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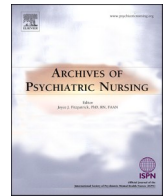
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# Influence of nursing staff characteristics on seclusion in acute mental health care—A prospective two-year follow-up study

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## ABSTRACT

**Introduction:** Seclusion still occurs on mental health wards, despite absence of therapeutic efficacy and high risks of adverse patient effects. Literature on the effect of nursing teams, and the role of psychological characteristics in particular, on frequency of seclusion is scarce.

**Aim:** To explore the influence of demographic, professional or psychological, nursing team-level, and shift characteristics on the frequency of use of seclusion.

**Methods:** Prospective two-year follow-up study.

**Results:** We found that the probability of seclusion was lower when nursing teams with at least 75% males were on duty, compared to female only teams, odds ratio (OR = 0.283; 95% CrI 0.046–0.811). We observed a trend indicating that teams scoring higher on the openness personality dimension secluded less, (OR = 0.636; 95% CrI 0.292–1.156).

**Discussion:** Higher proportions of male nurses in teams on duty were associated with lower likelihood of seclusion. We found an indication that teams with a higher mean openness personality trait tended to seclude less. These findings, if causal, could serve as an incentive to reflect on staff mix if circumstances demand better prevention of seclusion.

## Introduction

Coercive measures, such as seclusion and restraint, are still common practice on mental health wards in some countries, despite the absence of evidence for their therapeutic efficacy (Chieze, Hurst, Kaiser, & Sentissi, 2019; Sailas & Fenton, 2000). Coercive measures, while solving an acute problem with safety hazards in the short term, imply a violation of patients' autonomy, damage the therapeutic relationship and will often reduce the possibilities of future shared decision-making (Hem, Gjerberg, Husum, & Pedersen, 2018; Hofer, Habermeyer, Mokros, Lau, & Gairing, 2015). Furthermore, coercive measures can have other negative consequences, such as posttraumatic stress, physical injury and even death (Chieze et al., 2019; Frueh et al., 2005; Kersting, Hirsch, & Steinert, 2019). Therefore, the application of coercive measures in

mental health care has been under fierce debate over the last few decades (Fisher, 1994; Laiho et al., 2013). Clinicians often perceive coercive measures as necessary when dealing with situations deemed dangerous, although they acknowledge the well-known negative consequences (Bowers et al., 2010; Cullen et al., 2018; Gerace & Muir-Cochrane, 2019; Keski-Valkama et al., 2010; Laukkanen, Vehvilainen-Julkunen, Louheranta, & Kuosmanen, 2019). The type of coercive measure used on mental health wards (e.g. seclusion, physical restraint, involuntary medication) and frequency of use vary substantially between countries (Bak & Aggernaes, 2012; Raboch et al., 2010). The Netherlands is one of the countries that use seclusion as intervention of last resort (Bak & Aggernaes, 2012; Veltkamp et al., 2008). Seclusion is the containment of patients in a room with minimal resources and designed to prevent physical injury (Van Der Merwe, Muir-Cochrane,

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Jones, Tziggili, & Bowers, 2013). The use of seclusion in the Netherlands declined from 11.8% in 2008 to 7.1% of patients admitted in 2013, likely because of a nation-wide seclusion reduction program (Noor-thoorn et al., 2016).

The probability of seclusion seems higher in male patients, those of younger age and admitted involuntarily (Beghi, Peroni, Gabola, Rossetti, & Cornaggia, 2013; Bullock, McKenna, Kelly, Furness, & Tacey, 2014; Cullen et al., 2018; Dumais, Larue, Drapeau, Menard, & Giguere Allard, 2011; Flammer, Steinert, Eisele, Bergk, & Uhlmann, 2013; Georgieva, Vesselinov, & Mulder, 2012; Happell & Koehn, 2010; Lay, Nordt, & Rossler, 2011; Miodownik et al., 2019; Thomsen et al., 2017).

Compared to research on patient characteristics, research on the influence of nursing staff characteristics is relatively scarce. Nurses seem to influence the decision to seclude patients (Laiho et al., 2013). Studies on demographic characteristics of nurses, such as gender and age, or professional characteristics, such as education and work experience, show inconclusive results (Bowers et al., 2010; De Benedictis et al., 2011; de Cangas, 1993; Doedens et al., 2017; Janssen, Noor-thoorn, Linge, & Lendemeijer, 2007; Miodownik et al., 2019; Vollema, Hollants, Severs, & Hondius, 2012).

