (Kumpfer, 1999), cognitive flexibility and skills enhance the ability to profit from this support, may form a positive accumulation of protective factors. The assessment guides to look for recent implications (i.e. "present over the preceding year" (Borum et al., 2002, p. 19) of the strengths being present, and to anchor treatment efforts in those found as a positive gateway to intervention.

## 2.6 Empirical studies of SAVRY

When conducting structured assessment using a decision-making scheme *reliability measures* i.e. the agreement between two or more raters coding the same case, may be evaluated by performing intraclass correlations. The Intraclass Correlation Coefficient (ICC) for multiple raters on SAVRY has yielded ratings in the ranges good to excellent (Borum, Lodewijks, Bartel, & Forth, 2010; Fleiss, 1986). The method has also been assessed for *concurrent validity* (if the method measures the right kind of variables) the measurement of and compared with other well established assessment methods such as the PCL-YV, and the YLS/CMI (Catchpole & Gretton, 2003; Welsh, Schmidt, McKinnon, Chattha, & Meyers, 2008), and against assessments for risk of sexual violence (JSORRAT-II; Epperson, Ralston, Fowers, DeWitt, & Gore, 2006; JSOAP-II; Prentky & Righthand, 2003; Viljoen et al., 2008) and have proved SAVRY a valid method for assessing risk of violent reoffending.

The validity of SAVRY has been well established in several studies across Western countries, whether using total scores (TS) or a summary (consensus) risk rating (SRR), the latter by weighting the items for each individual. Its reliability and validity have also been confirmed in both institutional (Borum et al., 2002; McEachran, unpublished) and community settings (Borum et al., 2002; Catchpole & Gretton, 2003; Chapman, Desai, Falzer, & Borum, 2006; Gammelgård et al., 2008; Lodewijks, Doreleijers, et al., 2008), and there are several prospective studies with community follow-up ranging from six months to ten years (Catchpole & Gretton, 2003; Dolan & Rennie, 2008; Meyers & Schmidt, 2008; Schmidt, Campbell, & Houlding, 2011; Welsh et al., 2008). Use of SAVRY has been extended to assess risk for non-violent offending as many of the risk items in SAVRY are also associated with more general antisocial development in young people (Catchpole & Gretton, 2003; Dolan & Rennie, 2008; Meyers & Schmidt, 2008; Schmidt et al., 2011; Welsh et al., 2008). SAVRY has also proved to be a valid measure across ethnic groups regardless of gender or race (Gammelgård, Weizmann-Henelius, Koivisto, Eronen, & Kaltiala-Heino, 2012; Lodewijks, De Ruiter, & Doreleijers, 2008; Meyers & Schmidt, 2008; Penney, Lee, & Moretti, 2010; Vincent, Chapman, & Cook, 2011; Woods, 2013), and their findings strengthen the assumption that taking special foci of assessment into consideration does improve the predictive validity.

Even though SAVRY was originally developed for use with young people in custodial facilities, the applicability in cases where psychiatric symptoms may have an impact on the outcome has shown that adding knowledge on psychiatric symptomatology and phases of mental disorders improves the validity of the assessment. Bartel et al. (2003) found that the SAVRY TS

was statistically significantly related to an increased risk for institutional aggression (*r = .40*) in their sample of delinquent youth, and recognising their aggressive conduct disorder strengthened the correlation (*r = .52*). Lodewijks et al. (Lodewijks, Doreleijers, et al., 2008) found in their follow-up (7–11 months) in residential treatment that the SAVRY TS and SRR managed to accurately predict both physical institutional violence and disruptive behaviour in their group of delinquent boys (N = 66), with AUC values ranging from 0.58 to 0.92 for the disruptive behaviours (verbal assaults, violent threats, destroying property, & rule breaking) and 0.80 for violent behaviours. Dolan & Rennie (2008) in their sample of institutionalised boys (N=99) found that SAVRY outperformed the PCL-YV in predicting risk when controlling for the psychiatric component of conduct disorder (CD), and that the SAVRY TS and SRR were equally able to predict recidivism (Dolan & Rennie, 2008). In their further studies, Khanna et al. (2014) (N=76), they controlled for the impact of Attention Deficit and Hyperactivity Disorder (ADHD) with or without comorbid CD on predictive validity. Findings showed that comorbid ADHD and CD were statistically significantly associated with higher risk scores on SAVRY TS, social and individual domains and with the PCL-YV interpersonal and lifestyle factors, but for predictive validity SAVRY outperformed the PCL-YV and the YLS/CMI only with the CD group. In the comorbid group only the subdomain regarding family and parents in the YLS/CMI was found to be predictive of reoffending. The finding highlights the fact that the correlates of violent and antisocial behaviour should not be assumed to be the same for all mental illnesses. The evaluation of the impact of a wider range of psychiatric symptomatology, including psychosis, on the SAVRY estimate has so far been lacking.

Last, the impact of the protective factors of SAVRY on refraining from reoffending has attracted increasing attention. Lodewijks et al. 2009 studied the association of the protective risk and violent reoffending of delinquent boys ( N = 66) rated either low or high risk and found that the prosocial subscale TS, and in particular the items strong social support and attachment to prosocial adult were significant predictors of desistance. Rennie & Dolan (Rennie & Dolan, 2010) found in their study on high risk rated boys (N = 111) that the protective factor correlated not only with desistance from violent and general offending, but also with fewer psychopathology problems rated with the Child Behavior Checklist (CBCL). For them the sub-item resilient personality traits (i.e. above average intellectual abilities & cognitive skills, adaptability, calm mood and realistic self-esteem) seemed to be of crucial importance.

The most commonly used approach to validating risk assessment has been performing receiver operating characteristics (ROC) analyses in which the 'area under the curve' (AUC) a downward concave curve ranging from -1 (perfect negative association) to +1 (perfect positive association) thus representing the extent of the predictive value of the variable (Mossman & Somoza, 1991) According to Swets (1988), the AUC value ranges from excellent (0.91–1.0), good (0.81–0.90), fair (0.71–0.80), poor (0.61–0.70) to failing (0.50–0.60). However, Singh and colleagues (2011) argued that AUC measures are not enough specific to estimate validity in the SPJ approach, hence, sensitivity and specificity and predictive accuracy have also been scrutinised (Cook, 2007; Mossman, 2013; Singh, 2013). Singh and colleagues (2011) further argued, based on their findings in a large metastudy of nine commonly used risk assessment decision aids, including SAVRY, that the more specifically the assessment fits a specific population, the better is its predictive validity.

## 2.7 Critical and ethical consideration

Systematic, empirically based risk assessments currently form a cornerstone of forensic assessment; nonetheless, they also constitute a potential risk for stigmatising individuals, and for the abuse of institutional power. Therefore, when conducting risk assessments one should not only consider the safety aspects, but always also bear in mind the possible impact on the future life of the assessee. The assessment should be conducted carefully and objectively bearing in mind the context (legal, mental health, corrective, institutional or community) and the purpose of the evaluation assessment (decision-making and predicting violent reconviction, risk of sexual violence, institutional violence etc. or treatment efforts, i.e. risk-management, reduction and prevention). One should also recognise and specify what limitations or biases may be attached to the outcome of assessment due to information gathering, methods used, and/ or own professional knowledge. When shifting the focus of assessment from prediction to treatment and emphasising change, the treatment relevant factors should be causally related to therisk of violence, i.e. there ought to be solid evidence that by successfully treating these factors the risk of violent behaviour does indeed decrease (Skeem & Monahan, 2011).

Table 3. SAVRY studies on predictive validity

| | Focus and design | Results violent offending (AUC/ correlations) | Results non-violent, and general offending (AUC/correlations) |
|---|---|---|---|
| **McEachran,A. (unpublished)** (US) Master's thesis Simon Fraser University | Predictive validity, associations with violent reconviction<br>N = 108 (males)<br>Juvenile offenders<br>Retrospective, file based<br>36- month follow-up | **AUCs**<br>SRR rating .89,<br>Total score .70, | |
| **Gretton, H. & Abramowitz, C. (2002, March)** (CA) | Predictive validity, violent & non-violent reconviction<br>N = 176 (94% boys)<br>Forensic adolescents<br>12 months follow-up in community | **AUCs**<br>SRR rating .74,<br>Total score .67 | **AUCs**<br>SRR rating .66,<br>Total score .68 |
| **Catchpole R. & Gretton H. (2003)** (CA) | Predictive validity, general reoffending, violent recidivism<br>N = 66<br>Prospective<br>12 months follow up<br>Young offenders | **AUCs**<br>TS score =.73 | **AUCs**<br>TS score= .74 |
| **Lodewijks, H., Doreleijers, T., & de Ruiter, C. (in press)** (NL) | Predictive validity for community violence<br>N = 117 (95% boys)<br>Prospective,<br>36 months follow-up | **AUCs**<br>SRR rating = .71,<br>TS score= .65, | |
| **Rieger, M, Stadtland, C, Freisleder, F.J., & Nedopil, N. (2006, june)** (D) congress presentation, 2006 | Predictive validity general and violent re-offending, community<br>N = 89<br>Retrospective, 12-month follow up<br>Young offenders | **AUCs**<br>SRR rating=<br>TS =.69 | **AUCs**<br>SRR =.70<br>TS =.58 |
| **Walkington, Z., O´Keeffe, C., & Thomas, S. (2006)** (UK) | Predictive validity,<br>N = 57<br>6-month follow-up<br>Juvenile offenders | **AUCs**<br>Violent threat SRR rating = .66<br>Physical abuse SRR rating = .67 | |
| **Dolan, M. C. & Rennie, C. E. (2008)** | Predictive validity<br>N = 99<br>Prospective<br>6-month follow-up | **AUCs**<br>SRR rating =.69<br>TS score =. 69 | **AUCs**<br>SRR rating = .64.<br>TS score = .64 |
| **Lodewijks, H., Doreleijers, Th., de Ruiter, C. & Borum, R. (2008) (NL)** | Institutional violence<br>N = 66<br>Prospective<br>18-month follow-up | **AUC**<br>SRR rating =.86<br>TS core= .80 | **AUCs** |
| **Meyers, J. & Schmidt, F. (2008)** | Predictive validity, community, gender & racial issues<br>N = 121<br>Prospective<br>12 /36-month follow up | **AUC**<br>1year/ 3 year<br>SRR rating boys= .66/.77 girls .76/.75 | **AUCs**<br>1year/ 3 year<br>SRR rating = .80/.68 |
| **Welsh, J., Schmidt, F, McKinnon, L., Chattha, H., & Meyers, J. (2008)** | Community violence<br>N = 133<br>Prospective<br>36-month follow up | **AUCs**<br>TS =.81<br><br>Low 3%, Moderate 26% High 56% | **AUCs**<br>TS =.77 |
| **Penney, S. R., Lee, Z., & Moretti, M. M. (2010) (CA)** | Gender-issues, community: violent vs nonviolent<br>N= 144 (80/64)<br>Prospective<br>24-month follow-up | **AUC**<br>SRR boys= .64 girls=. 72<br>TS boys= .69 girls=.72 | **AUCs**<br>SRR boys= .69 girls=. 67<br>TS boys=.76 girls=.65 |
| **Hilterman, E., Nicholls, T., & Niewenhuisen, C. (NL)(2014)** | Predictive validity, self-reported violent offending<br>N= 105<br>Prospective<br>Delinquent youth | **AUC**<br>SRR =. 90<br>TS =.71 | |

## 2.8 Summary

SAVRY is a North American risk assessment method, following the structured clinical judgement approach to assess the risk of an individual relapsing into violent offending. It was primarily constructed and validated for the evaluation of risk for violent reoffending among juvenile delinquents, and the empirical base rests on research primarily carried out in samples of boys.

In Finland the structured assessments concerning risk for violent behaviours in young subjects are often carried out in youth psychiatric settings. The information regarding the impact of psychiatric illness on structured risk assessment is well researched in adult samples, but in the adolescent context the empirical knowledge regarding the applicability of SAVRY in youth settings is still scarce. In the present thesis the correctional school sample is the subgroup most resembling the original focus group of SAVRY, as such serving as a reference group to the existing empirical knowledge on SAVRY performance.

SAVRY was translated into Finnish in 2005, and the present dissertation is an attempt to validate the Finnish version for use both in the general psychiatric setting, in adolescent forensic psychiatry and in child welfare settings meeting the needs of youth presenting with severe violent and disruptive behaviours. For this purpose we needed to know about the base rates of these behaviours (Paper I); and the validity of the instrument for assessing inpatient violence in the various settings (Paper II). We also wanted to ascertain the impact of features of psychopathology on the assessments (Paper III); and on the long-term predictive validity and relapsing into violent crime in early adulthood (Paper V).

When we started our research in 2005, the debate in the risk assessment field largely centred around the applicability of risk assessment methods to female offenders as such, or if there should be separate assessment methods for use with female offenders. We wanted to know how well SAVRY functioned in the risk assessment of girls and if there were items in SAVRY that should be especially noted when conducting risk assessment among females, and even more precisely among girls rated as presenting with a high risk for violent offending (Paper IV).

# 3. Aims of this study

For validation purposes, and to strengthen the assessment of risk in Finnish adolescent psychiatry, child welfare and custodial settings, the aims of this dissertation were to evaluate:

1) Are youth in Finnish custodial institutions violent, and if there are differences related to gender, age, diagnostics or setting (paper I).
2) Is SAVRY a valid method for predicting both institutional violence and violent reoffending (papers II and V).
3) Are there dimensions of psychiatric symptoms that are more closely associated with elevated risk of violence and violent outcome (paper III).
4) Are there gender differences in the violence risk protocols and / or risk items that are more strongly associated with an escalated risk in either gender (paper IV).

# 4. Materials and Methods

## 4.1 Study design

The study comprised a file-based assessment of violence risk using SAVRY in three different institutional facilities for adolescents, and a follow-up of six months within the institution recording violent and disruptive behaviours during the treatment, and a four-year register based follow-up recording subsequent violent and non-violent crimes.

A general adolescent psychiatric ward (GAP) served as a secondary level service unit as it serves a wide range of psychiatric needs of all young people in a well-defined catchment area (one of the 21 health care districts in Finland).

An adolescent forensic psychiatric unit (AFP) represented one of the two tertiary level units of care for young people with severe mental health disorders and severe violent and non-compliant behaviours in Finland. They also perform forensic psychiatric assessments of minors (15-18 years) for the courts. The unit catchment area is nationwide, and young people in need of forensic assessment or intense psychiatric support and care may be referred from both psychiatric and correctional settings.

The correctional school units (CS) represented secondary level institutions (3 out of 8 national units) within the child welfare system, serving the needs of the social system when a child has severe oppositional, defiant or conduct problems, and when the primary caregivers and or foster care units cannot meet their needs. They may also admit young people as part of correctional interventions.

Structured assessments of risk were first compared against the results of a semi-structured 6-month follow-up while in institutional settings and then again four years after the initial assessments from crime registers and registers on deaths and causes of death. In the general adolescent psychiatric (GAP) and correctional school (CS) units, data concerning sex, age, psychiatric diagnosis as well as information needed to score the structured risk assessment was collected from patient and child welfare records during two separate study periods in spring and autumn 2005. All adolescents residing in the study units during the study periods were included. In the forensic adolescent psychiatric (FAP) unit all those who had been assessed or treated in the unit since its opening in 2004 and until the end of 2007 were assessed in a similar manner. We decided to use all information at hand for the statistical analyses, and as the information gathering in the forensic unit continued until the end of 2007, the numbers of subjects in the different publications vary (Fig 1).

