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Screening for risk of violence using service users' self-perceptions. A prospective study from an acute mental health unit

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Each author's contribution

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Screening for risk of violence using service users' self-perceptions. A prospective study from an acute mental health unit

ABSTRACT: *Service users' self-perception of risk has rarely been emphasized in violence risk assessments. A recent review pointed to the importance of a multidisciplinary approach, because different perspectives may provide a deeper and improved understanding of risk assessment. The aim of this study was to investigate service users' perceptions of their own risk of committing violence, using a self-report risk scale, to determine the feasibility and efficacy of this potential violence risk marker during acute mental health hospitalization. All service users admitted to a psychiatric emergency hospital in Norway during one calendar year were included (N = 512). Nearly 80% self-reported no risk or low risk; only seven (1.4%) reported moderate risk or high risk. Service users who reported moderate risk, high risk, don't know or won't answer, were more likely to be violent (OR = 4.65, 95% CI = 2.79–7.74) compared with those who reported no risk or low risk. There was a significant gender interaction with higher OR for women on both univariate and multivariate analyses. Although the OR was higher for women, women's violence rate (11.0%) was almost half that of men's (21.8%). For women, sensitivity and specificity were .55 and .88, respectively; corresponding values for men were .40 and .80. Inclusion of self-perception of violence risk is the first step towards service users' collaborative involvement in violence prediction; these results indicate that self-perception can contribute to violence risk*

assessments in acute mental health settings. Findings also indicate that there are gender differences in these assessments.

KEY WORDS: *gender, mental disorders, risk assessment, self-report, violence*

INTRODUCTION AND BACKGROUND

Violence within the health sector is a global concern (Gates 2004; Kuehn 2010; Llor-Esteban *et al.* 2016), and the acute psychiatric hospital environment is one of heightened risk for aggression and violence (Abderhalden *et al.* 2007). Reviews have described violence rates in acute mental health wards as ranging from 17% to 31% (Bowers *et al.* 2011; Iozzino *et al.* 2015). A more ethical approach to violence prediction takes service users' self-assessments into account (Roychowdhury & Adshead 2014).

Violence risk assessments and service users' self-perception of violence

There is broad international research consensus that structured violence risk assessment instruments provide more accurate predictions of violence compared with clinical assessment (Singh *et al.* 2016). Yet the most common method of violence risk assessment used in acute mental health units is unstructured clinical judgment (Daffern 2007; Doyle & Dolan 2002; Skeem *et al.* 2013). Most structured risk assessment instruments achieve moderate accuracy with an area under curve (AUC) value of 0.7 in comparison studies, suggesting a 'glass ceiling' effect beyond which few instruments can improve (Coid *et al.* 2011; Yang *et al.* 2010). There is a need for investigation into whether different and extended approaches may improve predictions (Singh *et al.* 2011). A recent review article emphasized the importance of a multidisciplinary approach to violence risk assessments (Steinert & Whittington 2013), because different perspectives may provide a deeper and improved understanding of risk assessment. Despite this, service users' self-perception of risk has rarely been emphasized as useful in violence risk assessment, and only a few studies have addressed the topic (Roaldset & Bjørkly 2010; Skeem *et al.* 2013). One group (Roaldset & Bjørkly 2010) developed a

‘Self-report Risk Scale’ (SRS), which significantly predicts occurrence of in-patient violent threats (AUC = .73, 95% confidence interval [CI] = .61–.85, $p < .001$) and violent acts (AUC = .68, 95% CI = .55–.81, $p = .003$). However, the sample in this report was relatively small ($N = 428$), and the rate of in-patient violence was low (7.6%) compared with other studies, leading the authors to call for further studies.