Even sparser is research on the possible influence of nurses' psychological characteristics. Pawlowski and Baranowski (2018) reported that nurses' 'creative' personality, assessed with Gough's Adjective Check List (Gough, 1960) was associated with less use of seclusion. Yang, Hargreaves, and Bostrom (2014) found that nurses with a high score on an empathy scale secluded less than those with low scores did. Vollema et al. (2012) found that nurses' feeling of safety decreased the likelihood of seclusion. As far as we are aware, there have been no studies on the association between seclusion and nurses' personality traits assessed with a common model of personality, such as the Five Factor Model (Digman, 1990). Finally, shift characteristics, such as patient-staff ratio and shift, had extensive attention in scientific literature, but showed equivocal results (Bowers, 2009; De Benedictis et al., 2011; Husum, Bjorngaard, Finset, & Ruud, 2010; Janssen et al., 2007; Morrison & Lehane, 1995; O'Malley, Frampton, Wijnveld, & Porter, 2007; Yang et al., 2014).

In sum, there is a lack of evidence concerning the influence of nursing team characteristics (demographic, professional or psychological) and shift characteristics on the use of seclusion in acute mental health care.

The aim of our study was to explore the influence of nursing team characteristics (demographic, professional or psychological) and shift characteristics on the occurrence of seclusion on an acute mental health ward, while controlling for patient characteristics.

## Materials and methods

### Design

We conducted a prospective two-year follow-up study on a closed mental health admission ward for adult patients in a university hospital in Amsterdam, the Netherlands.

### Participants

All patients who resided and nurses who worked on the study ward between 1 January 2013 and 31 December 2014 were included in the study, which overlapped with our pilot study (Doedens et al., 2017). The study ward has twelve beds and is equipped with two seclusion rooms. The ward admits both men and women. Most patients had a civil involuntary admission order according to the Dutch Mental Health Act. The nurses of the ward knew that the study focused on factors influencing the use of seclusion, but were unaware of the study variables to diminish the risk of performance bias. Staff members were mostly registered nurses with bachelors (European Qualifications Framework [EQF] 6) or vocational (EQF 4) degrees and scheduled in a ratio of one

registered nurse to every three patients during day (7:30 AM–4:00 PM) and evening shifts (2:30 PM–11:00 PM) and one registered nurse to six patients during night shifts (22:45 PM–7.45 AM).

### Data collection

Nurses provided demographic and professional characteristics on their entry into the study. To assess psychological characteristics, nurses were asked to fill out the Neuroticism Extraversion Openness Five-Factor Inventory 3 (NEO-FFI-3) (McCrae, Costa, & Martin, 2005). Nurses participated voluntarily and we coded their data before analyses to ensure their privacy. Furthermore, we gathered data on shift characteristics, such as type of shift and patient-staff ratio. We gathered shift data three times per day (day, evening and night shift) and used nursing reports to capture all aggressive incidents and coercive measures. Data collection was identical for all patients and consisted of demographic and clinical characteristics.

### Nursing team characteristics

We gathered characteristics of individual nurses at their entry into the study. We assessed 1) demographic characteristics: gender (male/female); age (years); BMI; physical stature; 2) professional characteristics: registered nurse (y/n); educational level (bachelor vs non-bachelor); level of employment (>32–40 h per week vs <32 h per week); cumulative employment as a nurse (years); cumulative experience in mental health care (years); and 3) online questionnaire using LimeSurvey® to assess psychological characteristics and general feeling of safety at work. We used mean scores of the individual nurses present in a shift team to assess team characteristics in the statistical model.

Three independent assessors scored the subjective variable *physical stature* on a five-point scale (very small, small, average, large and very large); the mean score was used in the analysis. The interrater reliability of this estimate was moderate, Fleiss  $\kappa = 0.43$  (Fleiss, 1971; Landis & Koch, 1977).