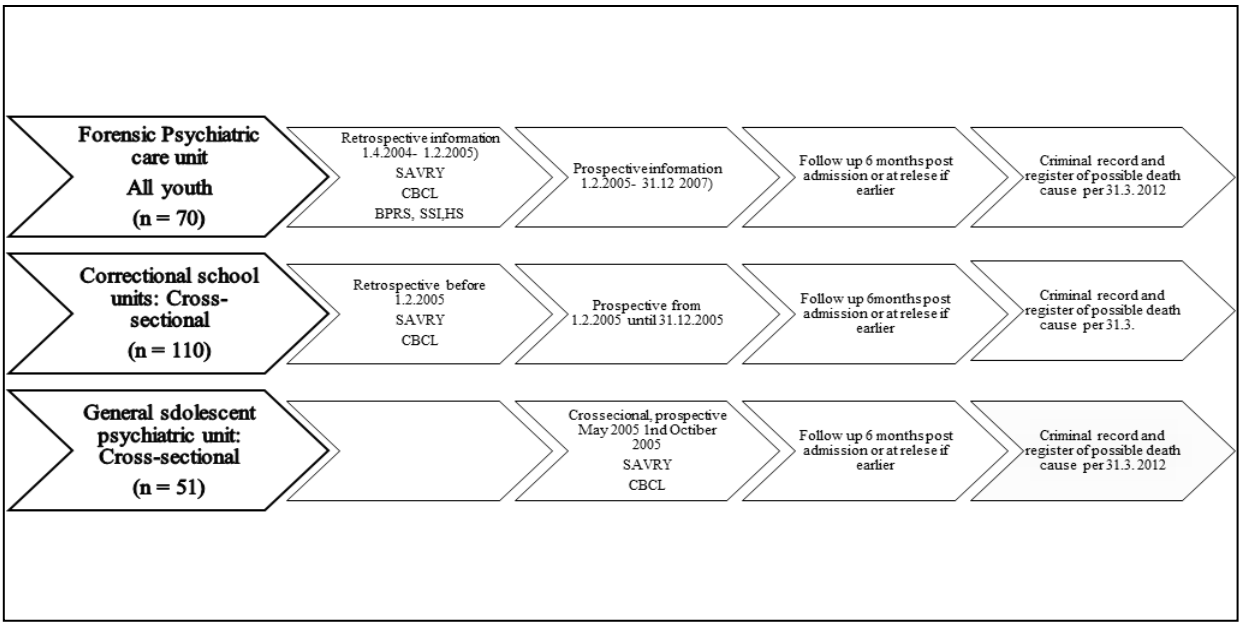

Figure 1. Study populations and informationgatheringprocess

## 4.2 Study population

Subjects (N = 231) comprised 135 boys and 96 girls. Of these adolescents 51 (15 boys and 36 girls) were treated in a general adolescent psychiatry facility (GAP); 110 (71 boys and 39 girls) in correctional school settings (CS), and 70 (49 boys and 21 girls) at an adolescent forensic psychiatric unit (AFP). The mean age of the total sample was 15.1 (SD 1.5; range 11–18). Girls were slightly older in all groups, but the finding was statistically significant only in the AFP group ($p = 0.006$).

Of the young people, 194 (84%) had a psychiatric diagnosis according to the ICD-10 recorded in their psychiatric files. Conduct disorder (F90–99 + F60–69) was the most common diagnosis (47%). Merging the conduct disorder and personality disorder was chosen due to their both being strongly linked to disruptive behaviours. Fourteen percent of the subjects suffered from schizophrenia spectrum disorder (F20–29), and 23% had some other F-diagnoses. Conduct disorders (F90–99) were more common in the CS group than in the other two groups. The GAP subjects had more mood (F30–39) and anxiety disorders (F40–49) than the other two groups.

The comparability of the groups as regards distribution of sex, age, psychiatric diagnosis was evaluated. The only significant difference between the units was found in the gender distribution in the general adolescent psychiatric unit, where there were significantly more girls than boys than in the other two units ($p < .001$). Also, those not diagnosed with any psychiatric diagnosis all resided in the correctional school setting and all those suffering from psychosis in psychiatric settings.

Of the subjects, 66% (23% of the GAP; 56% of the AFP and 90% of the CS groups) were either taken into care by the child welfare authorities or they were treated on an involuntary basis under the provisions of the Mental Health Act. Of the subjects 23% (GAP none, AFP 41%, and CS 23%), had convictions for violence prior to the assessment, and 68% (GAP 36%, AFP 74%, CS 77%), had some severe violent act in their records. Previous sexual violence was reported for 9% of the total sample (GAP none, AFP 26%, CS 3%).

## 4.3 Measures (Figure 2)

### 4.3.1 Background variables

Background information including sex, age and psychiatric diagnoses as well as the time spent in the institution was collected from the medical and child welfare records of the subjects For the analyses, age was dichotomized to early (11–14 years) and middle (15–17 years) adolescence. The most recent primary psychiatric diagnosis was collected as set by the treating psychiatrist according to the ICD-10 (Sosiaali- ja terveysalan tutkimus- ja kehittämiskeskus*, 1995), which is the official classification used in Finnish healthcare. For the statistical analyses psychiatric diagnoses were classified as follows: schizophrenia spectrum disorders (F20–29), disruptive behavioural and personality disorders (F90–99 and F60–69), other mental or developmental disorders (all other F-diagnosis), and no diagnosis.

### 4.3.2 The Structured Assessment of Violence Risk in Youth (SAVRY)

Risk of violence (Papers II–V) was assessed with the Finnish translation of the Structured Assessment of Violence Risk in Youth (SAVRY; Kaltiala-Heino, 2005). The SAVRY assessment was made for each subject using all information available.

In SAVRY the 24 risk factors are divided into historical, social/contextual and individual domains and classified into low – moderate – high according to the manual. An item is coded low when the feature is not present, moderate when indications or features are present but rarely or in a mild form, and high if the item or behaviour is obvious, persistent and / or severe. The six protective items are coded dichotomously as present or absent. If information is insufficient for coding, the item is coded X. The final risk estimate is formed as a consensus of all items and

information at hand and communicated in terms of a SAVRY Summary risk rating (SRR) in terms of Low, Moderate, or High. For research purposes, risk scores can be converted into numerical values ranging from low = 0 to high = 2. Protective factors are accordingly marked dichotomously as absent = 0, or present = 1. A numerical total risk score (TS) is counted summarising all 24 risk factors. Subscale scores can be used for historical, social/contextual, and individual risk factors and for the protective factors separately.

### 4.3.3 Child Behavior Checklist (Paper II).

Psychopathology was measured using the Child Behavior Checklist (CBCL; Achenbach, 1991), a semi-structured survey rated by adult informants with items regarding the six to eighteen year olds competencies and behavioural / emotional problems. For our analysis we used the structured part of the scale, comprising 112 items covering the following domains: Aggressive; Anxious / Depressed; Rule-Breaking; Withdrawn / Depressed; Attention Problems; Social Problems; Thought Problems and Somatic Complaints. For each item the respondent is asked to state, on a three point scale (0 = not true, 1 = occasionally or sometimes true, 2 = very or often true), how well it describes the young person in question. The outcome gives an indication of the severity of the problem, again subcategorising into non-clinical, borderline and severe clinical range. In the study the CBCL forms were distributed to the assigned nurses of the GAP and CS young people at the time of the risk assessment, and in the AFP group to the information could be retrieved from the files as the form is distributed to the patient's parents as a part of the routine clinical assessment at the unit. The analyses consider both continuous and dichotomised (= non-clinical vs. borderline and clinical ratings) approaches to the CBCL outcome. The CBCL comprises well-established normative data and provides standardized clinical cut-offs for both the separate dimensions of psychopathology and for summary outcomes (total, internalising and externalising scales) which have demonstrated strong psychometric properties for discriminating between referred and non-referred young people within a wide range of clinical settings (Achenbach, 1991; Achenbach, Dumenci, & Rescorla, 2003; Almquist, Bredenberg, Suominen, & Leijala, 1988; Verhulst & Achenbach, 1995).

### 4.3.4 The Brief Psychiatric Rating Scale (Paper II)

Psychotic symptomatology was measured using the Brief Psychiatric Rating Scale (Overall & Gorham, 1988; Overall & Gorham, 1962), a clinician-rated scale initially designed to measure

change in adult patients with psychotic illness, covering a wide range of symptoms commonly seen in psychotic relapses. The 18-item scale is rated by the clinician on a 7-point Likert scale ranging from the symptom not being present to being extremely severe. The highest total score is 126. For the analysis we collected the clinician rated BPRS scores from the patient files (Dittmann et al., 2008). The BPRS has demonstrated good validity for assessing symptoms of psychological dysfunction and psychosis among adult psychiatric patients (Hopko, Averill, Small, Greenlee, & Varner, 2001), and has previously been used in research among adolescent psychiatric patients (Dittmann et al., 2008).

### 4.3.5 The Beck Hopelessness Scale (BHS, Paper II)

The Beck Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974) is a 20-item self-report instrument based on the cognitive theory of depression and designed to measure negative expectations about the future. Subjects are asked to answer the questionnaire dichotomously (yes / no) based on their thinking during the previous week. Total scores range from 0–20 with higher scores indicating greater hopelessness. Elevations in BHS scores have repeatedly been found to be associated with suicide attempts and completed suicide in clinically confirmed adult samples and in adolescent psychiatric patients with a history of suicide attempts BHS scores were predictive of suicide attempts following discharge from hospital (Goldston, 2000; Hawton, Kingsbury, Steinhardt, James, & Fagg, 1999).

### 4.3.6 The Beck Scale for Suicidal Ideation (SSI, Paper II)

The Beck Scale for Suicidal Ideation (Beck, Rush, Sahw, & Emery, 1979) is a well-established clinical rating scale designed to measure the intensity, pervasiveness and characteristics of suicidal ideation. It aims to identify individuals with increased thoughts, plans and wishes to commit suicide (Beck & Deffenbacher, 2000). The SSI is presented as a semi-structured self-report questionnaire and its psychometric properties have been evaluated in both adult and child populations with an internal consistency that has been shown to be good (Allan, Kashani, Dahlmeier, Taghizadeh, & Reid, 1997). Holi et al. (2005) also found that the SSI is a reliable and a valid measure of suicidal ideation in depressed young people, with a cut-off threshold of four being appropriate for detecting significant suicidal ideation.

## 4.4 Outcome measures

### 4.4.1 Incidents of institutional violence (Papers I–IV)

Information regarding incidents of institutional violence was collected from admission and six months onwards with a semi-structured approach using the Staff Observation Aggression Scale - revised (SOAS-R; Nijman, Evers, Merckelbach, & Palmstierna, 2002; Nijman & Palmstierna, 2002; Nijman, Palmstierna, Almvik, & Stolker, 2005). The rating scale assesses observable aggressive or violent behaviour in institutional settings. On the bases of the report data and the written reports of the violent incident made by the institution staff, items concerning what had provoked the young person to act violently, the type and target of the violent act, and means used by the aggressor were recorded from the files six months after the initial assessment. A violent outcome included physical violence towards others or a threat made with a weapon (i.e. a potentially dangerous object held in the hand. Self-harm included both suicide attempts and parasuicidal behaviour, and disruptive behaviours included acts like absconding from the institution, destroying property or uncontrolled behaviour endangering the safety of the young person or his/her surroundings. The threshold for inclusion was set at incidents severe enough to require the institutional staff (or police) to physically intervene, and rendering a consequence of coercive measures. For institutional violence, the follow-up was set at 180 days after admission to the unit. Data was collected on all episodes of violence during follow-up or until discharge in case it occurred sooner.

### 4.4.2 Crime register (Paper V)

Information regarding criminal convictions outcome was retrieved from the National Crime Register for all subjects on the 1 April 2012. All crimes that had led to legal consequences for the young people were collected. In the Finnish crime register minor crimes (crimes punishable by fines or crimes punishable by suspended sentences) are deleted from the crime register after five years. For violent crime, and for crimes resulting in conditional release or sentencing to a correctional facility with a maximum penalty of two to five years, records are deleted after ten years. For crimes punished by custodial sentences exceeding five years as well as information regarding subjects committed to forensic facilities by reason of insanity, crime registers are deleted after 20 years. The findings on the National Crime Register were classified into two groups: convictions for violent and for non-violent crimes. Violent crime included all forms of physical assault, robbery and arson as

well as menace. The second category included non-violent crime, such as all forms of theft, breaking and entering, traffic offences including drunken driving and drug related offences. The data regarding criminal conviction was collected for each subject from the date when SAVRY was completed for the first time. This means that the follow-up ranged from a maximum of seven to a minimum of four years. For the analysis the time limit was set at four years for purposes of comparison. Information regarding young people who had died before the follow-up point (1 April 2012) was retrieved from the National Register of Deaths and Causes of Deaths and subsequently removed from the final analysis. On those who had died we also obtained information regarding the cause of death.

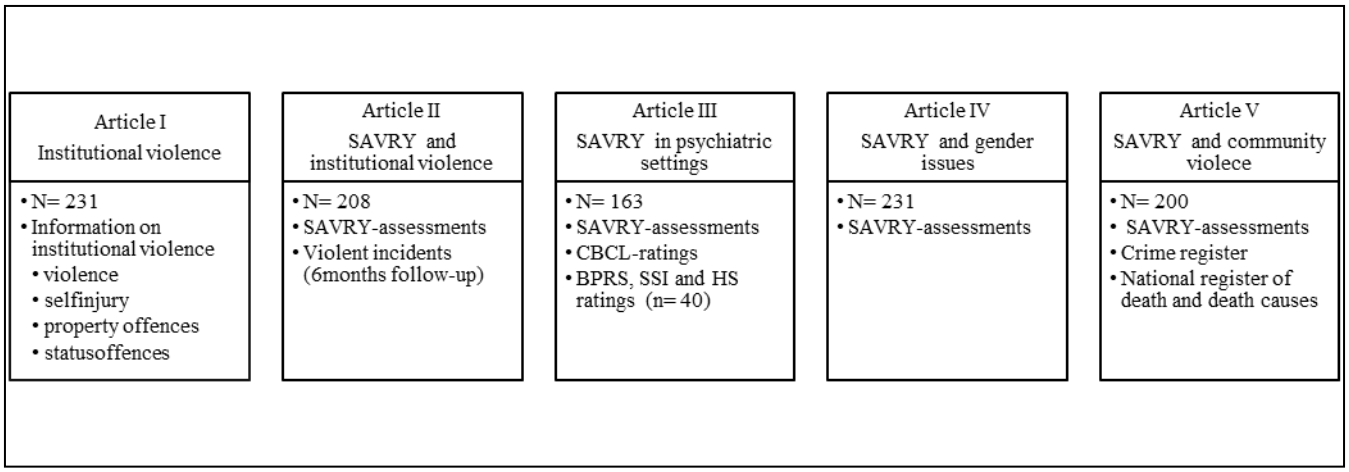


Figure 2. Distribution of material and methods in the original papers.

## 4.5 Statistical analysis

### 4.5.1 Baseline analysis (Paper I)

Incidence rate ratios (IRR (95% CI)) for violence towards self and others and for disruptive behaviour were calculated separately for boys and girls, for early and middle adolescents, for diagnostic groups and for treatment settings. Incidence ratios and their 95% confidence intervals were calculated using Poisson regression analysis.