Factors associated with violence

A better understanding of the factors associated with violence in acute mental health units would assist in planning services and developing preventative measures. Being male is strongly associated with violence in the community (Iozzino *et al.* 2015), and gender differences have therefore been of interest to researchers. Several studies have also described gender differences in violence within mental health settings. Of the 424 empirical studies included in one literature review (Bowers *et al.* 2011), only 22 included gender comparisons, including those showing that men have a higher probability of aggression (combined relative risk [RR] = 1.10, 95% CI = 1.03–1.17, $z = 2.88$, $p < 0.01$). Another review of 35 studies conducted in acute mental health settings found that male gender is a risk factor for violence (Iozzino *et al.* 2015). A single study found female gender to be a predictor of violence (Serper *et al.* 2005), while another did not find gender differences (Brown & Langrish 2012). Several systematic reviews of aggression in mental health settings show that being involuntarily admitted is also generally associated with violence (Cornaggia *et al.* 2011; Dack *et al.* 2013) and with specific violence within acute mental health settings (Iozzino *et al.* 2015). Other risk factors associated with violence include: having a history of violence, alcohol and substance abuse, younger age, and diagnosis of psychosis (Bowers *et al.* 2011; Cornaggia *et al.* 2011; Dack *et al.* 2013; Iozzino *et al.* 2015).

Consequences of violence within the acute mental health context

Violence in clinical mental health settings has a multitude of negative consequences for both service users and mental health professionals (Abderhalden *et al.* 2007). A UK study found that a third of mental health service users have been threatened and that 18% of those surveyed reported having been physically assaulted while in the care facility (Royal College of Psychiatrists 2007). Witnessing violence can also induce fear and uncertainty among service users (Hamrin *et al.* 2009), and for the service users who exhibit violence, consequences can include exposure to coercion or other restrictive measures. These individuals are also subject to mainstream stereotypes about mental illness, and the negative image of mental health service users is reinforced by their violence, which compounds the public's stigmatization of this group (Whitley & Berry 2013).

A more recent Italian study found the relative risk of violence against employees within mental health services to be 22 times higher compared with other health services (Magnavita & Heponiemi 2012). Mental health professionals also report stress-related sickness and poor work and treatment environments (Needham *et al.* 2005). Harmony among staff working on mental health units is useful in preventing violence (Cornaggia *et al.* 2011), and positive therapeutic relationships between mental health service users and mental health professionals are essential for supporting recovery processes.

AIM

The objective of this study was to investigate whether service users' assessments of their risk of committing violence contribute to improving violence risk assessments in acute mental health settings. We specifically investigated: (i) the predictive accuracy of

SRS recorded at admission, as a risk marker for violence during hospitalization; and (ii) possible gender differences in the predictive accuracy of SRS recorded at admission.

METHODS

Design

The study design was a naturalistic prospective in-patient study conducted at the Acute Psychiatric Section at Oslo University Hospital in Norway. The research was approved by the Regional Committee for Medical and Health Research Ethics. This approval granted exemption from asking for the service users' informed consent to participate but required that all service users be informed about their participation and right to withdraw. All service users were informed verbally and in writing about both the study and their right to withdraw from participating, both during their hospital stay and at discharge.

Setting and population

Oslo is the capital of Norway and has a total population of about 655 000 inhabitants. The Acute Psychiatric Section at Oslo University Hospital has five units, with a total of 45 beds for all emergency mental health admissions, serving a catchment area of about 204 000 individuals older than 18 years. Service users are first admitted to the Emergency Unit (seven beds), where they stay for a maximum of three days, after which they are either discharged or transferred to one of four specialized acute units.

The target group for the study included all involuntarily and voluntarily acutely admitted service users during one year (March 2012 to March 2013). The final study sample was $N = 512$ service users, among whom there were 684 total admissions and 340 episodes of violent behaviour. Clinical and demographic characteristics of the

sample are in Table 1. The target population was 558 service users with 755 admissions; 30 declined to participate, and an additional 16 were excluded because of missing SRS data at admission. Seventeen reported incidents of violence were excluded from analyses because of incomplete recordings.

Procedure

The SRS was administered by the attending physician during the initial intake and admission to the unit. All violent episodes during the hospital stay were recorded by the nursing staff, using the Staff Observation Aggression Scale – Revised (SOAS-R) (Nijman *et al.* 1999). Additional information regarding violent episodes during the hospital stay was collected by the researchers from hospital records and hospital protocols documenting coercive measures.

Service users with more than one admission (*i.e.*, more than one file number) during the study period were only counted once in analyses. For those with more than one admission, the first admission with recorded violence was used. For non-violent service users, the first admission was used.

For service users with more than one episode of violence, the most severe episode was considered to be the most important in this context (*i.e.*, because it conveyed potential harm to others) and was used as the index episode.