Concerning psychological characteristics, we assessed Five Factor Model personality traits online with the NEO-FFI-3 (McCrae et al., 2005), a self-report questionnaire consisting of sixty items scored on five-point Likert-scales. Items result in five basic personality dimension scores, namely: neuroticism, extraversion, openness, agreeableness and conscientiousness. The NEO-FFI-3 has been designed for clinical and non-clinical personality testing and has adequate to good psychometric properties (McCrae et al., 2005). Our study considered general feeling of safety as a trait of an individual nurse. After an extensive literature search, we found no instrument to measure the general feeling of safety of nurses. Nurses scored four items about their general feeling of safety in their organization, their ward, with their colleagues and with their manager on five-point Likert scales (strongly disagree, disagree, neutral, agree, strongly agree), which were combined into a total score.

### Shift characteristics

Assessment of shift characteristics (date, shift (day, evening, night), number of nurses; number of registered nurses; number of student nurses; number of patients) and outcome measurements (seclusion) were performed three times each day (day, evening or night shift). The outcome (seclusion) was explicit, dichotomous and registered according to the Argus-system, a national coercive measurement registry (Janssen et al., 2011).

### Patient characteristics

Data on patient characteristics were gathered from the electronic health record and consisted of gender (male/female), age (years), length of admission (days), involuntary nature of the admission (y/n), diagnosis according to the Diagnostic Statistical Manual IV-TR (psychotic disorder, bipolar disorder or other disorder) (DSM-IV-TR) (American Psychiatric Association, 2000), secondary diagnosis of substance abuse, personality disorder and/or intellectual impairment, prior seclusion (y/

n), whether the admission was preceded by an aggressive event (y/n), whether it was their first admission in mental health care (y/n); Global Assessment of Functioning [GAF] score; Health of Nation Outcome Score [HoNOS]. Higher score on GAF indicates better functioning (Jones, Thornicroft, Coffey, & Dunn, 1995) and lower score on HoNOS indicates better functioning or less severe symptoms (Wing et al., 1998).

**Ethical considerations**

The patient population of a closed admission ward is vulnerable and careful attention for their ability to give informed consent is required (Helmchen, 2010; Spencer, Gergel, Hotopf, & Owen, 2018; Storosum, van Zwieten, & de Haan, 2002). The Medical Ethics Review Committee of our institution reviewed our study protocol. The Dutch Medical Research Involving Human Subject Act (WMO) is based on international quality standards for medical research, the Declaration of Helsinki and Good Clinical Practice in particular. This act considers formal approval by a medical ethics review committee mandatory if it concerns medical research and involves participants who are subjected to procedures or are required to follow rules of behavior (WMO, 1998). The committee opined that our study solely observed routine clinical practice and neither applied interventions nor subjected patients to additional behavioral rules. Thereby, our study was deemed to have no impact on the treatment, cause no risk concerning damage or nuisance nor was it deemed to negatively affect patients' wellbeing. Thereby, the committee decided that formal ethics approval was not needed according to Dutch law.

To protect patients' privacy, clinical staff members collected data from the electronic patient record and recoded and anonymized the data before analysis. Because of the importance of improving the knowledge on factors influencing the use of seclusion and absence of impact on patients' privacy or wellbeing due to the anonymization of data, we were allowed not to seek active consent to re-use patients data for this study, according to the exception grounds of article 24 of the Dutch GDPR Implementation Act (GDPR-Implementation, 2016). Patients had the right to object to the re-use of their treatment data for scientific research and the pertinent procedure was explained on our institution's website. None of the patients objected to use of anonymized treatment data.

Staff members were asked to participate on a voluntary basis and give permission to the use of their data in the analysis. Staff members were free to refuse participation and the researchers did not communicate the (non)participation of a staff member to other staff members or management. We used data recorded by staff members for treatment purposes, such as the daily shift reports by nurses. The researchers had no hierarchical relationship with the staff members.

**Analysis**

We used STATA SE, version 15 and MLwiN, version 3.02 to analyze the data. We used frequencies to report nominal and ordinal variables and means and standard deviations to report continuous variables. We used a median and interquartile range (IQR) for the reporting of highly skewed variables. We used a logistic cross-classified random-effects model to estimate the associations of various independent variables with seclusion. We report odds ratios and their corresponding 95% credible intervals (95% CrI).

Cross-classification signifies that our data do not have a simple hierarchical structure in which each nursing shift team consists of unique individual nurses and each patient receives care from a single nurse during the entire admission. In clinical reality, the 98 different nurses, over the 2 years of follow-up, formed 1299 different team compositions during 2190 shifts (3 shifts during 730 days). Most patients encountered many teams and many different nurses over their admission(s). Statistically, the variances in cross-classified data are not identical to strictly hierarchical data; the data is nested in two different clusters on the same level, namely 1) nesting of patients within nursing shift teams; and 2)

nesting of nursing shift teams within patients.