Logistic regression analyses were performed to evaluate associations between independent variables (sex, age, psychiatric diagnosis and treatment setting) and the outcome variables: violence towards others / violence towards self / disruptive behaviours (each dichotomously classified as present / not present).

The subgroups of disruptive outcome were not exclusive, thus a young person might be reported as perpetrating violent, self-harming and disruptive behaviours simultaneously. However, if during the same incident they displayed all kinds of outcome behaviours, the most serious behaviour (first violence towards others, second self-harm and last disruptive behaviours) was recorded as the outcome.

### 4.5.2 Pilot study

All violence risk assessments for the present thesis were conducted by the present author , a clinical psychologist with training in the use of SPJ assessment methods. Assessments were made independently from the assessment units solely for research purposes. To evaluate the quality of the assessments a pilot study was conducted on the first 21 cases rated at the forensic unit. The material was retrospectively collected from the medical files. Analyses on inter-rater agreements were run against the ratings of an experienced clinician in the field of forensic child and adolescent psychiatry.

The intra-class correlation coefficient within a 95% confidence interval (ICC, 95% CI) for the average measures was 0.87 (0.58–0.95) for the continuous SAVRY variable (TS) and 0.77 (0.41–0.90) for the categorical (SRR). Cronbach´s alpha was 0.77 for the TS and 0.90 for the SRR which, according to Fleiss' (1986) description of critical values, were in the excellent range (ICC > .75).

### 4.5.3 SAVRY short-term predictive validity (Paper II)

In SAVRY there are no fixed cut-off scores therefore, in the present study, we used both the categorised Summary Risk Rating and the numerical total and subscale scores. Means and standard deviations (SD), medians and ranges [min, max] of the SAVRY total and subscale scores were given for the total sample. Because of the slightly skewed distributions of independent variables (sex, age, psychiatric diagnosis) in the treatment settings the statistical significances of differences between the subgroups were tested using the Kruskall-Wallis analysis of variance.

The categorical summary risk ratings and outcome institutional violence were compared using crosstabulations with Chi-square statistics as were the protective subscale factors for and the categorised protective factors high (0–1 items present) moderate (2–4 items present ) low (5–6 items present).

To evaluate the accuracy (validity) of a risk prediction instrument, Receiver Operating Characteristics (ROC) analyses were used. Institutional violent behaviour (dichotomously rated yes /no) was set as the dependent variable, and the continuous predictor (SAVRY sum score) was set as the independent variable. The AUC values increase with accuracy and translate into excellent (0.91–1.00), good (0.81–0.90), fair (0.71–0.80), poor (0.61–0.70), and fail (below 0.60) (Swets, 1988).

Associations between the summary risk rating and violent outcome were studied using logistic regression analysis. Violent outcome (yes/no) was entered as the dependent variable and the Summary Risk Rating (low, moderate, high) as the independent variable. Confounding by sex, age, psychiatric diagnosis and service level and time spent in the institution was controlled for. Odds Ratios (OR) with 95% confidence intervals are presented.

### 4.5.4 Associations of psychopathology and risk of violence (Paper III)

The associations between SRR and gender, psychiatric diagnosis and treatment settings were evaluated with cross-tabulation and chi-square statistics.

The dimensions of psychopathology were measured with the Child Behavior Checklist (CBCL). Due to the slightly skewed distribution of the subscale scores in the treatment units, we reported median scores (min/max) and the outcome was presented for the total sample and the SSR categories separately.

Differences in continuous CBCL subscale scores between the SRR categories were tested using Kruskall-Wallis analysis of variance. Pair-wise comparisons between different SSR categories (low vs. moderate, low vs. high and moderate vs. high) in CBCL scores were conducted with Mann–Whitney U test. Because of the multiple comparisons made, all p-values were adjusted by multiplying them by the number of comparisons made (three). Only values for statistically significant comparisons ($p. < 0.05$) were reported.

Associations between psychopathology measures (continuous CBCL scores) and SSR were studied using multinomial logistic regression analyses. The SRR was set as the dependent variable, and the continuous CBCL scales as independent variables. The outcome of measures were controlled for impact of the confounding factors; age, sex, psychiatric diagnosis and treatment setting. Similar analyses were conducted for the CBCL scores when dichotomised into borderline or clinical vs. non-clinical groups using the cut-points proposed by Achenbach (1991).

In the AFP sample, the associations between the SRR and the continuous subscale and total scores on the CBCL, BPRS, BHS and SSI scales were analysed analogously. For logistic regression analyses, the group rated as presenting with low risk was excluded due to small sample size and binary logistic regression analyses were used.

### 4.5.5 Gender (Paper IV)

Differences in the distribution of SAVRY SRR (low, moderate and high) and institutional violent outcome were compared using chi-square statistics for boys and girls, diagnostic groups, treatment settings (GAP, AFP and CS), and with Kruskall-Wallis analysis of variance for the age groups (12–14 or 15–18) due to skewed distributions between settings.

Distribution (%) of the classification of risk (low – moderate – high) in the individual SAVRY items was compared between boys and girls using cross-tabulation with chi-square statistics or Fisher´s exact test first in the total sample, and then separately for those rated as displaying a high risk of violence.

Logistic regression analyses were conducted to evaluate if the associations between the SAVRY items and violent outcome were different for boys and girls. Violent outcome (categorised yes /no) was entered as the dependent variable. As independent variables, crude models included sex, item and sex-by-item interaction, and multivariate models sex, item, sex-by-item interaction and confounders (age, psychiatric diagnosis and treatment setting).

Items were analysed following three approaches: First using the original three risk categories of SAVRY with the category "low" selected as a reference category as recommended in the SAVRY manual.

Secondly, we applied two binning strategies recently proposed by Singh and colleagues (2011) for use in violence risk assessment when measuring sensitivity and specificity: First the SAVRY SRRs indicating a moderate or high risk were combined and compared against the low risk category. This binning strategy "A" is useful for screening purposes, especially where a high sensitivity is needed, ruling in as many as possible of those displaying an elevation of risk for violence. Thirdly, in binning strategy "B" the high-risk category was compared against a combined moderate and low category in an approach aiming at ruling out or minimising the occurrence of false positives in the risk-ratings. P-values $< 0.05$ were considered statistically significant. For the interaction terms, the level of significance was set at $p < 0.1$.

### 4.5.6 Predictive validity II (Paper V)

The predictive validity of SAVRY was tested using two different analyses using receiver operating characteristics (ROC). First, those who had committed violent crimes were compared against all others (non-violent crime and no-crime combined), second, those with non-violent crime were compared to those with no crime and last those who had committed any crimes (violent and/ or non-violent crimes) were compared with those who had not committed a crime. SAVRY total and subscale scores were used as continuous predictors. To evaluate the association of separate SAVRY items with crime, we conducted cross-tabulations with each SAVRY item (categorised into low/moderate/high) and (1) violent crime (yes/no) and (2) any crime (yes/no).

We then performed a series of logistic regressions with violent crime (yes/no) or any crime (yes/no) as the respective dependent variables and the SRRs as independent variables. In accordance with the approach initially proposed by Singh and colleagues (2011), we used binning strategies in violence risk assessment for measuring sensitivity and specificity to visualise the organisation of assessment according to true positive (high risk and violent outcome), true negative (low risk and no violence) false positive (high risk and no violence) and false negative (low risk and violent outcome; Singh, 2013).

First, the three original risk categories of SAVRY were retained and the category low was selected as a reference category; then, the SAVRY SRRs indicating moderate or high risk were combined and compared against the low risk category. This binning strategy "A" is a useful approach for screening purposes, where a high sensitivity is needed, and the aim is to rule in as many as possible of those displaying an increased risk. Last, binning strategy 'B' was applied where the SRR high-risk category was compared against a combined moderate-and-low category in an approach endeavouring to rule out or minimise the occurrence of false positives in the risk ratings. Sex, age, psychiatric diagnosis and treatment setting were entered into each model as possible confounders, and adjusted odds ratios with 95% confidence intervals were presented.

# 5. Results

## 5.1 Adolescent violence in institutionalised care (Paper I).

### 5.1.1 Subject characteristics

The study comprises file-based, cross-sectional data of young people (N = 231; 135 boys, 96 girls), all having resided in closed settings at some point during the years 2004–2007.

The mean age of the group was 15.1 years (SD 1.5 years). One third was categorised into the early adolescence (< 15years) and two thirds into the mid-adolescence (15–18years) subgroup. The majority of the young people (85%) had a psychiatric diagnosis; 48% in the conduct or personality disorder group, 14% in the schizophrenia spectrum; and 23% had some other psychiatric diagnosis. Those who did not have a formal psychiatric diagnosis (15%) were all treated at the CS unit. Conduct disorders (F90–99) were more common in the CS group than in the other two groups. Those in the GAP had more "other psychiatric disorders" (F30–39, F40–49, F50–59 and F80–89) compared to the others. Of the young people with a schizophrenia spectrum diagnosis 80% had an antipsychotic medication at the time of assessment.

### 5.1.2 Violent and disruptive behaviours

During the 6-month follow-up in the institution a total of 738 incidents of violence towards others, self-directed violence and nonviolent problem behaviours emerged in the sample. Of these incidents, 252 (34%) included violence towards others, 187 (25%) violence towards self, and 299 (41%) disruptive behaviours. A total of 97 (47 boys / 50 girls) were involved in the incidents.

### 5.1.3 Incidence rate ratios (Table 4)

The incidents per person per day in treatment totalled an incidence rate ratio (IRR [95%CI]) of 0.23 for incidents of a violent nature, 0.18 of self-harm and 0.27 of other disruptive behaviour per 30 days of care or, 0.68 incidents per day, for the total sample. On a unit level, the corresponding ratios were; 3.23 incidents per day in the AFP unit; 0.24 incidents per day in the GAP unit and 0.63 incidents per day in the CS units.

The rates of both violent and non-violent incidents on the units differed significantly between boys and girls, with girls having higher incidence rate ratios than the boys for violent behaviour (*IRR*: 2.07 [1.61-2.65]), for self-directed violence (*IRR*: 20.42, [11.62-35.88]), and for disruptive behaviours (*IRR*: 2.86 [2.25-3.63]).

Younger subjects (< 15 years) had more incidents of violence towards others and disruptive behaviours than the older subjects (> 15 years), whereas for incidents involving self-harm the distribution was the opposite.

Rates of violence towards others, self-directed violence and other disruptive behaviours were highest among those with a diagnosis in the schizophrenia spectrum, followed by those with a diagnosis of conduct disorder, which was associated with the next highest rates of violence and also non-violent disruptive behaviours, but not self-harm. Adolescents with no psychiatric diagnosis displayed least violent and disruptive behaviours. All types of incident were most common among adolescents in the forensic adolescent psychiatric group.

### 5.1.4 Violent perpetrator characteristics (Table 5)

The overall risk for engaging in disruptive behaviours requiring staff's physical intervention was higher among the girls than among the boys and the findings were statistically significant for all levels of outcome measures. A small group of the subjects perpetrated the majority of all violent and disruptive incidents in the institutions. When focusing exclusively on the violent perpetrators, the differences between genders disappered.

The risk of being involved in any type of incident in this sample was not related to age. Psychiatric diagnosis did not differentiate the risk of being involved in violent incidents towards others or being involved in nonviolent disruptive behaviours, but the proportion of adolescents involved in self-directed violence was the highest in the schizophrenia group, followed by the "other psychiatric diagnosis" group. Young people in the forensic adolescent psychiatric setting were at highest risk of being involved in violent behaviours towards both self and others.

Table 4. Number of incidents and observation days; incidence rates (IR (95% CI)) per subject per 30 days, and incidence rate ratios (IRR (95% CI)) for incidences if violence, self harm and disruptive behaviours during 180 days of follow-up in institutional setting

| Predictor variables | Violent incidents / observation days | IR / 30 days (95% CI) | Crude IRR (95% CI) |
|---|---|---|---|
| Total, N = 231 | 252 / 32636 | 0.23 (0.20–0.26) | |
| Boys, n = 135 | 107 / 19715 | 0.16 (0.13–0.20) | *reference* |
| Girls, n = 96 | 145 / 12921 | 0.33 (0.28–0.40) | 2.07 (1.61–2.65) |
| Age group | | | |
| 11–14, n = 74 | 126 / 10951 | 0.34 (0.29–0.41) | 1.98 (1.55–2.53) |
| 15–18, n = 157 | 126 / 21685 | 0.17 (0.14–0.21) | *reference* |
| Psychiatric diagnosis | | | |
| Schizophrenia spectrum (F20–29) | 104 / 4198 | 0.74 (0.61–0.90) | 21.52 (10.01–46.27) |
| Conduct disorder (F90–98) | 119 / 16193 | 0.22 (0.18–0.26) | 6.39 (2.98–13.68) |
| Other psychiatric or developmental diagnosis | 22 / 6163 | 0.11 (0.07–0.16) | 3.10 (1.32–7.26) |
| No diagnosis | 7 / 6082 | 0.03 (0.03–0.07) | *reference* |
| Treatment setting | | | |
| General adolescent psychiatry (GAP) | 8 / 3578 | 0.07 (0.03–0.13) | *reference* |
| Correctional school (CS) | 39 / 19613 | 0.06 (0.04–0.08) | 0.89 ( 0.42–1.90) |
| Adolescent forensic psychiatry (AFP) | 205 / 9445 | 0.66 (0.56–0.75) | 9.71 (4.79–19.67) |
| | Self harm / observationdays | IR / 30 days (95% CI) | Crude IRR (95% CI) |
| Total, N = 231 | 187 / 32636 | 0.18 (1.15–0.21) | |
| Boys, n = 135 | 13 / 19715 | 0.02 (0.01–0.03) | *reference* |
| Girls, n = 96 | 174 / 12921 | 0.40 (0.35–0.47) | 20.42 (11.62–35.88) |
| Age group | | | |
| 11–14, n = 74 | 16 / 10951 | 0.04 (0.02–0.07) | 0.19 (0.11–0.31) |
| 15–18, n = 157 | 171 / 21685 | 0.24 (0.20–0.27) | *reference* |
| Psychiatric diagnosis | | | |
| Schizophrenia spectrum (F20–29) | 126 / 4198 | 0.90 (0.75–1.07) | *reference* |
| Conduct disorder (F90–98) | 26 / 16193 | 0.05 (0.03–0.07) | 0.05 (0.04–0.08) |
| Other psychiatric or developmental diagnosis | 35 / 6163 | 0.17 (0.12–0.24) | 0.19 (0.13–0.28) |
| No diagnosis | 0 / 6082 | 0 | N / A |
| Treatment setting | | | |
| General adolescent psychiatry (GAP) | 17 / 3578 | 0.14 (0.08–0.23) | *reference* |
| Correctional school (CS) | 2 / 19613 | 0.003 (0.0003–0.011) | 0.02 (0.005–0.09) |
| Adolescent forensic psychiatry (AFP) | 168 / 9445 | 0.53 (0.46–0.62) | 3.74 (2.27–6.17) |
| | Disruptive behaviours / observationdays | IR / 30 days (95% CI) | Crude IRR (95% CI) |
| Total, N = 231 | 299 / 32636 | 0.27 (0.24–0.31) | |
| Boys, n = 135 | 104 / 19715 | 0.16 (0.13–0.19) | *reference* |
| Girls, n = 96 | 195 / 12921 | 0.45 (0.39–0.52) | 2.86 (2.25–3.63) |
| Age group | | | |
| 11–14, n = 74 | 145 / 10951 | 0.40 (0.34–0.47) | 1.86 (1.48–2.34) |
| 15–18, n = 157 | 154 / 21685 | 0.21 (0.18–0.25) | *reference* |
| Psychiatric diagnosis | | | |
| Schizophrenia spectrum (F20–29) | 93 / 4198 | 0.66 (0.54–0.81) | 7.09 (4.33–11.62) |
| Conduct disorder (F90–98) | 154 / 16193 | 0.29 (0.24–0.33) | 3.04 (1.89–4.90) |
| Other psychiatric or developmental diagnosis | 33 / 6163 | 0.16 (0.11–0.23) | 1.71 (0.97–3.01) |
| No diagnosis | 19 / 6082 | 0.09 (0.06–0.15) | *reference* |
| Treatment setting | | | |
| General adolescent psychiatry (GAP) | 18 / 3578 | 0.15 (0.09–0.24) | *reference* |
| Correctional school (CS) | 73 / 19613 | 0.11 (0.09–0.14) | 0.74 (0.44–1.24) |
| Adolescent forensic psychiatry (AFP) | 208 / 9445 | 0.66 (0.57–0.76) | 4.38 (2.70–7.08) |