Baseline measures

To register service users' self-perceptions of their risk of committing violence during their hospital stay, a modified version of the SRS was used, the details of which have been previously reported (Roaldset & Bjørkly 2010). The service users were asked to state their opinion of the risk that they would threaten others, or act violently towards

others, during their hospital stay. They were asked to choose one of six response options to explain best their self-assessment of risk: *no risk* (will definitely not happen), *low risk* (is unlikely to happen), *moderate risk* (limited to certain situations), *high risk* (will happen in many situations), *don't know*, and *won't answer*. Information about violence (*i.e.*, violent threats and/or violent acts) that may have led to their admission was recorded in accordance with the definition of violence as *yes* (occurred), *no* (did not occur) or *don't know* (don't know whether episodes of violence/threats occurred).

Clinical and demographic variables including gender, age, marital status, education, employment, accommodation, history of violence (recorded as part of the V-RISK 10 at admission), whether they were admitted voluntarily or involuntarily, and ICD 10 diagnoses were collected from hospital records.

Outcome measures

The outcome measure was violent behaviour. Violent behaviour included verbal threats of violence and physical violence. Verbal threats were operationalized as verbal and non-verbal communication conveying a clear intention to inflict physical injury upon another person. Physical violence was defined as a physical act against another person, involving the use of body parts or objects, with a clear intention to cause physical injury to that person (Dean *et al.* 2006; Eriksen *et al.* 2016; Monahan *et al.* 2005; Roaldset *et al.* 2011; Swanson *et al.* 2006).

The SOAS-R was used to register violent behaviour against others (Nijman *et al.* 1999). The SOAS-R form is designed to be completed by staff members who witness aggressive behaviour by a service user, with aggression defined as: any verbal, nonverbal or physical behaviour that was threatening (to self, others or property), or physical behaviour that actually did harm (to self, others or property) (Nijman *et al.*

1999). Only physical and verbal aggressive incidents directed against other persons were used from the SOAS-R recordings. Recordings of self-harm and aggression against objects were excluded. Because the SOAS-R had already been used on the wards for a year as part of another research project, nursing staff taking part in data collection were experienced in use of the form.

Statistics

Data were analysed using SPSS version 24.0. Mann–Whitney U-test and independent t-tests were used to test differences on continuous variables between groups or subsamples. Chi Square was used to analyse categorical variables. Univariate binary logistic regression was conducted to estimate effect sizes as odds ratios (OR) for SRS and other variables associated with violence. Multivariate logistic regression was used to control for clinical and demographic variables with significant positive or negative associations with violence. Clinical and demographic variables that differed significantly between violent behaviour groups in the univariate analysis were used as confounders in the multivariate analysis. All variables significant in the univariate analyses at $p < .05$ were included.

AUC of the receiver operator characteristic (ROC) was calculated to determine overall predictive accuracy. AUC values range from 0 to 1, with an area of 0.5 indicating equal chance and 1.0 indicating perfect prediction. In order to compare the results directly with previous recommendations (Singh *et al.* 2015), further statistical analyses were performed to estimate (1) sensitivity, (2) specificity, (3) positive predictive value (PPV), (4) negative predictive value (NPV), (5) number needed to assess (NNA) and (6) likelihood ratio (LR). NNA is the number of service users who would need to be assessed to identify one true violent case (equal to $1/PPV$). LR

specifies the extent to which the odds of an outcome (*e.g.*, violence) increase when a test is positive (LR+) and decrease when a test is negative (LR-); for tests with only two outcomes, LR+ can be expressed as sensitivity / (1 – specificity) and LR- as (1 – sensitivity) / specificity (Deeks & Altman 2004).

Transformation of variables and preliminary analyses

Episodes of threats and physical acts were combined into a dichotomous variable (no violence *vs.* any violence) in order to achieve a larger number of outcome episodes, to increase statistical power and to decrease type 2 error.