We used the cross-classified option in STATA's runmlwin command (Fielding & Goldstein, 2006; Leckie & Charlton, 2013). We describe the exact regression commands in Online Supplement 1. Briefly, we obtained the starting values for the Markov Chain Monte Carlo analyses using penalized quasi-likelihood estimates (PQL2) as explained in the user manual to runmlwin. The burn-in value was 2000 (the first 2000 MCMC chains were not used for estimation) and the number of chains run was 20,000. We included variables in the model based on earlier research or variables of our interest. We removed variables if their p-value was above 0.20 in explorative analysis (Hosmer & Lemeshow, 2000). We started with a basic model with patient characteristics and, subsequently, extended the model a set of with nursing team and shift characteristics. The variables describing the nursing team characteristics were constructed as the means of the individual nurses' values. For example, team age reflects the mean age of the nurses in the shift and team gender reflects the proportion of male nurses in the shift team. To improve the stability of the model, we divided these numerical variables into three (cut-offs the 17th and 83rd centile values) or four (cut-offs the 25th, 50th and 75th centile values) categories in order to retain good contrast between the lowest and highest categories.

**Results**

*Descriptive data*

Table 1 contains a summary of the patients' baseline characteristics. We included 224 unique patients in 310 admissions, of whom 133 were male (59.4%) and with an age at index admission ranging from 18 to 80 years. Due to the complexity of the statistical model, we decided not to model the fact that some patients (n = 57) were admitted more than once. The number of patients that were present at the ward in a single shift ranged from five to 13. The majority of the admitted patients suffered from psychotic disorders (67.4%) and substance abuse as a secondary diagnosis was common (41.1%). The majority of the patients

**Table 1**  
Baseline characteristics at index admission of patients (n = 224).

Characteristic	Secluded group (n = 46)	Non-secluded group (n = 178)	Group difference (p-value)
Male, n (%)	25 (54.3)	108 (60.7)	.501 <sup>a</sup>
Age (years), mean (SD)	37.1 (13.4)	39.3 (13.6)	.316 <sup>b</sup>
Length of admission (days), median (IQR)	25 (12–38)	12 (3–21)	<.001 <sup>c</sup>
Involuntary admission, n (%)	36 (78.3)	114 (64.0)	.079 <sup>a</sup>
Primary diagnosis, n (%)			.655 <sup>d</sup>
Psychotic disorder	32 (69.6)	119 (66.9)	
Bipolar disorder	7 (15.2)	22 (12.4)	
Other disorder	7 (15.2)	37 (20.8)	
Secondary diagnosis, n (%)			
Substance abuse	20 (43.5)	72 (40.4)	.739 <sup>a</sup>
Intellectual impairment	3 (6.5)	12 (6.7)	1.000 <sup>a</sup>
Personality disorder	6 (13.0)	19 (10.7)	.607 <sup>a</sup>
Aggressive incident	18 (39.1)	52 (29.2)	.214 <sup>a</sup>
reason for admission, n (%)			
Seclusion in patient's history, n (%)	15 (32.6)	31 (17.4)	.039 <sup>a</sup>
First admission in mental health care, n (%)	12 (26.1)	51 (28.7)	.855 <sup>a</sup>

SD = Standard deviation; IQR = Interquartile range.

<sup>a</sup> Fisher's Exact test, two-sided.

<sup>b</sup> Student's t-test, independent samples.

<sup>c</sup> Mann-Whitney U test, independent samples.

<sup>d</sup> Chi square test, two-sided (df = 2).

(67%) was involuntarily admitted under the Dutch Mental Health Act to avoid harm to themselves, others or objects. During the study period, we observed 112 seclusions in 46 patients. Twenty-eight patients were secluded once; 18 patients were secluded twice or more. The number of seclusions per patient ranged from one to 17. On average, patients secluded during follow up had undergone more prior seclusions and longer admissions than patients from the non-secluded group had.

Table 2 contains a summary of the nursing staff baseline characteristics and the amount of missing data per variable. The nursing staff consisted of 98 nurses during the study period. Thirty-eight nurses were male (38.8%) and their age ranged from 18 to 61 years. The number of registered nurses per shift ranged from two to seven. The ward had high numbers of temporary staff (56.1%) and (supernumerary) student nurses (17.4%). However, registered nurses that were part of the permanent nursing team of the ward worked 81.6% of the shifts worked during the study period.