Table 5. Number of participants n (%), odds ratio [OR (95%CI)], and level of significance (p) on risk for violence, self harm, and disruptive behaviours in a group of incarcerated Finnish adolescents.

| Predictor variables | Violent offence | | | Self-harm | | | Disruptive behaviour | | |
|---|---|---|---|---|---|---|---|---|---|
| | n (%) | OR (95%CI) | *p* | n (%) | OR (95%CI) | *p* | n (%) | OR (95%CI) | *p* |
| Total, N = 231 | 50 (22) | | | 21 ( 9) | | | 73 (32) | | |
| Sex | | | 0.801 | | | 0.004 | | | 0.028 |
| Boys, n = 135 | 30 (22) | *reference* | | 6 ( 4) | *reference* | | 35 (26) | *reference* | |
| Girls, n = 96 | 20 (21) | 0.92 (0.48–1.74) | | 15 (16) | 3.98 (1.48–10.68) | | 38 (39) | 1.87 (1.07–3.28) | |
| Age group | | | 0.088 | | | 0.894 | | | 0.428 |
| 11–14, n = 74 | 21 (28) | 1.75 (0.92–3.34) | | 7 (10) | 1.07 (0.41– 2.77) | | 26 (35) | 1.27 (0.71–2.28) | |
| 15–18, n = 157 | 29 (19) | *reference* | | 14 ( 9) | *reference* | | 47 (30) | *reference* | |
| Psychiatric diagnosis | | | 0.407 | | | 0.002 | | | 0.355 |
| Schizophrenia spectrum (F20–29) | 10 (31) | 2.12 (0.67–6.74) | | 8 (25) | *reference* | | 13 (41) | 2.22 (0.77–6.42) | |
| Conduct disorder (F90–98) | 25 (23) | 1.36 (0.50–3.64) | | 7 ( 6) | 0.38 (0.12–1.20) | | 38 (34) | 1.69 (0.70–4.10) | |
| Other psychiatric or developmental diagnosis | 9 (17) | 0.93 (0.30–2.91) | | 6 (11) | 0.20 (0.07–0.61) | | 14 (26) | 1.14 (0.42–3.09) | |
| No diagnosis | 6 (18) | *reference* | | 0 | | | 8 (24) | *reference* | |
| Treatment setting | | | 0.017 | | | <.001 | | | 0.322 |
| General adolescent psychiatry (GAP) | 6 (12) | *reference* | | 4 ( 8) | *reference* | | 12 (24) | *reference* | |
| Correctional school (CS) | 21 (19) | 1.77 (0.67–4.69) | | 2 ( 2) | 0.22 (0.04–1.23) | | 39 (36) | 1.79 (0.83–3.80) | |
| Adolescent forensic psychiatry (AFP) | 23 (33) | 3.67 (1.37–9.85) | | 15 (22) | 3.21 (0.99–10.32) | | 22 (32) | 1.49 (0.66–3.38) | |

## 5.2 SAVRY predictive validity for institutional violence

### 5.2.1 Violent and aggressive acts during follow-up

During the follow–up of 180 days in treatment, a total of 279 violent and or disruptive incidents, perpetrated by a total of 48 adolescents were collected from the files. Boys accounted for 38%, and girls for 62% of all incidents. Girls in the AFP unit accounted for 53% of all the recorded incidents. Adolescents in the GAP sample were involved in 2%, those in the CS unit in 18%, and those in the AF unit in 80% of the violent and disruptive acts.

### 5.2.2 SAVRY total scores (TS) and summary risk ratings (SRR; Table 6)

The median of the SAVRY TS in the total sample was 20. Risk scores ranged from 2 to 44. The median of the protective subscale was 1 [0–6]. The TS were lowest in the GAP and highest in the AFP unit. Boys scored significantly higher than girls on all risk scales. Early adolescents scored higher in the historical range than the middle adolescence group. Adolescents diagnosed with conduct disorder had higher risk scores and lower protective scores than the other groups. Adolescents in the GAP group had significantly lower risk scores than the other diagnostic groups. The SAVRY SRR was low in 24%, moderate in 48% and high in 28% of the cases. The majority of the subjects in the GAP unit (55%) were rated as low risk, in the CS unit (59%) in the moderate range, and in the AFP unit (57%) in the high risk range. A high risk rating was also most common among those diagnosed with conduct or personality disorder (F60–69, F90–99), followed by schizophrenia spectrum diagnoses (F20–29).

Table 6. SAVRY risk and protective scores mean (SD), median [min, max] for the total risk score and the subscales among 11–17-year-old adolescents

| | SAVRY risk and protective scores | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total risk scores | | Historical | | Social/contextual | | Individual | | Protective | |
| | mean (SD), median [min, max] | *p* | mean (SD), median [min, max] | *p* | mean (SD), median [min, max] | *p* | mean (SD), median [min, max] | *p* | mean (SD), median [min, max] | *p* |
| All (n = 208) | 19.8 (8.2), 20 [2, 44] | | 7.5 (3.9), 7 [0, 18] | | 5.5 (2.5), 5 [0, 11] | | 6.8 (3.5), 7 [0, 16] | | 1.5 (1.5), 1 [0, 6] | |
| Sex | | 0.005 | | 0.026 | | 0.039 | | 0.010 | | 0.592 |
| Boys (n = 110) | 21.2 (8.0), 21[3, 44] | | 8.0 (4.1), 8 [0, 16] | | 5.8 (2.5), 6 [0, 11] | | 7.4 (3.4), 7 [1, 16] | | 1.4 (1.4), 1 [0, 6] | |
| Girls (n = 88) | 18.0 (8.0), 18 [2, 39] | | 6.8 (3.6), 6.5 [0, 17] | | 5.1 (2.5), 5 [0, 11] | | 6.1 (3.5), 6 [0, 15] | | 1.7 (1.0), 1 [0, 6] | |
| Age (years) | | 0.065 | | 0.018 | | 0.155 | | 0.407 | | 0.101 |
| 11–14 (n = 66) | 21.5 (7.5), 21 [6, 40] | | 8.4 (3.9), 8 [1, 17] | | 5.9 (2.4), 6 [1, 11] | | 7.2 (3.3), 7 [1, 15] | | 1.3 (1.3), 1 [0, 5] | |
| 15–17 (n = 142) | 19.0 (8.3), 20 [2, 44] | | 7.1 (3.9), 7 [0, 18] | | 5.3 (2.6), 5 [0, 11] | | 6.7 (3.6), 7 [0, 16] | | 1.7 (1.6), 2 [0, 6] | |
| Diagnosis | | < 0.001 | | 0.001 | | < 0.001 | | < 0.001 | | < 0.001 |
| F20–29 (n = 27) | 17.5 (9.9), 20.5[0, 36] | | 7.3 (5.0), 7 [0, 17] | | 4.9 (2.8), 7 [0, 11] | | 5.4 (3.4), 6.5 [1, 13] | | 1.8 (1.5), 1 [0, 6] | |
| F60–69 + F 90–99 (n = 100) | 22.7 (7.5), 22 [3, 44] | | 8.5 (4.02), 8 [0, 18] | | 6.0 (2.3), 6 [0, 11] | | 8.1 (3.3), 8 [0, 16] | | 1.1 (1.3), 1 [0, 6] | |
| Other (n = 47) | 15.0 (7.3), 14 [4, 24] | | 5.9 (2.8), 5 [2, 15] | | 4.0 (2.2), 4 [0, 9] | | 5.1 (2.6), 4 [0, 14] | | 2.4 (1.7), 2 [0,6] | |
| None (n = 34) | 20.0 (5.8), 20.5 [9,34] | | 7.1 (2.8), 7 [2, 11] | | 6.4 (2.2), 7 [2, 11] | | 6.5 (2.6), 6.5 [1, 11] | | 1.4 (1.3), 1 [0, 4] | |
| Service level | | < 0.001 | | < 0.001 | | < 0.001 | | < 0.001 | | < 0.001 |
| GAP (n = 51) | 12.1 (6.0), 12 [2, 27] | | 3.7 (1.9), 4 [0, 8] | | 3.7 (1.9), 4 [0, 8] | | 4.2 (3.2), 4 [0, 13] | | 2.4 (1.7), 2 [0, 6] | |
| CS (n = 110) | 21.6 (6.2), 21 [9, 39] | | 6.3 (1.9), 5 [0, 11] | | 6.3 (1.9), 6 [1, 11] | | 7.5 (3.0), 7 [1, 14] | | 1.1 (1.2), 1 [0, 5] | |
| AF (n = 47) | 24.0 (8.8), 24 [3, 44] | | 5.6 (3.0), 5 [0, 11] | | 5.6 (3.0), 5 [0, 11] | | 8.1 (3.6), 8 [1, 16] | | 1.6 (1.4), 1 [0, 6] | |

### 5.2.3 Predictive validity (Table 7)

The predictive ability of the SAVRY TS for violent behaviour within a six-month follow-up for the total sample was fair (AUC 0.71 (95% CI 0.63–0.79). The AUC estimate of the SAVRY risk subscale scores ranged from poor (AUC 0.58) on the social contextual subscale to fair (AUC 0.71) on the historical subscale regardless of gender or age. Predictive values tended to be higher among subjects with a diagnosis of schizophrenia, but the superiority of predictive ability was only statistically significant (p = 0.03) on the social subscale.

Measures of sensitivity and specify showed that 4% of the adolescents who were classified as presenting with a low risk according to the SAVRY SRR behaved violently during follow-up, of those rated moderate risk, 29%, and of those rated high risk, 67% (p = <0.001).

In the analysis regarding impact of protective factors on institutional violence, the outcome did not reach statistical significance (*p*= 0.06). However, in the group with 5-6 protective factors there were nine subjects (4% of the total group), of whom one (10%) perpetrated a violent act during the six-month follow-up, in the group with 2-4 protective factors there were 87 subjects (42%) of whom 18 (21%) perpetrated a violent act and in the group with 0-1 protective items there were 112 subjects(54%) of whom 28 (25%) perpetrated a violent act.

Last, a logistic regression analysis of the SAVRY SRR and violent outcome showed a crude odds ratio of 27.85 (95% CI 6.18–125.44) for the high risk group compared to the low risk group, and an OR of 3.83 (95% CI .83–17.56) for the moderate risk group compared to the low risk. Adjusted measures (sex, age, diagnosis, setting) estimated the OR for the high risk group at 34.88 (95% CI 6.48–187.66), and the OR for the moderate risk group at 4.56 (95% CI .92–22.78) when compared to the high risk group. Further controlling for time spent in the institution yielded an OR of 73.74 (95% CI 8.85–614.60) for the high risk group and 5.35 (95% CI 0.73–39.19) for the moderate risk group.

Table 7. Predictive validity (AUC, 95% CI) of the SAVRY total risk and subscale scores and violent outcome among 11–17-year-old adolescents, according to sex, age, psychiatric diagnosis and service level.

| | Total | Historical | Social / contextual | Individual |
|---|---|---|---|---|
| All | 0.71 (0.64–0.79) | 0.70 (0.6–0.78) | 0.58 (0.49–0.68) | 0.69 (0.61–0.78) |
| Sex | | | | |
| Boys | 0.71 (0.60–0.81) | 0.69 (0.59–0.80) | 0.56 (0.43–0.68) | 0.71 (0.60–0.81) |
| Girls | 0.72 (0.60–0.84) | 0.72 (0.59–0.85) | 0.62 (0.49–0.76) | 0.67 (0.53–0.81) |
| Age | | | | |
| 11–14 years | 0.78 (0.67–0.90) | 0.76 (0.63–0.89) | 0.55 (0.40–0.71) | 0.79 (0.67–0.91) |
| 15–17 years | 0.67 (0.56–0.77) | 0.66 (0.56–0.77) | 0.59 (0.48–0.71) | 0.63 (0.52–0.75) |
| Diagnosis | | | | |
| F20–29 | 0.84 (0.70–0.99) | 0.87 (0.74–1.0) | 0.81 (0.65–0.97) | 0.68 (0.46–0.90) |
| F60–69 + F90–99 | 0.69 (0.58–0.80) | 0.68 (0.57–0.80) | 0.51 (0.37–0.64) | 0.70 (0.60–0.82) |
| Other | 0.77(0.60–0.93) | 0.74 (0.59–0.90) | 0.67 (0.48–0.86) | 0.67 (0.47–0.87) |
| None | 0.55 (0.26–0.84) | 0.47 (0.19–0.75) | 0.46 (0.12–0.80) | 0.72 (0.47–0.97) |
| Service level | | | | |
| GAP | 0.84 (0.69–1.0) | 0.87 (0.71–1.0) | 0.75 (0.53–0.98) | 0.69 (0.46–0.91) |
| CS | 0.64 (0.51–0.77) | 0.59 (0.45–0.73) | 0.51 (0.36–0.66) | 0.70 (0.58–0.82) |
| AFP | 0.65 (0.49–0.80) | 0.64 (0.48–0.80) | 0.60 (0.44–0.76) | 0.60 (0.44–0.77) |

## 5.3 Associations of psychopathology and elevated risk of violence (Paper III)

### 5.3.1 Psychopathological dimensions and SAVRY (Table 8)

Adolescents with moderate to high ratings on the SAVRY summary risk ratings (SRR) also had higher mean scores on the Child Behavior Checklist (CBCL) subscales rule-breaking and aggressive behaviours, as well as on the externalising subdomain and the total score of the CBCL. Multiple comparisons yielded systematic differences between the high and low risk groups, which could be expected, but on the rule-breaking subscale and in the externalising domain and total problems statistically significant differences also emerged between the low and moderate risk groups. The association between the SRR and the rule-breaking and aggressive subscales and the externalising domain behaviours remained statistically significant after controlling for the impact of confounding factors (sex, age, psychiatric diagnosis and treatment setting). The CBCL total score, however, reached a significant level only when the SRR was dichotomised into high and low risk groups (high vs. moderate+ low). Categorisation of the subscales (borderline/ clinical vs. non-clinical) also revealed an additional statistically significant association ($p$ = .03) between the SRR and the subscale thought problems which persisted when controlling for confounding factors (sex, age psychiatric diagnosis and treatment setting).