Descriptive statistics from the SRS revealed low numbers of violent incidents in the *moderate risk* category and no incidents in the *high risk* category. Based on the violence rates and SRS recordings, preliminary analyses were conducted. Violence rates among those who responded *don't know* and *won't answer* suggest that these scores should be regarded as risk predictors. The low values in the *moderate risk* and *high risk* categories make them difficult to analyse. This is most likely attributable to type 2 error, meaning that these categories would become significant for predicting violence in a larger sample. Preliminary analyses of the SRS used three coding schemes. First, SRS was treated as an ordinal variable with three categories: 0 (*no risk*), 1 (*low risk*), 2 (*moderate risk + high risk + don't know + won't answer*). Next, SRS was dichotomously coded in two different ways: *low risk* was regarded as a reference, and *low risk* was regarded as a risk predictor. Results from these three SRS coding methods are in Table 2. The OR for *low risk* (1.90) was not significant ($p = .066$). Based on clinical judgement, the *dichotomous SRS (SRS-d)* with *low risk* as reference was used in the logistic regression analyses. From a clinical viewpoint, there is a larger discrepancy between *low risk* and

moderate risk than there between *no risk* and *low risk*. Calculations were also repeated excluding those who responded *don't know* and *won't answer*.

Of the 16 service users excluded because of missing SRS information, three (two women) had violent behaviour recorded during hospitalization. Of the 81 service users who had violence recorded during hospitalization, 41 (50.6%) had one episode and 40 (49.4%) had two or more episodes. The SRS-d did not differ significantly between these groups ($p = .441$).

A history of violence was recorded as *no, maybe/moderate* and *yes. Don't know* scores showed a predictive power similar to *maybe/moderate*, so these groups were combined for analyses.

To avoid skewed results, a single service user was counted only once in analysis, regardless of the number of times that he/she was admitted during the study period. Analyses were also controlled for the effects of readmissions.

RESULTS

Characteristics and comparisons of violent and non-violent service users

Among the 512 service users, 55.3% ($n = 283$) were women. During their hospitalizations, 21.8% of men and 11.0% of women had violent behaviour recorded. Most incidents occurred within the first days of their hospital stays. Of the 340 recorded episodes of violence, 14% occurred on the day of admission (through midnight of the day of admission), and 28% and 37% occurred during the second and third days after admission, respectively.

The violent and non-violent subsamples differed on several factors (Table 1). Violent service users were characterized by longer hospitalizations, more often had violence as

a cause for admission, and were more often involuntarily referred and admitted. Service users who had only a primary school education and those who were unemployed committed violence more frequently. There were also significant differences in diagnoses between violent and non-violent subsamples. Service users diagnosed with schizophrenia and schizotypal and delusional disorders (F20-29, ICD-10 Diagnosis Codes) were more often violent, while those diagnosed with neurotic stress-related and somatoform disorders (F40-48, ICD-10 Diagnosis Codes) had violent behaviour recorded less frequently.

Prevalence of violence and SRS ratings

Distribution of the recorded violent incidents based on SRS reports is shown in Table 3. Of the index episodes, 9.9% consisted solely of verbal threats, while the remaining 90.1% consisted of physical violence (often combined with verbal threats). A total of 79.9% reported *no risk* or *low risk* of committing violence during hospitalization, while only 1.4% reported *moderate risk* or *high risk*. A total of 8.6% reported *don't know*, and 10.2% responded *won't answer*. Transformation of the SRS into SRS-d (described above) and analyses applying the different cut-off points are in Table 2. Service users who reported their risk of violence to be either *moderate*, *high*, *don't know* or *won't answer* were more than four and a half times more likely to become violent compared with those who reported *no risk* or *low risk*.

Gender differences in the SRS-d, and risk factors associated with violence

Interaction analysis showed significant gender difference in the SRS-d with OR = 3.16 (95% CI = 1.11–9.00, $p = 0.032$). Because of this, univariate logistic regression was conducted separately for each gender. The SRS-d differed significantly for violence