Table 3 contains a summary of the results of the personality tests and the items on general feeling of safety. The NEO-FFI-3 personality traits neuroticism, extraversion and conscientiousness and the general feeling of safety had acceptable internal consistency, openness and agreeableness had lower internal consistency. Thirty-six nurses refused participation or did not respond to the request of the researchers to participate with the psychological questionnaire. These nurses were responsible for 19.1% of the shifts worked during the study period.

**Main results**

We present the results from our final model in Table 4. We removed nurses' age before the final analysis, because of collinearity with nurses' experience in mental health care. We excluded GAF and HoNOS data from our final model due to poor quality of the data (high proportion of missing data and the available data was considered inconsistent with the patients' condition). We removed ethnicity, Dutch citizenship, seclusion in patient history, admission after aggression, first admission in mental health care, admission during weekends (patient characteristics), BMI, work experience, educational level, years of employment at the current hospital, fulltime nurse (nursing team characteristics) and patient-staff ratio (shift characteristics) from the analysis, because the p-values for their odds ratios were larger than 0.20.

**Nursing team characteristics**

We found that teams with more male nurses (50–75% males and >75% males) were associated with less seclusion than teams with only

**Table 2**  
Baseline characteristics of nursing staff (n = 98).

Characteristic		Missing data, n
Male, n	38	0
Age (years), mean (SD)	36.3 (13.5)	6
BMI, mean (SD)	23.4 (3.0)	7
Stature, n		19
Very small	2	
Small	14	
Average	44	
Large	18	
Very large	1	
Registered nurse, n	76	0
Bachelor of nursing, n	52	3
Years of employment, median (IQR)	2.0 (0–5.3)	3
Years of experience in psychiatry, median (IQR)	4.0 (0–17)	4
Permanent staff, n	26	0
Full time staff, n	59	0

SD = Standard deviation; BMI = Body Mass Index; IQR = Interquartile range. Stature is a subjective variable, scored independently by three raters on a five-point scale (very small, smaller than average, average, larger than average and very large). The interrater reliability of this estimate was moderate, Fleiss  $\kappa$  = 0.43. Note, since 98 is close to 100, numbers are almost equal to percentages and the latter are not reported.

**Table 3**  
Psychological characteristics of nursing staff at baseline.

	Sample, mean (SD)	Cronbach's $\alpha$	Reference group, mean (SD)
NEO-FFI-3			
Neuroticism	29.5 (6.1)	0.782	34.0 (7.5)
Extraversion	43.3 (6.1)	0.812	39.3 (5.8)
Openness	42.5 (5.2)	0.688	38.9 (5.7)
Agreeableness	45.2 (4.6)	0.617	41.1 (5.6)
Conscientiousness	44.7 (5.3)	0.765	43.4 (5.7)
General feeling of safety	15.4 (2.4)	0.899	

NEO-FFI-3 = Neuroticism Extraversion Openness Five Factor Inventory 3d version; SD = Standard deviation.

Reference group based on a representative sample (n = 1715) from the Dutch population (Hoekstra & De Fruyt, 2014). Cronbach's  $\alpha$  is a measure for internal consistency. Sample size n = 62

female nurses, respectively OR (95%CrI) = 0.616 (0.319–1.062) and OR (95%CrI) = 0.283 (0.046–0.811). The overall difference between the three categories and the reference group was statistically significant (p = .021). Other personal and professional characteristics also showed small associations with seclusion but the precision with which we could measure these was more limited and therefore these estimates were also compatible with the absence of an effect. We analyzed team means of the Five Factor Model personality traits and general feeling of safety in our final model. When looking at the magnitude and direction of the odds ratios, we viewed a possible association of lower mean scores of openness and seclusion, (OR (95%CrI) = 0.697 (0.404–1.113), p = .091 for overall difference with reference group).

**Shift characteristics**

Each shift had a team consisting of two to seven nurses. Night shifts had usually two nurses. Night shifts were associated with less seclusion than day shifts, OR (95%CrI) = 0.411 (0.175–0.837).

**Patient characteristics**

Younger patients' age, bipolar disorder, diagnosis other than psychotic disorder, psychiatric comorbidity (personality disorder and intellectual impairment) and involuntary admission were associated with higher probability of seclusion. Comorbid substance abuse was associated with less seclusion.