### 5.3.2 Dimensions of psychopathology and elevated SAVRY SRR in the AFP unit

In the AFP subsample alone, the behavioural and emotional subscales of the CBCL were not significantly associated with the SRR (Table 8). However, controlling for the impact of confounding factors revealed a statistically significant *negative* association ($p$ = .04) between the anxiety-depression subscale score and the SSR.

Table 8. Distribution of mean (Sd) and median (min-max) scores of psychopathological dimensions in the SAVRY SSR levels of risk in a group of Finnish institutionalised youth (n = 163) and in a subgroup of young people in adolescent forensic psychiatry (n = 44)

| | **Total group N = 163** | | | | | **AF subgroup n = 44** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **SAVRY summary risk rating** | | | | | **SAVRY summary risk rating** | | | | |
| | **CBCL total** | **Low (n=29)** | **Moderate (n=82)** | **High (n=52)** | | **CBCL total** | **Low (n = 3)** | **Moderate (n = 17)** | **High (n = 24)** | |
| **CBCL-scales** | Mean *(SD)*Median*[min-max]* | Median *[min-max]* | | | *p* | Mean *(SD)*Median*[min-max]* | Median *[min-max]* | | | *p* |
| Anxious-Depressive | 6.4 *(4.9)*, 5 [0–24] | 6 [0–19] | 4 [0–24] | 6 [0–17] | .470 | 8.4 *(5.2)*, 8[0–24] | 14 [7–15] | 10 [2–24] | 6.5 [0–15] | .108 |
| Withdrawn-Depressive | 4.2 *(2.9)*, 4 [0–13] | 3 [0–12] | 3 [0–13] | 4 [0–10] | .940 | 4.3 *(2.9)*, 4[0–12] | 7 [ 3–9] | 4 [1–12] | 4 [0–8] | .262 |
| Somatic complaint | 3.2 *(3.1)*, 2 [0–16] | 3 [0–11] | 2 [0–14] | 2 [0–16] | .472 | 3.5 *(3.1)*, 2[0–11] | 5 [0–11] | 3 [0–X] | 2 [0–11] | .806 |
| Social problems | 5.2 *(3.8)*, 5 [0–16] | 4 [0–11] | 4 [0–16] | 5 [0–16] | .142 | 6.3 *(4.0)*, 5.5[0–16] | 5 [5–6] | 7 [0–16] | 5.5 [1–15] | .932 |
| Thought problems | 4.1 *(3.6)*, 3 [0–17] | 2 [0–17] | 3 [0–17] | 4 [0–13] | .218 | 5.5 *(3.5)*, 4.5[0–15] | 4 [2–15] | 6 [1–12] | 4 [0–13] | .814 |
| Attention difficulties | 6.8 *(3.2)*, 7 [0–16] | 6 [1–12] | 7 [1–16] | 8 [1–13] | .070 | 7.5 *(3.0)*, 7 [0–16] | 7 [5–12] | 6 [3–16] | 8 [1–11] | .950 |
| Rule-breaking behaviour | 7.7 *(5.3)*, 7 [0–25] | 3.5 [0–21] | 7 [0–22] | 9.5 [0–25] | <.001[1] | 7.2 *(4.9)*, 6.5[0–22] | 2 [0–8] | 7 [0–22] | 6.5 [0–16] | .381 |
| Aggressive behaviour | 12.3 *(7.7)*, 11[0–34] | 6 [0–24] | 11 [0–34] | 15 [0–30] | <.001[1] | 12.8*(7.1)*,11.5[0–28] | 8 [5–19] | 13 [3–26] | 10.5 [0–28] | .593 |
| Internalising problems | 13.7 *(9.1)*, 11[0–44] | 14 [0–38] | 10 [0–44] | 12 [0–34] | .442 | 16.2*(9.4)*, 16[0–44] | 26 [10–35] | 16 [6–44] | 15 [0-30] | .292 |
| Externalising problems | 20.0 *(9.1)*, 19[0–52] | 10 [0–45] | 20 [0–47] | 23.5 [1–52] | <.001[1] | 20.0*(10.8)*, 18.5[1–45] | 10 [5–27] | 19 [5–45] | 17.5[1-42] | .448 |
| Total problems | 49.8 *(25.5)*, 46[0–136] | 41 [12–95] | 45 [0–136] | 54.5 [5–118] | .009[2] | 55.6*(25.0)*, 53.5[5–130] | 61 [27-86] | 59 [28-130] | 52[5–105] | .919 |

### 5.3.3 Psychotic symptoms and risk of violence

On the Brief Psychosis Rating Scale (Table 9) hostility, suspiciousness and hallucinatory behaviour, uncooperativeness and total score were associated with high risk of violence, whereas motor retardation was associated with low violence risk. Multiple comparisons showed that differences were found mainly between the moderate and high risk levels. However, for the item motor retardation – where the association was inverse – the differences were also statistically significant for the low risk level.

Controlling for impact of confounding factors , high (vs. moderate+low) SAVRY SRR was predicted by the BPRS items hostility (*OR* = 1.9, 95% CI[1.1–3.5], *p* = .03), suspiciousness (*OR* = 2.1, 95% CI [1.1–4.0], *p* = .03), hallucinatory behaviour (*OR* = 3.6, 95% CI [1.4–9.2], *p* = .01), uncooperativeness (*OR* = 1.8, 95% CI [1.1–3.0], *p* = .02) as well as by the BPRS total score (*OR* = 1.1, 95% CI [1.0–1.1], *p* = .02). The significant association between motor retardation and low risk for violence was levelled out, but instead an association emerged between the SRR and the item feelings of tension (*OR* = 2.3, 95% CI [1.1–4.7], (*p* = .03). We found no statistically significant associations for hopelessness (BHS) and suicidal ideation (SSI) and risk of violence.

Table 9. Distributions of median scores [min-max] and level of significance of the BPRS items in the Summary risk rating categories of SAVRY in 48 adolescents in a unit for especially challenging psychiatric patients (AF) in Finland

| Brief Psychiatric Rating Scale | SAVRY Summary Risk Rating | | | |
|---|---|---|---|---|
| | Low (n = 4) | Moderate (n = 20) | High (n = 24) | *p* |
| BPRS total score | 49 [32–68] | 38 [18–63] | 48.5 [29–69] | 0.023 |
| Somatic concerns | 2.5 [1–3] | 1 [1–4] | 2 [1–5] | 0.289 |
| Anxiety | 3 [3–5] | 3 [1–7] | 4 [2–6] | 0.239 |
| Emotional withdrawal | 4 [1–5] | 3 [1–4] | 3 [1–5] | 0.077 |
| Conceptual disorganisation | 3 [1–5] | 2 [1–4] | 2 [1–5] | 0.316 |
| Feelings of guilt | 3 [1–4] | 2 [1–4] | 3 [1–5] | 0.421 |
| Tension | 3 [1–4] | 2 [1–4] | 3 [1–5] | 0.114 |
| Mannerism | 2 [1–3] | 2 [1–4] | 2 [1–4] | 0.827 |
| Grandiosity | 1.5 [1–2] | 1 [1–4] | 2 [1–4] | 0.715 |
| Depressed mood | 4.5 [4–5] | 3 [1–6] | 3 [1–6] | 0.090 |
| Hostility | 3 [2–3] | 2 [1–7] | 3 [1–6] | 0.011[1] |
| Suspiciousness | 3 [1–5] | 2 [1–5] | 3 [1–6] | 0.034[2] |
| Hallucinatory behaviour | 1 [1–4] | 1 [1–3] | 2 [1–5] | 0.014[3] |
| Motor retardation | 3.5 [3–4] | 1 [1–5] | 1.5 [1–4] | 0.002[4] |
| Uncooperativeness | 3.5 [1–4] | 2 [1–6] | 3.5 [1–6] | 0.036[5] |
| Unusual thought content | 2 [1–4] | 2 [1–6] | 3 [1–6] | 0.210 |
| Blunted affect | 4 [0–5] | 2 [1–5] | 2.5 [1–7] | 0.247 |
| Excitement | 1.5 [1–3] | 2.5 [1–6] | 3 [1–5] | 0.136 |
| Disorientation | 1 [1–2] | 1 [1–3] | 2 [1–3] | 0.101 |

[1] Pairwise comparisons $p = 0.012$ (mod. vs. high)

[2] Pairwise comparisons $p = 0.030$ (mod. vs. high)

[3] Pairwise comparisons $p = 0.015$ (mod .vs. high)

[4] Pairwise comparisons $p = 0.003$ (low vs. mod), $p = 0.030$ (low vs. high)

[5] Pairwise comparisons $p = 0.030$ (mod. vs. high)

## 5.4 Gender differences (Paper IV)

Gender differences in the SAVRY SRR and items were studied first in a group of institutionalised adolescents (N = 231; 135 boys, 96 girls) in three different treatment units, with SAVRY ratings ranging from low to high, here referred to as the total sample. Secondly similar analyses were run in a subgroup of subjects (n= 71 adolescents; 47 boys and 24 girls), all of whom had an SRR of high risk.

### 5.4.1 Distribution of ratings on SAVRY items

Boys had more ratings in the high risk range than the girls on the SAVRY items: *History of Violence, Non-Violent Offending and Early Initiation of Violence, Poor School Achievement* in the historical risk domain; *Stress and Poor Coping* and *Community Disorganisation* in the social/ contextual domain*;* and *Risk Taking/Impulsivity, Anger Management Problems, Low Empathy/Remorse, Attention Deficit/Hyperactivity Difficulties,* and *Poor Compliance* in the individual risk domain. They also had more ratings than girls in the moderate range on the item *Low commitment to school*. Girls rated higher than boys on the item *History of Self- harm or Suicide Attempts*, and had more ratings than the boys in the moderate range on the item *Poor Compliance.*

On the protective factor subscale the items *Pro-social Involvement,* S*trong Commitment to School* and *Resilient Personality Traits* were more often rated as present for girls than for boys.

In the high risk sample alone, the gender differences were mostly levelled out, but boys still had more high risk ratings than girls on the items *History of Non-Violent Offending, Poor school Achievement* and *Attention Deficit/ Hyperactivity Difficulties*. Moderate to high risk ratings on the item *History of Self- harm or Suicide Attempts* were more common among girls in the high risk sample.

### 5.4.2 Associations of SAVRY items, gender and institutional violence (Table 10)

Among boys, a high risk rating on the items: *Early Initiation of Violence* on the historical subscale, and *Negative Attitudes, Risk Taking/ Impulsivity, Low Empathy/ Remorse, and Anger Management Problems* on the individual subscale where the best predictors for subsequent institutional violence. Among girls, corresponding outcome was best predicted by moderate to high risk rating on the items *History of Violence, Early Initiation of Violence,* and *History of Self-harm* on the historical

subscale, *Stress and Poor Coping* on the social/contextual subscale, and *Risk Taking/ Impulsivity, Anger Management Problems and Low Empathy/ Remorse* on the individual subscale.

After controlling for confounding factors (sex, age, psychiatric diagnosis and treatment setting) however, associations with institutional violence levelled out on all items except for the item *History of Non-Violent Offending* and *Low Empathy/ Remorse* in boys, and the items *History of Violence*, *Stress and Poor Coping,* and *Anger Management Difficulties* among girls. Also, in this approach, two additional statistically significant associations emerged for girls on the items *Poor Parental Management* and *Community Disorganisation*.

Table 10. Odds ratios and 95% confidence interval on associations on SAVRY items (low as reference category) and violent outcome (yes/no) in Finnish incarcerated adolescents (110 boys and 96 girls). Results are shown for both crude analysis and analysis adjusted for sex, age, psychiatric diagnosis, and treatment setting. Only items where statistically significant findings ($p \leq .05$) were found are reported.

| SAVRY Item | Girls Crude | | | Boys Crude | | |
|---|---|---|---|---|---|---|
| | OR | 95%CI | *p* | OR | 95%CI | *p* |
| 1. History of violence | reference | | < 0.001 | reference | | 0.080 |
| moderate | 1.05 | [0.23–4.78] | | 2.17 | [0.69–6.80] | |
| high | 12.13 | [3.44–42.68] | | 3.25 | [1.16–9.09] | |
| 2. History of nonviolent offending | | | 0.890 | | | 0.076 |
| moderate | 0.84 | [0.25–2.77] | | 0.44 | [0.10–1.91] | |
| high | 0.76 | [0.23–2.48] | | 1.81 | [0.69–4.76] | |
| 3. Early initiation of violence | | | 0.027 | | | 0.025 |
| moderate | 3.63 | [1.00–13.21] | | 3.57 | [1.32–9.65] | |
| high | 7.62 | [1.16–50.18] | | 2.50 | [0.93–6.69] | |
| 5. History of selfharm | | | 0.040 | | | 0.813 |
| moderate | 1.93 | [0.38–9.83] | | 1.04 | [0.42–2.55] | |
| high | 6.00 | [1.13–31.73] | | 1.62 | [0.37–7.04] | |
| 6. Exposure to violence in the home | | | 0.069 | | | 0.153 |
| moderate | 2.39 | [0.59–9.63] | | 2.68 | [0.96–7.44] | |
| high | 3.65 | [1.20–11.07] | | 1.69 | [0.68–4.24] | |
| 8. Parental / Caregiver criminality | | | 0.237 | | | 0.874 |
| moderate | 3.82 | [0.71–20.66] | | 1.35 | [0.43–4.20] | |
| high | 0.55 | [0.06–4.74] | | 1.08 | [0.27–4.29] | |
| 12. Peer rejection | | | 0.597 | | | 0.940 |
| moderate | 1.04 | [0.34–3.18] | | 0.88 | [0.37–2.11] | |
| high | 2.00 | [0.51–7.87] | | 0.85 | [0.27–2.65] | |
| 13. Stress and poor coping | | | 0.002 | | | 0.163 |
| moderate | 1.33 | [0.15–11.98] | | 0.69 | [0.19–2.51] | |
| high | 9.00 | [0.98–82.49] | | 1.58 | [0.45–5.54] | |
| 14. Poor parental management | | | 0.442 | | | 0.771 |
| moderate | 1.03 | [0.23–4.73] | | 0.68 | [0.23–1.98] | |
| high | 1.94 | [0.47–7.91] | | 0.72 | [0.30–2.28] | |
| 15. Lack of personal / social support | | | 0.518 | | | 0.874 |
| moderate | 1.40 | [0.39–4.98] | | 1.09 | [0.40–2.98] | |
| high | 2.04 | [0.60–6.95] | | 0.86 | [0.32–2.31] | |
| 16. Community disorganization | | | 0.098 | | | 0.169 |
| moderate | 1.24 | [0.30–5.07] | | 1.01 | [0.39–2.60] | |
| high | 4.54 | [1.14–17.99] | | 2.65 | [0.92–7.63] | |
| 17. Negative attitudes | | | 0.561 | | | 0.037 |
| moderate | 0.81 | [0.27–2.45] | | 1.87 | [0.75–4.64] | |
| high | 1.82 | [0.46–7.18] | | 4.25 | [1.40–12.92] | |
| 18. Risk taking / impulsivity | | | 0.011 | | | 0.049 |
| moderate | 1.34 | [0.29–6.18] | | 5.56 | [0.66–47.08] | |
| high | 5.70 | [1.42–22.89] | | 10.28 | [1.30–81.21] | |
| 20. Anger management problems | | | < 0.001 | | | |
| moderate | 2.00 | [0.20–20.38] | | | N/A | |
| high | 27.20 | [3.27–226.03] | | | N/A | |
| 21. Low empathy / remorse | | | 0.019 | | | 0.011 |
| moderate | 0.75 | [0.21–2.65] | | 3.13 | [1.12–8.76] | |
| high | 5.25 | [1.45–19.03] | | 5.74 | [1.81–18.18] | |
| P1. Prosocial involvement | | | | | | |
| yes | 1.05 | [0.34–3.34] | 0.912 | 0.83 | [0.22–3.16] | 0.782 |
| P2. Strong social support | | | | | | |
| yes | 0.89 | [0.32–2.47] | 0.821 | 0.80 | [0.34–1.86] | 0.599 |
| P4. Positive attitudes towards intervention and authority | | | | | | |
| yes | 1.74 | [0.57–5.53] | 0.327 | 0.56 | [0.21–1.50] | 0.247 |

### 5.4.3 Gender interaction analysis

When the gender by item interaction was included in the logistic regression model and the impact of confounding factors controlled for, significant differences emerged between boys and girls on the risk items *History of Violence, History of Non-violent Offending,* and on the protective item *Positive Attitudes Towards Intervention and Authority*. Girls rated as high risk on the item *History of Violence* had a significantly stronger risk for institutional violence than the boys. On the item *History of Non-violent Offending* the association with institutional violence was positive for boys, but not for girls. Last, on the protective item *Positive Attitudes Towards Intervention and Authority* the gender interaction analysis showed a negative association with institutional violence for boys, but for girls the outcome was the opposite, which would indicate that indications of recent positive attitude to intervention and/or authorities paradoxically associated with an increased risk for violent behaviours in girls rated as high risk for violence.