within both genders (Table 4). The ORs were 2.74 (95% CI = 1.40–5.39, $p = 0.003$) for men and 8.66 (95% CI = 3.89–19.29, $p < 0.001$) for women. Variables that differed significantly based on service user violence within both genders were: *length of hospitalization* (Males: OR = 1.05, 95% CI = 1.03–1.06, $p < 0.001$; Females: OR = 1.03, 95% CI = 1.02–1.05, $p < 0.001$), *violence as a reason for admission* (Males: OR = 2.25, 95% CI = 1.03–4.95, $p = 0.043$; Females: OR = 5.83, 95% CI = 2.10–16.21, $p = 0.001$), *referred to hospital involuntarily* (Males: OR = 9.79, 95% CI = 4.17–23.00, $p < 0.001$; Females: OR = 4.28, 95% CI = 1.93–9.49, $p < 0.001$), *admitted to hospital involuntarily* (Males: OR = 8.38, 95% CI = 4.15–16.89, $p < 0.001$; Females: OR = 6.20, 95% CI = 2.84–13.55, $p < 0.001$), and a having a *history of violence* (Males: Maybe, OR = 3.30, 95% CI = 1.43–7.62, $p = 0.005$; Yes, OR = 5.68, 95% CI = 2.43–13.29, $p < 0.001$; Females: Maybe, OR = 5.94, 95% CI = 2.19–16.11, $p = 0.013$; Yes, OR = 17.11, 95% CI = 9.24–31.09, $p < 0.001$). Additional variables that differed significantly for only males were *primary school education* (OR = 2.60, 95% CI = 1.31–5.16, $p = 0.006$), *unemployed* (OR = 6.53, 95% CI = 1.93–22.03, $p = 0.003$), and *psychosis* (OR = 4.27, 95% CI = 2.19–8.32, $p < 0.001$).

Multivariate logistic regression was performed to control for variables that were significantly associated with violence in the univariate analysis (Table 4). For females, *involuntarily admitted* and *history of violence* remained significant. Women with a positive prediction on the SRS-d were more than four and a half times more likely to become violent, even after controlling for *involuntarily admitted* and *history of violence*. For males, *involuntarily admitted* remained significant in the multivariate analysis. Men with a positive prediction on the SRS-d were more than two and a half times more likely to become violent, even after controlling for *involuntarily admitted*.

Predictive measures of SRS-d

AUC values were 0.60 (95% CI = 0.51–0.70, $p = 0.027$) for men and 0.71 (95% CI = 0.60–0.82, $p < 0.001$) for women. Predictive validity of the SRS-d during hospitalization is shown in Table 5. Sensitivity of the SRS-d was .40 for men and .55 for women; specificity was .80 for men and .88 for women. According to the LR, women with a positive prediction from the SRS-d were almost four and a half times more likely to become violent. For men, this value was just over twice as likely. PPV was .36 for men and .35 for women; NPV was .83 for men and .94 for women.

DISCUSSION

Main findings

Service users' self-assessment of risk for committing violence was significantly associated with subsequent violence. Service users who reported not knowing their own violence risk, or who refused to answer, were at increased risk of becoming violent while hospitalized. The SRS-d was significantly associated with violence in both men and women. Known risk factors—history of violence, involuntary admission and psychosis (men only)—were associated with violence, but the SRS-d remained an additional risk predictor. When controlling for both *involuntarily admitted* and *history of violence*, the OR for women was more than four and a half times higher, while for men it was more than two and a half times higher when controlling for *involuntarily admitted*.

SRS ratings and the context in which the data were collected

Only seven service users (1.4%) reported *moderate risk* or *high risk* of becoming violent during hospitalization. A significant percent reported *don't know* (8.6%) or *won't*

answer (10.2%). This pattern is similar to a previous study of SRS (Roaldset & Bjørkly 2010). The low proportion who report *moderate risk* or *high risk* of being violent may be explained by different factors. The acute phase of the mental illness, and the associated distress and crisis that this induces, will influence service users' thoughts, feelings and judgements. In this acute state, service users may be unaware of their own increased risk. The fact that SRS was recorded upon admission to the unit, which can be a challenging time and setting, may also have affected these data. Lack of trust between service users and practitioners may also have played a role. If service users expect an association between SRS and their hospital care, this could affect their answers. If individuals with increased self-reported risk for violence are, for example, fearful or worried about a longer hospital stay, or afraid that they will be treated with physical restraints, seclusion and coercive practices, this may also affect their answers.