### 5.4.4 Employing binning strategies to enhance accuracy of risk estimates (Table 11)

To assess whether or not a binning of the risk levels would yield any differences due to gender, the levels moderate and high were first merged and compared against the low risk rating (binning strategy A). This approach, however, did not show any statistically significant differences between genders in either of the logistic regression approaches. In the approach of comparing high risk ratings against a combined set of the low and moderate risk categories (binning strategy B) the items *History of Violence, Stress and Poor Coping* were more strongly associated with subsequent violent outcome in girls than in boys.

Controlling for the possible confounding effect of age, psychiatric diagnosis and treatment setting showed persistence in the associations of items *History of Violence* and *Stress and Poor Coping* and institutional violence in girls. In this approach the item *History of Non-violent Offending* appeared to serve as a strong predictor for institutional violence in boys, but to decrease the risk of violence in girls. Last, in binning strategy B, the item: *Affiliating with Antisocial Peers* showed a tendency to differ statistically significantly between genders as it seemed to lower the risk in girls and raise the risk in boys. Even though it was only a tendency, the finding may be of interest for further studies.

Table 11. Gender interaction (GI) and odds ratios (OR) with 95% confidence interval (CI) of categorical and binned (low+ moderate vs. high) values on the associations on SAVRY items and violent outcome in 231 institutionalised adolescents (135 boys and 96 girls) in Finnish psychiatry and child welfare

| **SAVRY Items** | **Crude GI** | | Girls | | | Boys | | |
|---|---|---|---|---|---|---|---|---|
| | *p* | | OR | [95% CI] | *p* | OR | [95% CI] | *p* |
| **Categorical: low vs. moderate vs. high** | | | | | | | | |
| | *0.053* | low | | reference | *<0.001* | | reference | *0.080* |
| **1. History of violence** | | moderate | 1.05 | [0.23–4.78] | | 2.17 | [0.69–6.80] | |
| | | high | 12.13 | [3.44–42.68] | | 3.25 | [1.16–9.09] | |
| **Binning B: low+moderate vs high** | | | | | | | | |
| | *0.016* | low+mod | | reference | *<0.001* | | reference | *0.052* |
| **1.History of violence** | | high | 11.92 | [3.88–36.63] | | 2.20 | [0.99–4.88] | |
| **13. Stress and poor coping** | *0.076* | low+mod | | reference | *<0.001* | | reference | *0.066* |
| | | high | 7.00 | [2.42–20.25] | | 2.11 | [0.95–4.67] | |
| **SAVRY Items** | **Adjusted GI** | | Girls | | | Boys | | |
| | *p* | | OR | [95% CI] | *p* | OR | [95% CI] | *p* |
| **Categorical: low vs. moderate vs. high, adjusted for age, diagnosis and setting** | | | | | | | | |
| **1. History of violence** | *0.088* | low | | reference | *0.014* | | reference | *0.160* |
| | | moderate | 1.55 | [0.23–4.78] | | 1.85 | [0.54–6.40] | |
| | | high | 12.84 | [3.45–42.68] | | 3.30 | [0.96–11.30] | |
| **2.History of non-violent offending** | *0.058* | low | | reference | *0.592* | | reference | *0.042* |
| | | moderate | 0.97 | [0.22–4.29] | | 0.23 | [0.04–1.16] | |
| | | high | 0.47 | [0.10–2.196 | | 1.49 | [0.49–4.51] | |
| **P4.Positive attitudes towards intervention and authority** | *0.033* | no | | reference | *0.077* | | reference | *0.385* |
| | | yes | 4.70 | [0.85–26.08] | | 0.63 | [0.22–1.80] | |
| **Binning B: low + moderate vs high, adjusted for age, diagnosis and setting** | | | | | | | | |
| | *0.032* | low+mod | | reference | *0.004* | | reference | *0.094* |
| **1.History of violence** | | high | 10.46 | [2.16–50.59] | | 2.33 | [0.87–6.24] | |
| **2.History of non-violent offending** | *0.022* | low+mod | | reference | *0.306* | | reference | *0.036* |
| | | high | 0.48 | [0.11–1.97] | | 2.79 | [1.07–7.28] | |
| **11. Antisocial peers** | *0.067* | low+mod | | reference | *0.266* | | reference | *0.101* |
| | | high | 0.39 | [0.07–2.05] | | 2.14 | [0.86–5.32] | |
| **13. Stress and poor coping** | *0.099* | low+mod | | reference | *0.010* | | reference | *0.304* |
| | | high | 7.58 | [1.64–35.09] | | 1.60 | [0.65–3.94] | |

## 5.5 SAVRY violence risk ratings as predictors of violent and any crime in a four-year follow-up (Paper V)

### 5.5.1 Predictive validity of the SAVRY total and subscale scores

Assessing the SAVRY predictive accuracy for community violent, and non-violent crime in a group of 200 subjects (104 boys / 96 girls) showed that the SAVRY total and subscale scores ranged in the levels from poor to fair (Table 12). The best predictors of future violent crime were elevated scores on the clinical / individual subscale and /or the total SAVRY score.

The strongest association detected was between criminal conduct and the inverse scores of the protective subscale, where the AUC for the association was just below fair. The association between the sum scores of the historical and social subscales of SAVRY and violent vs. non-violent outcome was poor, and actually only just above chance.

Table 12. Predictive validity (AUC, 95% CI) of the SAVRY total risk and subscale scores and violent and non-violent crime among 200 adolescents in Finnish psychiatric and child welfare institutions

| SAVRY | Violent crime | | Non-violent crime | |
|---|---|---|---|---|
| | AUC | 95% CI | AUC | 95% CI |
| Total risk score | 0.711 | 0.601–0.820 | 0.677 | 0.577–0.778 |
| Historical | 0.632 | 0.517–0.748 | 0.600 | 0.499–0.700 |
| Social / contextual | 0.638 | 0.525–0.750 | 0.611 | 0.521–0.700 |
| Individual | 0.732 | 0.611–0.853 | 0.713 | 0.601–0.825 |
| Protective | 0.686 | 0.583–0.788 | 0.684 | 0.591–0.776 |

*Note.* AUC = Area under the curve; CI = Confidence interval

Conducting measures of sensitivity and specificity for the SAVRY SRR ratings yielded a sensitivity of 0.66 and a specificity of 0.73 for high risk rating and violent outcome only, and a sensitivity of 0.40 and a specificity of 0.72 for the merged outcome group “any crime” (criminal behaviour with or without violence).

### 5.5.2 SAVRY items and association with violent and/ or any crime.

The distribution (%) of the sub-items of the SAVRY SRR and the association with violent crime and any crime revealed that in this sample, the historical subscale items *History of Violence* and *History of Non-Violent Offending*, and *Past Supervision/ Intervention Failures* were the items statistically significantly associated with subsequent crime.

On the contextual subscale the items *Affiliating with Delinquent Peers and Community Disorganisation* and on the individual subscale the items *Negative Attitudes, Poor Compliance Low Interest/ Commitment to School, Low Empathy/Remorse, and Substance Use Difficulties* were statistically significantly associated with both violent and any crime in follow-up.

On the protective subscale, which was inversely associated with violent and any crime, *Pro-social Involvement* and *Social Support*, and for non-violent crime also *Positive Attitudes Towards Interventions and Authority* were statistically significantly associated with desistence from subsequent crime.

### 5.5.3 SAVRY SRR and violent and any crime

The logistic regression analysis showed that the associations between the SAVRY summary risk rating and violent crime four years after the initial assessment was statistically significant ($p = .002$) with the main differences in violent crime found, as expected, between the high risk rated and the low risk rated young people as indicated by the crude odds ratio of 6.70 (95% CI 1.44–31.17).

Similar findings emerged on the association between the SAVRY SRR and non-violent crime OR 5.22 (95% CI 1.42–19.16) and on any crime OR 3.80 (95% CI 1.30–11.12). Controlling for impact of sex, age, psychiatric and treatment setting during the initial assessment further confirmed the outcome.

The more protective factors a young person had present the less did they engage in violent or any criminal behaviours. Among those who had five or six protective factors present (nine cases) no one violently reoffended, of those with 2-4 protective factors (83 cases) four participants (4%) violently reoffended and of those with less than two protective factors present (87 cases) 17 (20%) violently reoffended in the four-year follow up

### 5.5.4 Binning strategies (Table 13)

Further, applying the binning strategies recommended by Singh et al. (2011) revealed that the predictive power of the qualitative approach lies primarily within the high risk domain, as the predictive value declined when the moderate and high risk groups were combined and compared against the low risk group. Comparing the high risk rated young people against all others and considering the impact of confounding factors indicated a strong association (p. = <.001) with later conviction for violence OR 10.55 (95% CI 2.92–38.20).

Table 13. Odds ratios (OR) with 95% confidence interval (CI) of categorical, binned and adjusted values of the associations on SAVRY Summary Risk Rating, and violent, non-violent and total criminal outcome in a 4-year follow-up on 200 institutionalised adolescents in Finnish psychiatry and child welfare.

| | **Crude SAVRY summary risk rating** | | | | **Adjusted SAVRY summary risk rating** | | | |
|---|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | *p* | | OR | 95% CI | *p* |
| | **Categorical: low vs moderate vs high** | | | | | | | |
| Violent crime | | | | *.002* | | | | *.002* |
| | low | reference | | | low | reference | | |
| | moderate | 1.29 | 0.24–6.93 | | moderate | 0.85 | 0.14–5.35 | |
| | high | 6.70 | 1.44–31.17 | | high | 9.34 | 1.40–62.15 | |
| Non-violent crime | | | | *.009* | | | | *.002* |
| | low | reference | | | low | reference | | |
| | moderate | 1.79 | 0.47–6.84 | | moderate | 1.47 | 0.33–6.44 | |
| | high | 5.22 | 1.42–19.16 | | high | 8.09 | 1.77–37.02 | |
| Total crime | | | | *.005* | | | | *.001* |
| | low | reference | | | low | reference | | |
| | moderate | 1.14 | 0.37–3.50 | | moderate | 0.84 | 0.25–2.86 | |
| | high | 3.80 | 1.30–11.12 | | high | 5.06 | 1.41–18.13 | |
| | **Binning A: Low vs moderate + high** | | | | | | | |
| Violent crime | | | | *.128* | | | | *.343* |
| | low | reference | | | low | reference | | |
| | mod + high | 3.19 | 0.72–14.24 | | mod + high | 2.22 | 0.43–11.53 | |
| Non-violent crime | | | | *.083* | | | | *.145* |
| | low | reference | | | low | reference | | |
| | mod + high | 3.00 | 0.86–10.41 | | mod + high | 2.81 | 0.70–11.24 | |
| Total crime | | | | *.164* | | | | *.378* |
| | low | reference | | | low | reference | | |
| | mod + high | 2.05 | 0.75–5.62 | | mod + high | 1.65 | 0.54–5.04 | |
| | **Binning B: Low + moderate vs high** | | | | | | | |
| Violent crime | | | | *<.001* | | | | *<.001* |
| | low + mod | reference | | | low + mod | reference | | |
| | high | 5.62 | 2.14–14.77 | | high | 10.55 | 2.92–38.20 | |
| Non-violent crime | | | | *.003* | | | | *<.001* |
| | low + mod | reference | | | low + mod | reference | | |
| | high | 3.45 | 1.54–7.72 | | high | 6.04 | 2.25–16.20 | |
| Total crime | | | | *.001* | | | | *<.001* |
| | low + mod | reference | | | low + mod | reference | | |
| | high | 3.49 | 1.64–7.37 | | high | 5.76 | 2.28–14.52 | |

# 6. Discussion

## 6.1 SAVRY predictive validity

### 6.1.1 Predictive validity for violent behaviour

The main finding of this dissertation on the predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY) was that a summary risk rating (SRR) indicating a high risk in adolescence, and /or a high total score (TS) is indeed indicative of subsequent relapse into both institutional and community violent behaviour, and also into institutional disruptive and more general criminal behaviours well into early adulthood. Our findings corresponded well with the existing literature on the predictive validity of SAVRY (Catchpole & Gretton, 2003; Chapman et al., 2006; McEachran, unpublished). This outcome was expected, especially for the correctional school sample, as a larger proportion of adolescents who may receive prison sentences, for example, in the USA or the UK, are likely to be placed in correctional schools in Finland due to the differences in the legal systems, even though the correctional schools do also admit adolescents without formal criminal records (Kuula et al., 2006).

However, the study did also confirm that, even if SAVRY was not originally intended for use in adolescent psychiatric settings, it is successful in identifying individuals at increased risk for violence, also in settings where the base rate of incidents may be very low, or, for that matter, in the forensic setting, very high, and where psychiatric illness may play a significant role in disruptive and violent behaviours. The result corroborate the findings of Lodewijks et al. (2008) and Bartel et al. (2003), who, in their follow-up on male delinquents in residential treatment settings, found that the SAVRY total and summary risk scores were successful in accurately predicting institutional violence both physical violence against persons and disruptive behaviour, and that recognising aggressive conduct disorder further strengthened the findings.

The predictive validation approach was also applicable regardless of gender, age, psychiatric illness and/or treatment setting, and recognizing these confounders actually strengthened the predictive value of the assessment, supporting the assumption that the use of a structured approach combining empirically derived risk factors and the clinicians' specialist knowledge concerning the focus group and individuals assessed is indeed superior to that of simply adding risk items.

Even though the outcome of the quantitative data of the SAVRY total and sub-scale scores (historical- social & individual) was only modest in the very restrictive settings such as the forensic (AFP) and correctional (CS) units assessed, where de-escalation techniques and aggression management are built in into the treatment routines, and psychotic symptoms and mood disorders are stabilized and treated medically according to best treatment practice, it still served well in pinpointing those in need of intense risk reduction interventions. Among the subscales the clinical subscale was the one most strongly related to reconviction for violence, which again confirmed the findings by Lodewijks and colleagues (2008) and Bartel et al. (2003).