Gender differences in the SRS-d and involuntary hospitalization

Interaction analyses showed significant differences in how men and woman assess their own risk of becoming violent. Women assessed their risk more accurately; those with a positive prediction on the SRS-d were over four and a half time more likely to be violent, after controlling for both being involuntarily admitted and history of violence. Men with a positive predictor based on the SRS-d were over two and a half times more likely to be violent, after controlling for being involuntarily admitted. The AUC value for women should be considered as fair.. To our knowledge, no previous study has investigated gender differences in service users' self-perception of violence risk. If men are generally more assertive and have higher self-esteem (Kling *et al.* 1999), while women score higher on anxiety and trust (Feingold 1994), women might self-report more accurately and honestly compared with men. Stress has also been reported to

increase men's risk taking, while it has the opposite effect on women (Lighthall *et al.* 2009). If men are more impulsive (Cross *et al.* 2011) and stressed, they may also be more likely to ignore self-risk.

Violence as a reason for admission, being referred involuntarily, and being involuntarily admitted were associated with violence during hospitalization. A significant proportion (36%) of those involuntarily referred by their external physician did not have this referral legally upheld by the psychiatrist and became voluntary admissions. The association between involuntary admission and violence is consistent with previous reviews (Cornaggia *et al.* 2011; Dack *et al.* 2013; Iozzino *et al.* 2015). Associations between involuntary referral and admission are usually complex. Evidence that a person is a danger to himself/herself or to others is a requirement for involuntary admission. The process of involuntary admission and detention on a locked ward can also amplify the service user's hostility and propensity to violence (Iozzino *et al.* 2015).

SRS-d combined with other risk instruments

The low sensitivity in these analyses suggests that the SRS-d is not suitable for screening, although the relatively high positive predictive values indicate that service users' positive risk predictions could be of clinical importance. The low sensitivity and high specificity is in contrast to traditional risk instruments. Adding SRS to traditional risk assessment instruments could therefore have some benefits, such as reducing the risk of false negatives. Whether prediction improves by adding service users' own perception of violence to structured risk assessment instruments, or risk prediction instruments, has yet to be investigated.

Importance of service user involvement and positive therapeutic relationships

Involving service users in their own violence risk assessments is a means of helping service users to understand why interventions are necessary (Kumar & Simpson 2005). Successful inclusion in the therapeutic process may contribute to empowerment, which can also have a positive impact on the development of therapeutic relationships (Hamann *et al.* 2003). Positive therapeutic relationships between service users and mental health professionals are essential for supporting the recovery processes, and fear of violence can undermine and erode such confidence (Ward 2013). Being open and non-judgemental about these issues is likely to help establish a relationship based on partnership between service users and practitioners (Kumar & Simpson 2005), and positive therapeutic relationships are helpful for preventing violence (Gilburt *et al.* 2008). Both the context in which the service users were asked about SRS (in the first interview) and the results call into question whether there was a lack of trust in these relationships. Service users' self-perception of violence may be linked directly to safety plans, in order to support the service users to avoid committing violence during their hospital stay.

Ethical implications

Performing risk assessments in general, without service users' full knowledge, requires certain ethical consideration. A more ethically nuanced approach to risk assessment might be to seek the service users' permission first, and to take into account their voice and narrative regarding their risk (Roychowdhury & Adshead 2014). Service user care is influenced by the outcomes of violence risk assessments. False positives become subject to unfair restrictions on freedom, while false negatives have significant implications for individual care and the well-being of others (Ryan *et al.* 2010). To

categorize mental health service users into low or high risk diverts resources from users categorized as low risk, even though a significant proportion do go on to commit harmful acts (Ryan *et al.* 2010). If future violence risk assessments in acute mental health settings are able to include service users' self-perceptions, doing so might emphasize empowerment and be a step towards treating service users as more equal partners.

Strengths and limitations

A prospective, naturalistic design increased the study's external validity. The sample size and low missingness are also strengths, although the sample size is also a limitation because it was insufficient to exclude the possibility of type 2 errors on the SRS-d. Data collection in a single hospital is a limitation. The study design may also have resulted in implementation of preventive measures. This may have resulted in 'true positive' cases becoming 'false positive' cases because of efficient risk management and thereby weakening overall predictive validity.

Under-reporting of violence has been identified in previous studies using the SOAS-R (Hvidhjelm *et al.* 2014, Tenneij *et al.* 2009). The use of additional sources to gather information from hospital records, and hospital protocols documenting coercive measures, may have decreased under-reporting in this study. Our use of multiple statistical methods to examine nuanced aspects of the results, in accordance with recent recommendations, is a study strength (Singh *et al.* 2015).

Transformation of the SRS into the SRS-d may be a study limitation because of the reduced SRS scale. If the non-significance of *low risk* is due to type 2 error, *low risk* should be considered to be a risk predictor instead of being treated as a reference. Still, analysis of the SRS-d provided significant results regarding the association between

service users' self-perception of violence and subsequent violence during hospitalization.

Conclusion and relevance for clinical practice

Results from this study indicate that service users' self-assessment of their violence risk may contribute to violence risk assessments in an acute mental health context, as a risk marker for violence during hospitalization. Findings also indicate gender differences and that the SRS-d might be a stronger predictor of violence among women. Further research is recommended to investigate the gender differences more thoroughly and to investigate how the SRS may be better designed (*e.g.*, as a dichotomous or ordinal variable). Future comparison of service users' self-prediction and experts' prediction, as well as use of the SRS in combination with traditional risk prediction instruments, will be relevant for clinical practice. Further research on the SRS in other settings and populations is also recommended, including investigation of whether there might be potential for practice changes in relation to women service users. The SRS is a first step towards service users' involvement in violence prediction and may give service users greater control, which would allow them to be meaningfully empowered.

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TABLE 1: *Comparison of violent and nonviolent in-patients*

Variable	Total sample (<i>N</i> = 512)			<i>P</i>
	All, <i>N</i> = 512 (%)	Violent, <i>n</i> = 81 (15.8%)	Nonviolent, <i>n</i> = 431 (84.2%)	
Male / female, <i>n</i> (%)	229 (44.7) / 283 (55.3)	50 (21.8) / 31 (11.0)	179 (78.2) / 252 (89.0)	0.001
Age, mean / median	40.8 / 37.5	40.7 / 35	40.8 / 38.0	0.957
Stay days mean / median	12.3 / 3.0	38.6 / 30	12.3 / 3	0.000
Violence as a caused for admission	53 (10.4)	19 (35.8)	34 (64.1)	0.000
Involuntarily referred †	216 (42.2)	64 (29.6)	152 (70.4)	0.000
Involuntarily admitted †	138 (27.0)	53 (38.4)	85 (61.6)	0.000
Mandatory aftercare	73 (14.3)	29 (39.7)	44 (60.3)	0.000
Not a living-in relationship	365 (72.7)	62 (17.0)	303 (83.0)	0.123
Only primary school	149 (32.2)	35 (23.5)	114 (76.5)	0.003
Unemployed (ex. age pensioners)	326 (68.9)	66 (20.2)	260 (79.8)	0.000
Main diagnoses according to ICD 10				
F10-19 substance abuse	84 (16.4)	19(22.6)	65(77.4)	0.062
F20-29 psychosis	126 (24.6)	33(26.2)	93(73.8)	0.000
F30-31 bipolar	56 (10.9)	11(19.6)	45(80.4)	0.406
F32-39 depression	59 (11.5)	4(6.8)	55(93.2)	0.043
F40-49 Neurotic stress-related and somatoform disorders	68 (13.2)	2(2.9)	66(97.1)	0.002

F60-69 personality disorders	49 (9.6)	5(10.2)	44(89.8)	0.257
Other or no diagnoses	70 (13.7)	7(10.0)	63(90.0)	0.151

Note: † According to the Norwegian Mental Health Care Act of 1999, an individual can be referred to in-patient mental health care either voluntarily or involuntarily.

For service users referred involuntarily, the institution must ensure during the first 24 hours that a psychiatrist or clinical psychologist affirms the legal basis for the admission. An involuntarily admitted patient can be retained either on observational status (up to 10 days) or under long-term detention.