On an item level, we found that the features most closely related to relapse into violent behaviour in the total sample were those related to antisocial activities, antisocial peers, antisocial attitudes, substance abuse problems, failure to benefit from interventions, and lack of motivation for prosocial activities. Our findings resembled the cluster of risk items from criminological research on risk factors among adult re-offenders referred to as "the central eight" (Andrews, Bonta, & Wormith, 2006) forming the basis of the Youth Level of Service/ Case Management Inventory (Hoge, 2002) . The model comprises items such as antisocial past, -personality, -cognition and -associates and further with substance abuse, inappropriate parental monitoring, poor work performance and lack of pro-social involvement. In our study, relapsing into criminal behaviours, both violent and non-violent, and into institutional violence and disruptive behaviours on the ward was associated with SAVRY items prior non-violent offending, affiliating with antisocial peers, negative attitudes, substance abuse problems, lack of social support and community disorganization, lack of motivation to engage in treatment and educational effort and lacking of pro-social involvement. Antisocial personality disorder is not on our list, but this was explained by the subjects being minors and thus not (yet) diagnosed with a personality disorder. Nevertheless, the present finding adds to the evidence of a strong concurrent validity between the SAVRY risk items and risk total score and the items and total scores on the YLS/CMI especially (Borum, 2006; Catchpole & Gretton, 2003; Hilterman, 2014; Welsh et al., 2008).

The SAVRY estimate also served to discriminate between those in need of more intense efforts to specifically reduce violence risk and those for whom time and increasing age and prosocial involvement *per se* would decrease risk behaviours and whose needs could be met in other contexts, for example, with more general family interventions and parental support. This is of importance, as findings may become confused with the implications of the early vs. late onset taxonomy of Moffit, and the findings of (Andrews et al., 2006) indicating that intense risk reducing

efforts should indeed be applied to those individuals with the highest risk levels, and that too much intervention effort in low-risk cases may even be counterproductive

As expected, the general adolescent psychiatry (GAP) patients were mainly rated as having a low risk of violence, while the majority of those in correctional school and adolescent forensic care had moderate to high overall risk when assessed with SAVRY. This was an expected outcome since the institutionalisation of the adolescents in the CS and AFP units often was due to behavioural problems.

However, when a young person had a summary risk rating of "high" in the GAP, it did indeed indicate an elevated risk for institutional violent behaviour, thus indicating that in cases with histories of violence or those displaying severe violent threat are indeed worth the effort of a structured assessment for pinpointing of amendable areas of intervention. In relation to violent threat in low baseline settings, Borum & Reddy (2001) have discussed the structured professional judgement approach in Tarasoff cases, i.e. when threat of violence is evident, targeted, acute and executable and where people who know the assessee well are expressing concern *but where nothing has yet happened*. In those cases the first step to be taken is to analyse the current situation and evaluate what should be done to keep the target/ targets safe. After this, however, to decrease false assumptions and/or the future risk, a more detailed analysis of the combination of risk items and protective factors present may guide treatment efforts for risk reduction.

### 6.1.2 SAVRY applicability for assessing risk of institutional disruptive behaviours and any criminal outcome

The finding regarding the value of SAVRY in predicting adverse outcome beyond the scope of relapsing into violent offending is of importance and supports the use of SAVRY not only for estimating the risk of future violent behaviour but also for more general non-violent criminal behaviours, even though SAVRY was not originally designed for this purpose. Support for this has been found in several studies in both community and in institutional settings, although the focus has not been on psychiatric treatment facilities.

In general the item profile statistically significantly associated with increased risk for relapsing into criminal behaviour resembled the profile for violent reoffending. Non-violent antisocial behaviour, however, was more strongly associated with the items S*tress and Poor Coping* and *Negative Attitude owards Intervention and Authority* which may thus serve as amendable areas of treatment.

### 6.1.3 Protective factors.

Protective factors are coded as present or absent in SAVRY, and our analysis supported earlier findings as a lack of protective factors was statistically significantly correlated with conviction for a violent offence in the four-year follow-up. Performing the same analysis for institutional violence was not as clearly discriminative between groups, with the outcome only approaching statistical significance (p= 0.06). Nevertheless, the categorised approach proved useful as those with five or six protective items relapsed into violent incidents less frequently. Our findings support the assumption that protective factors play an important role in violence risk assessment in youth samples. Protective factors may buffer against criminal behaviours, but on the other hand the lack of these specific factors (for example, low intellectual ability) may also increase the adverse effects of the risk items. The results showed that one single protective item does not alone suffice to make any major difference, but that two do indeed have an impact. The findings resemble those of Lodewijks and colleagues (2010), who found that the same critical cutpoint of two protective factors present dramatically lowered the risk for reoffending violently. This finding indicates an important key for strengthening desistance from violent reoffending, especially among the high risk offenders.

## 6.2 Gender differences in risk of violence and risk assessments

### 6.2.1 Institutional violent behaviour

In our sample of institutionalised young people we found support for the assumption that, as in findings among adult offenders (Kivivuori, 1999; Moretti & Odgers, 2002; Putkonen et al., 2003), among young people in the high risk range (Moretti & Odgers, 2002) a small group perpetrate the majority of all violent incidents, and that in institutional settings the gender gaps indeed decrease, as our young females perpetrated the majority of all incidents rendering necessary staff interventions and coercive measures during institutional treatment. They outperformed the boys statistically significantly both in violent incidents, self-harm and disruptive incidents during the follow-up in institutions This is contradicts public expectations and base rates in community samples, but is well in line with the findings in adult psychiatric and forensic psychiatric populations, where the male preponderance in violent and rule breaking behaviours diminishes and even turns to female

preponderance (Grassi et al., 2001; Hill et al., 2012; Kaltiala-Heino et al., 2013; Krakowski & Czobor, 2004; Mellesdal, 2003; Weizmann-Henelius & Suutala, 2000).

### 6.2.2 Predictive validity and performance of SAVRY according to gender

The SAVRY total scores (TS) and summary risk ratings (SRR) performed as well for girls as they did for boys for both institutional violence and for community violent offending. However, binning the SRR and controlling for the impact of gender yielded a result indicating that a moderate SRR in boys is more predictive for a general antisocial attitude or for desisting, whereas the girls with a moderate risk rating seemed more prone to relapse into violent, self-harming or disruptive institutional behaviours. On a risk item level differences emerged mainly in the historical and individual domains as boys scored higher on items related to individual features and conduct, i.e. early initiation of violent behaviour and criminality, poor school performance, lack of anger management skills and problems related to ADHD. Girls scored higher on self-harm. However, when focusing on adolescents rated as high risk only, adding confounders to the analysis, the differences diminished, even suggesting that the high risk girls' profiles resembled those of the high risk boys more than those of other girls. The differences in school performance, ADHD and general criminal conduct was still significantly higher among boys and self-harm among girls.

### 6.2.3 Gender-interaction analysis

To assess possible significant differences due to gender more specifically we performed the gender interaction analysis, which pinpointed the item history of violence as a key factor among high risk girls, and the items general criminal conduct, antisocial attitudes and lack of empathy and remorse for high risk boys. The analysis indicated that girls rated as high risk having experienced more stressful lifetime events and lacking resilience and skills for coping and thus being more prone to resort to reactive violence than the boys, for whom general antisocial features were more closely linked to subsequent violence. Contextual and relational features and especially the girls' vulnerability in close relationships play a major part in girls developing emotionally triggered reactive violent behaviours (Crick & Grotpeter, 1995; Odgers & Moretti, 2002; Odgers, Moretti, & Reppucci, 2005; Rivera & Widom, 1990). In boys, the findings of early onset violent behaviour, antisocial attitudes and lack of empathy and remorse and the associations with subsequent violent

acts supported the findings regarding a path towards antisocial personality defined by Moffit et al. (2001).

The finding suggesting that girls crossing the threshold of physical violence are especially prone to relapse into violent behaviours in institutional settings shows that the negative effect of acting out in girlhood may be of even greater importance than in boyhood. Odgers et al. (2005) suggested that it may well be that as girls' violent behaviours are in conflict with the cultural expectations concerning girls' behaviour in general, they subsequently form a vicious circle of the girls who lack both the skills to cope and the skills to inhibit anger expression. This finding was recently supported by the findings of Kaltiala-Heino and colleagues (2013) in a more detailed analysis of a group of high risk rated girls in forensic adolescent psychiatric treatment. Therefore a history of severe violent acting out and institutional self-harming behaviours forms a crucial treatment focus among high risk girls, who, regardless of their internalising symptoms, need similar support in modelling expression of negative affect as those directing their behaviours outwards.

Girls generally have more protective item scores than boys. High risk girls with positive ratings on the items capacity to bond and attach, and girls with resilience as a personality trait and with positive attitudes towards authority also seemed to be more receptive towards remedial interventions than high risk boys with similar ratings. When correlating the findings with institutional violence, the gender interactions analysis highlighted that in our total sample it was in fact the boys who had shown positive attitudes towards interventions and authority who were less prone to relapse into violent behaviours, and not the girls. In the subgroup rated as high risk, none of the protective items were statistically significantly associated with lowering the risk for violent outcome as our subjects in general lacked protective features and supportive environments, which made it hard to evaluate the impact of these. On the other hand lack of these was presumably part of the reason why the young people were incarcerated in the first place.

## 6.3 Psychopathology

### 6.3.1 Schizophrenia spectrum disorders

The predictive validity of the SAVRY violence risk assessment was satisfactory across diagnostic categories, including schizophrenia spectrum, however, the adolescents with a diagnosis of

schizophrenia or behavioural and personality disorders were more often classified as presenting a high risk of violence than were those with other psychiatric diagnoses and those without a diagnosis. Studies among adult psychiatric patients have suggested that the nature of psychotic experience, and especially symptoms associated with threat/control override the type of delusions (Strand & Belfrage, 2001; Stueve & Link, 1997; Swanson et al., 1997), and may increase the risk of violence. However, for adolescents it has been suggested that risk of violence in psychosis is related to similar factors as that among non-psychotic young people, rather than to the nature of psychotic experiences (Clare et al., 2000). SAVRY does not include psychotic symptoms as an item, but the summary risk rating allows the individual inclusion of additional items appearing particularly relevant in a specific case. In our data, the predictive validity of SAVRY assessments actually tended to be better in the schizophrenia spectrum group than in the other groups, even if statistically significant only on the social/contextual subscale. This may suggest that in adolescents, even in psychosis, generally valid risk factors do indeed play a greater role than the symptoms themselves. In our sample of institutionalised adolescents, the externalising dimensions of psychopathology, more precisely rule-breaking and aggressive behaviour, were statistically significantly associated with an increased risk of violence. The finding persisted even after controlling for confounders, indicating that the externalising dimensions did indeed serve to distinguish between high and low risk young people across diagnostic groups. The more historical items such as *Early Initiation of Violence*, *Exposure to Violence in the Home*, *Childhood History of Maltreatment* and *Early Caregiver Disruption* may play a more significant part in psychiatric illness with subsequent violent and acting out behaviour. Finally it is notewrothy that 21 (87%) of the young people with a schizophrenia spectrum disorder had proper antipsychotic medication according to the best treatment practice during the time of assessment. This should, according to the findings of Fazel et al. (2014), and Swanson et al. (2009), for example, lower the risk of violent behaviours. Regardless of this, Savry managed to pinpoint those who relapsed into violence well.

### 6.3.2 Internalising disorders

Earlier research on adolescent samples (Sareen, Stein, Cox, & Hassard, 2004; Teplin et al., 2002) has implied associations between aggressive behaviours and internalising disorders. Our approach on the dimensions of psychopathology instead of diagnostics did not find such an association. Adolescents often display externalising symptoms, also in internalising disorders such as depression and anxiety, and our results suggest that the association between aggressive behaviours and specific

disorders is mediated through externalising and not internalising symptom dimensions. Among the most challenging adolescent forensic patients the anxious-depressive symptoms were actually negatively associated with risk of violence, which further supports the above interpretation that it is mainly the externalising dimensions of psychopathology that are associated with increased risk of violent behaviours and not the disorders *per se*.

### 6.3.3 High risk settings

In the AFP group the results indicated in general that on a more specialised level of treatment, where the subjects may form a more homogenous group, the dimensions of psychopathology no longer serve to distinguish between risk levels. This may be due to the co-occurrence of so many different types of symptoms simultaneously that a general measure of psychopathology simply no longer suffices to differentiate between them. Considering the association found between elevated risk of violence and symptoms such as hostility, suspiciousness, hallucinatory behaviour and intractability, these symptoms are similar to those reported among adult forensic samples (Beck, 2004; Link, Stueve, & Phelan, 1998; Strand & Belfrage, 2001; Stueve & Link, 1997; Swanson et al., 2006). Clare and colleagues (2000) argued that in adolescence the sum of psychosocial problems may be more important than the type of symptoms for estimating the risk for violent behaviours. Our findings indicated that the psychotic symptoms *per se* actually do contribute to the risk of violence, and may thus also offer opportunities for violence prevention.The finding of an association of the CBCL subscale thought problems and risk for violence in the total sample strengthens the conclusion drawn on the forensic sample regarding the associations between psychotic symptoms and risk for violence, and concurs closely with research findings in adult settings. In this study substance abuse disorders alone did not emerge as being associated with risk of violence.

About half of the subjects had had some negative experiences with alcohol or drugs, but only three were incarcerated primarily due to drug-related problems. However, it is noteworthy that the subjects in this study were all below the age when it is legal to buy alcohol in Finland (18 years), hence developing actual diagnosable alcohol substance abuse disorders is uncommon among them. Also, the subjects had been institutionalised at a very young age, which perhaps had served as a protective intervention; they were also so mentally ill, lacking in social skills and subsequently behaving oddly, that they had not been included in peer groups where they might have been exposed to illicit substances. This may be part of the explanation for the low occurrence of severe

drug or alcohol related problems among them. Nonetheless, based on our findings we venture to lend support to the findings of Copeland and colleagues (2007) and Elbogen & Johnson (2009) that it is the combination of several risk factors that is important in risk assessment.

## 6.4 Treatment setting

Violent and aggressive incidents occurred generally with an incidence ratio ranging from 0.1 to 1.5 incidents per subject per day in the units studied. The finding is in line with the results of the review by Tremmery et al. (2014), where the incidence ranged from 0.6 to 2.4 incidents / day. The forensic subgroup had more incidents per day, and all forms of disruptive behaviour were displayed most commonly there, as this facility admits the most difficult to manage adolescents from both adolescent psychiatry and correctional schools. Although the findings were roughly comparable with those in the Tremmery review, there were also some differences between samples in the cut-offs set for the inclusion of disruptive behaviours. Whereas Tremmery et al. also included interventions such as verbal time out, we only included cases where staff had to physically intervene to remove or secure the young person, or security or police had been summoned. Thus our institutional violence was such as to require by law that the institution keep track and report on them. It could therefore be assumed that our incidents were potentially more challenging, and it is clear that if we had also included verbal interventions by staff and time out, that the number incidents we included would have been significantly higher. The institutionalised girls caused significantly greater numbers of incidents than boys - both institutional violent, disruptive and in particular self-directed violent incidents. Early adolescents caused more incidents of violence towards others and non-violent problem behaviours than did middle adolescents, which can be understood from a developmental point of view. The ability to self-control normatively increases from early to middle adolescence (Hammond et al., 2012). Self-directed violent behaviours were, however, more common among middle adolescents than early adolescents, which is likely due to the higher prevalence of severe psychiatric illness such as severe mood disorders and psychoses among older adolescents and the findings implying that severe depression and suicidal behaviour increase in late adolescence or early adulthood (Cash & Bridge, 2009). Psychiatric disorders impair an adolescent's capacity for behavioural control; hence all the incidents studied were more common among adolescents with a psychiatric diagnosis than those without. Schizophrenia spectrum disorders particularly were demonstrated to be associated with all kinds of violent and disruptive incidents. It was to be expected that incidents of violence towards others and non-violent disruptive

behaviours were more common in the conduct disorder group and incidents of self-directed violence were rather associated with other psychiatric disorders such as depression and anxiety disorders.