TABLE 2: *Univariate logistic regression of differently transformed versions of the SRS*

	OR	(95% CI)	<i>P</i>
SRS (don't know and won't answer as missing)			
No risk	–	–	–
Low risk	1.90	(.96–3.77)	.066
Moderate risk	6.51	(1.05–40.52)	.045
High risk	0.00	(0.00)	.999
SRS ordinal			
No risk	–	–	–
Low risk	1.90	(.96–3.77)	.066
Moderate risk + High risk + don't know + won't answer	5.48	(3.16–9.50)	< .001
SRS dichotomous (SRS-d), low risk as reference (moderate as cut-off)			
	4.65	(2.79–7.74)	< .001
Alternative SRS dichotomous, low risk as risk factor (low risk as cut-off)			
	3.61	(2.20–5.92)	< .001

TABLE 3: *Distribution of the recorded episodes (threats and acts) based on SRS*

	Males, <i>n</i> = 229 (44.7%)				Females, <i>n</i> = 283 (55.3%)			
	Non-violent <i>n</i> = 179 (78.2%)	Violent threats <i>n</i> = 5 (2.2%)	Violent acts <i>n</i> = 45 (19.7%)	Any violence <i>n</i> = 50 (21.8%)	Non-violent <i>n</i> = 252 (89.0%)	Violent threats <i>n</i> = 3 (1.1%)	Violent acts <i>n</i> = 28 (9.9%)	Any violence <i>n</i> = 31 (11.0%)
No risk	115 (84.6%)	3 (2.2%)	18 (13.2%)	21 (15.4%)	178 (95.2%)	3 (1.6%)	6 (3.2%)	9 (4.8%)
Low risk	29 (76.3%)	2 (5.3%)	7 (18.4%)	9 (23.7%)	43 (89.6%)	0 (0.0%)	5 (10.4%)	5 (10.4%)
Moderate risk	2 (66.7%)	0 (0.0%)	1 (33.3%)	1 (33.3%)	1 (50.0%)	0 (0.0%)	1 (50.0%)	1 (50.0%)
High risk	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Don't know	19 (70.4%)	0 (0.0%)	8 (29.6%)	8 (29.6%)	11 (64.7%)	0 (0.0%)	6 (35.3%)	6 (35.3%)
Won't answer	13 (54.2%)	0 (0.0%)	11 (45.8%)	11 (45.8%)	18 (64.3%)	0 (0.0%)	10 (35.7%)	10 (35.7%)

TABLE 4: *Univariate and multivariate logistic regression predicting violence during hospitalization*

	Males (n = 229)						Females (n = 283)					
	Univariate			Multivariate			Univariate			Multivariate		
	OR	(95% CI)	P	OR	(95% CI)	P	OR	(95%CI)	P	OR	(95%CI)	P
SRS-d	2.74	(1.40–5.39)	.003	2.68	(1.25–5.72)	.011	8.66	(3.89–19.29)	< .001	4.68	(1.92–11.38)	.001
Stay days	1.05	(1.03–1.06)	< .001				1.03	(1.02–1.05)	< .001			
Violence as a caused for admission	2.25	(1.03–4.95)	.043				5.83	(2.10–16.21)	.001			
Referred involuntarily	9.79	(4.17–23.00)	< .001				4.28	(1.93–9.49)	< .001			
Admitted involuntarily	8.38	(4.15–16.89)	< .001	8.29	(4.06–16.95)	< .001	6.20	(2.84–13.55)	< .001	3.26	(1.35–7.83)	.008
Only primary school	2.60	(1.31–5.16)	.006				1.37	(.59–3.22)	.467			
Unemployed	6.53	(1.93–22.03)	.003				1.69	(.69–4.11)	.249			
Psychosis	4.27	(2.19–8.32)	< .001				1.14	(.48–2.68)	.767			
History of violence												
Maybe/ moderate	3.30	(1.43–7.62)	.005				5.94	(2.19–16.11)	< .001	3.77	(1.32–10.79)	.013
Yes	5.68	(2.43–13.29)	< .001				17.11	(5.66–51.77)	< .001	9.24	(2.75–31.09)	< .001

Note: SRS-d = Self-report Risk Scale; ‘Age’ and ‘Neurotic stress-related and somatoform disorders’ were tested with non-significant results.

TABLE 5: *Predictive characteristics of SRS-d*

	Sensitivity	Specificity	PPV	NPV	NNA	LR+	LR-
Males	.40	.80	.36	.83	2.75	2.05	.75
Females	.55	.88	.35	.94	2.82	4.46	.51