# 7. Strengths and weaknesses

## 7.1 SAVRY ratings

To the best of our knowledge this was the first study to evaluate the occurrence of violent and severe non-violent disruptive behaviours in child and adolescent institutionalised treatment settings including different types of institutions evaluated with similar methodology.

All violence risk assessments were conducted by one researcher, a clinical psychologist (MG) trained in use of several SPJ assessment methods. Assessments were made independently from the assessment units, and solely for research purposes. To evaluate the quality of the assessments a pilot study was conducted, rendering an intra-class correlation coefficient of 0.87 (0.58–0.95) for the average measures for the continuous SAVRY variable (TS) and 0.77 (0.41–0.90) for the categorical (SRR). Cronbach´s alpha was 0.77 for the TS and 0.90 for the SRR, which according to Fleiss (1986) description of critical values, were in the excellent range (ICC > .75), which made us confident about using this approach to material gathering.

The strengths of this study include the extensive information on file in the research units, comprising reports by both psychiatric and child welfare professionals. If an adolescent residing in correctional school has a psychiatric treatment history, summaries of the psychiatric case histories are routinely included in child welfare files, and this allowed us also to record psychiatric diagnoses in the correctional school sample. Since both the Finnish Mental Health Act and the Child Welfare Act require units to keep a record of restrictions applied to patients/residents, file the information on episodes necessitating staff's physical intervention, or requiring the involvement of security staff or police is comprehensive and reliable. However, minor aggressive and disruptive incidents, handled, for example, with *pro re nata* medication, therapeutic discussions, intensive nursing or severe admonitions are not included in our data. This means that our figures must be understood as minimum figures of the features studied, but this is unlikely to influence the findings related to the role of age, gender, psychiatric diagnosis or service level.

In general, all the information needed for scoring both the SAVRY items and incidents of violence on the ward was easily located in the files. On the GAP ward, where the adolescents stayed for a much shorter time and where severe aggressive behaviour was less frequent, there were fewer files available on family and social risk factors or on structured psychological tests, and the range of psychiatric symptoms - other than psychosis or conduct disorder - was wider than in the two other units, thus making the SAVRY scoring more challenging.

We did, however, have the opportunity to gather more information by interviewing the relevant staff on the ward. Of the total sample there were about five SAVRY assessments where some items had to be omitted due to lack of information. For the analysis the missing items were coded 0 / low. This may increase the risk of false negatives. However, the missing values were all found among young people rated as displaying either low or moderate risk for violent behaviour. All these resided in the GAP unit. Since we used the qualitative summary risk ratings of SAVRY, and our results implied that the moderate group was not strongly associated with violent outcome, we chose to cope with insufficient records in this manner in order to minimise the risk of false positives. The SAVRY SRR was still formed using the information available. In the cumulative approach the missing items were coded zero.

Even though the information on file in most cases did also include subjective information gathered on the adolescents and their careers, information obtained directly from the subjects directly or from their parents presumably could have added to the knowledge obtained from the files. However in SAVRY, as when in dealing with delinquent young people in general, the importance of relying on multiple source record information is especially stressed (Borum & Verhagen, 2006; Grisso, 2005) and this information would merely have been complementary.

## 7.2 Psychopathology

The extensive information on file in the research units, comprising reports by social workers and teachers as well as psychiatric reports and psychological tests is a major strength of this study. Information gathering regarding psychotic symptoms was carried out by experienced clinicians using well established methods. The CBCL estimates were also all supplied by adult informants (assigned nurse or parent) who knew the subjects well, as required by the instructions of the CBCL (Achenbach, 1991). Since in Paper III only subjects with valid test scores on the CBCL were included in the study, the number of subjects decreased from 235 to 163, leaving us with less than half of the GAP population (45%) and about 60% of the AFP population, which may have biased the results. Subjects with and without CBCL scores available did not differ by sex, but those lacking CBCL forms were somewhat older and had somewhat more conduct disorder diagnoses than those on whom complete data was available.

Working on site was an asset, as it made it possible to request missing information directly from the treating physician or from the assigned nurses of the specific subject.

However we did not carry out any structured diagnostic interviews for psychiatric diagnoses, leaving us with a group of young people who did not have an official psychiatric diagnosis even though from the papers we could often have diagnosed at least a conduct disorder on the basis of the behavioural information.

Moreover, the diagnostic groups had to be merged due to the limitations imposed by sample size. We chose to merge the groups of subjects with emotional and behavioural disturbances mainly starting in childhood and adolescence (F90–99) and the diagnosis of persistent personality disorders (F60–69) because of the prevalent continuity from disorders of the previous category to the latter (Farrington, 1995; Loeber et al., 2001; Moffitt & Caspi, 2001). In the CS sample the share of those with no diagnosis was probably greater than it would have been if diagnostic interviews had been conducted since studies (Kaltiala-Heino & Kahila, 2006; Kuula et al., 2006; Lehto-Salo, 2011) have shown that of the young people in child welfare in Finnish correctional schools from every second to as many as two thirds suffer from one or more psychiatric disorders, particularly from disruptive behavioural disorders.

The ratings on depressive thinking and suicidal ideation were collected as self-reports from the subjects studied during the approximately two-month assessment period at the adolescent forensic unit. Here our findings differed from those of earlier studies, where violence to self and others frequently co-occurs (Becker & Grilo, 2007). It may be that situational factors (being treated involuntarily or subjected to forensic evaluation) occasioned problems in cooperating, or that the young people were unable to communicate their problems realistically (Grisso, 2005). However, the outcome may also be due to the small sample size or to the fact that the subjects displayed so many different symptoms that the scales simply did not serve to differentiate between groups.

Finally, the small sample size of this study constitutes a limitation, especially when regarding the adolescent forensic sample alone. This group also comprises a highly selected group of young people, where the risk levels and needs for treatment exceed the capacity of the services offered in general adolescent psychiatric or child welfare treatment. However, since this is an area of research where data is still sparsely available, the findings add to the body of existing research, and support the suggestions of Odgers and Moretti (2002) that we should indeed focus on outliers when trying to understand the extremes in violence risk research.

## 7.3 Institutional violence

A limitation of the information-gathering for this dissertation was that the young people who left the institutions prior to the six-month cut-off were not subjected to a structured follow-up of six months. The cut-off at six months was set after the analysis regarding the compatibility of the different care levels units as our primary focus was on intra-institutional violence. It is clear that being unable to follow up the young people outside the institutions we must have missed some incidents perpetrated by those who left the institutions prior to the six-month cut-off. They may now appear as false negatives since we do not know if they have perpetrated violent acts in the community. On the other hand, one can assume that those released from treatment posed a smaller risk of violence to self or others.

Setting the cut-off at six months also left us with many incidents that had occurred in treatment thereafter, which were not counted in this article *(Paper I)*, where they now falsely pose as false positives i.e. high risk and no violence. This was found particularly among the correctional school subjects who had more disruptive incidents at the end of their incarceration (i.e. just before turning 18, when the law no longer enabled involuntary treatment). Nonetheless, in light of our findings on institutional violence in this population, one can assume that there may have been even more adverse outcomes in the follow-up had some subjects not been residing in restrictive settings.

## 7.4 Criminal registers and registers of death and causes of death.

The age of criminal responsibility in Finland is 15 years, and information on criminal conduct before that age is a matter for the child welfare authorities. Therefore we had no crime register data on any violent acts perpetrated before the age of 15. However, one can assume that it would have been noted in the child welfare files, regardless of the treatment unit, had there been any severe violent incidents in a young person's past. For the follow-up we did not have access to information regarding possible institutionalisation, or for legal consequences not registered in the criminal records (i.e. mediation as an alternative for settling and resolving cases arising from offences) Some of the young people had no opportunity to engage in criminal conduct due to environmental restrictions or they had committed crimes but had no criminal records as a less severe crime may be dealt with in social welfare in an offender – victim mediation programme instead of proceeding in the legal justice system. On the other hand, some of the criminal acts recorded in the files of the young people were committed in institutions or while on leave (authorised or unauthorised) from an

institution. Institutional violence may be underreported, as minor incidents which in the community might lead to sanctions are often dealt with in the institutional system, but severe violent incidents, where someone is hurt, or severe criminal conduct, are usually reported to the authorities due to legal and insurance issues.

Young people may be treated involuntarily in adolescent psychiatry due to severe mental disorder until they are 18, but thereafter only if they have a psychotic disorder. Under the social and child welfare laws a young person can be detained involuntarily until 18 years, and then under surveillance until 21. As the youngest subjects were at the time of follow-up only 16 years old, they may thus still reside in settings where their potential problem behaviours can be managed. Some subjects had been referred involuntarily to state mental hospitals for treatment in medium to high security psychiatric settings. Six young people had died during follow- up. For these six young people we did not have access to their criminal records as they are deleted yearly. They were now deleted from the data, but in a different approach they could have added to the predictive outcome, as none of them had died a natural death. Yet overall we had no knowledge regarding possible re-institutionalisation of the subjects, which could have restricted their opportunities to engage in violent or non-violent criminal activities in the community.

# 8. Conclusions and Recommendations

The Finnish translation of SAVRY is a valid tool for estimating risk of violent behaviour not only in facilities for juvenile delinquents, but also in adolescent psychiatric settings, both general and forensic, and professionals with appropriate knowledge of youth development and who in their daily professions come into contact with young people displaying challenging and violent behaviours can feel comfortable using it as a guideline for their decision-making when asked to specify risk behaviours in youth settings.

SAVRY is not a screening method. It requires both time and a cognitive effort going beyond that of simply adding up risk items and subtracting protective ones. It is imperative to note that the Receiver Operating Curves do indeed show that the continuous approach to risk assessment serves within a satisfactory range. However, our findings also show that the SPJ approach of structured information gathering and the addition of clinical and "salient knowledge" strengthens the outcome of assessments further. SAVRY is indeed able to not only pinpoint youth in need of extensive treatment efforts to reduce the risk of reoffending, but also to give indications as to which areas of the risk domains should be given more attention and what steps should be taken next on the individual level.

Even if SAVRY is based primarily on the literature concerning boys, when correctly applied, as a guideline for the assessment of risks and needs, professionals can feel confident about using it for assessing the risk of violence among adolescent girls. There are some specific items of SAVRY that may have a more robust impact on the estimate outcome for girls than for boys. This does not imply the need for a new, gender specific risk assessment tool, but suggests that items such as history of violence and self-destructive behaviour should be considered especially when occurring in high risk settings for girls, and may require specific risk reducing effort. Overall, even though some items did indeed have a more robust impact on the risk estimate outcome for girls than for boys and vice versa, the SAVRY summary risk estimate works well in both girl and boy samples

The incidents of disruptive behaviours, both violent and non-violent, were associated with diagnosis in the schizophrenia group. Schizophrenia spectrum disorders are very severe mental disorders that pervasively lower functioning and hinder adolescent development. Violent and disruptive behaviours may reflect the inability of psychotic patients to cope constructively with everyday challenges. The generalization of our findings on associations between psychotic

symptoms and risk of violent behaviour demands caution, especially regarding applicability in less disturbed populations, but the outcome still indicates that even in adolescence, certain psychotic symptoms may be associated with increased risk of violent behaviour and should be accounted for in the assessment.

Reducing the risk of violence needs to be included in the treatment of early onset schizophrenia spectrum disorders, in parallel with reducing productive psychotic symptoms and promoting functioning in the various domains of life. When age, psychiatric diagnosis and service level were controlled for, most of the incidents involving violent behaviours, whether directed at others or self, and non-violent disruptive behaviours were perpetrated by girls.

The proportion of girls displaying violence towards others in non-violent disruptive behaviours was equal to that of boys, but the incidents displayed by the girls were manifold. In closed institutions, the gender difference in violent and disruptive behaviours becomes the opposite of that seen in adolescent population at large

Making active use of the assessments in everyday practice, focusing on strengthening what works, supporting social network efforts and navigating according to constructive developmental paths with a rather low focus on violence *per se* would probably serve young people in the low / low to moderate range best. Those in the moderate-high and high range on the other hand may need more skills coaching and perhaps more monitoring.

For intervention planning it may be useful to turn the focus onto the protective factors of SAVRY. The chance to form a secure attachment to a prosocial adult seems to be of key importance for both girls and boys, but then there are implications that prosocial engagement and social support seem to be essential for boys, whereas among girls the building of resilience and self-esteem may be a crucial component.

Future studies on SAVRY could benefit from field studies and focusing increasingly on the impact of the protective factors and the links to desistance from violent offending. This is also the domain to focus on in clinical interventions, as it is highly dynamic and the emerging research shows that these may be especially effective for those young people with many risk factors present. Also, focusing on strengths and building up skills is less provocative for individuals who may be prone to negatively biased cognitions of social contexts and thus less motivated to participate in interactions aimed at reducing risk.

Our second suggestion for future work is likewise in the treatment area, as, to the best of our knowledge, no studies have so far been presented on the effects of utilising SAVRY for treatment

planning and monitoring change. Linking effective treatment approaches and domains of need with targeted interventions in combination with secure treatment ought to yield benefit.

To the best of our knowledge this was the first study to focus on psychotic disorder in violence risk assessment with SAVRY. SAVRY does not include major mental or severe developmental disorder among its items. It would, however, be useful in the future to consider this, as prodromal symptoms may well start in middle adolescence and early intervention is crucial, especially among those with many historical risk factors. Another area of interest would be to explore the functioning of SAVRY among the subgroup of young people with Asperger's syndrome and autism spectrum diagnoses with acting out type behaviours and violence.

Last, SAVRY is a method made for use in adolescence, and the time frame is age 12-18. However, among multiproblem young people, and especially in psychiatric settings, the development is often delayed, so that even though the chronological age may be at the level when a young person enters adulthood, it may well be that the functional and emotional levels are much lower. For future research, the transition into adulthood may be an amenable area, as there may be needs that are not met in adult settings and on the other hand there may be flexibility in the service of prosocial and "normal" development to utilise in intervention planning.

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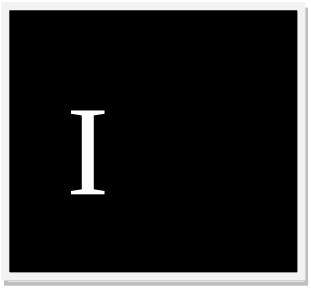
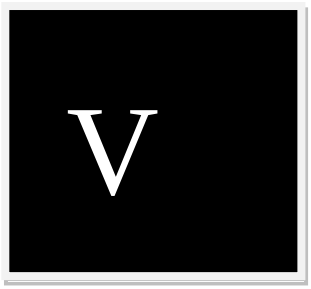


# II

# III

# IV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