**Discussion**

This study aimed to explore the effects of nursing team characteristics (demographic, professional or psychological), shift characteristics on the use of seclusion on acute mental health wards, while controlling for patient characteristics. We found that having more male nurses in a team was associated with fewer seclusions. In addition, higher team score on the personality trait 'openness' tended to be associated with fewer seclusions.

There is previous evidence concurring with our finding that more male nurses in teams is associated with less seclusion (Janssen et al., 2007), although other authors reported no association or an inverse association (Bowers, 2009; Bowers et al., 2010; De Benedictis et al., 2011; de Cangas, 1993; Morrison & Lehane, 1995; Vollema et al., 2012). However, we observe some overlap in the confidence intervals of studies that report associations between male nurses' proportional representation and seclusion. Apart from gender, we found no demographic or professional nurse-related variables associated with seclusion. Other authors also investigated demographic and professional characteristics, such as age (Bowers & Crowder, 2012; De Benedictis et al., 2011), educational level (Bowers et al., 2010; Khalil, Al Ghamdi, & Al Malki, 2017; Miodownik et al., 2019) and working experience (De Benedictis et al., 2011; Janssen et al., 2007; Khalil et al., 2017; O'Malley et al.,

**Table 4**  
Results of cross-classified multilevel regression model predicting the occurrence of seclusion.

	Odds ratio	95% CrI	p	Standard error
<b>Nursing team characteristics</b>				
Gender				
Only female nurses	Reference		0.021	
Mixed team, majority females	0.801	0.468–1.290	0.338	0.211
Mixed team, 50–75% males	0.616	0.319–1.062	0.078	0.192
>75% male nurses	0.283	0.046–0.811	0.014	0.201
Stature (quartiles)				
1	Reference		0.615	
2	0.607	0.277–1.189	0.120	0.235
3	0.940	0.500–1.619	0.698	0.297
4	1.351	0.699–2.388	0.418	0.443
Team with only registered nurses	0.906	0.487–1.151	0.628	0.266
<b>Nursing team psychological characteristics</b>				
Neuroticism <sup>a</sup>				
1	Reference		0.220	
2	1.914	0.987–3.444	0.064	0.654
3	1.414	0.556–2.961	0.514	0.634
Extraversion <sup>a</sup>				
1	Reference		0.517	
2	1.084	0.590–1.840	0.916	0.322
3	1.588	0.630–3.228	0.358	0.677
Openness <sup>a</sup>				
1	Reference		0.091	
2	0.697	0.404–1.113	0.134	0.186
3	0.636	0.292–1.156	0.144	0.224
Conscientiousness <sup>a</sup>				
1	Reference		0.451	
2	1.197	0.677–2.007	0.642	0.356
3	1.501	0.686–2.989	0.368	0.586
Agreeableness <sup>a</sup>				
1	Reference		0.551	
2	1.110	0.660–1.806	0.792	0.299
3	1.403	0.636–2.659	0.422	0.516
General feeling of safety <sup>a</sup>				
1	Reference		0.331	
2	0.890	0.519–1.471	0.556	0.248
3	0.717	0.346–1.350	0.284	0.262
<b>Shift characteristics</b>				
Day shift				
Evening shift	1.263	0.751–2.027	0.430	0.333
Night shift	0.411	0.175–0.837	<0.001	0.166
<b>Patient characteristics</b>				
Male				
Age <sup>b</sup>	0.801	0.515–1.213	0.266	0.177
Primary diagnosis	0.803	0.733–0.880	<0.001	0.037
Psychotic disorder				
Bipolar disorder	2.235	1.289–3.554	0.008	0.586
Other diagnosis	4.655	2.490–7.664	<0.001	1.362
Comorbidity				
Substance abuse	0.426	0.260–0.647	<0.001	0.100
Personality disorder	3.320	1.913–5.031	<0.001	0.824
Intellectual impairment	2.327	1.110–4.221	0.016	0.729
Involuntary admission	3.021	1.541–5.571	<0.001	1.081

CrI = Credible interval; SD = Standard deviation.  
To obtain good contrasts in the explanatory variables, we avoided using dichotomies, and used at least three categories for each variable. The nurses' gender is analyzed in four categories, namely teams with only female nurses, mixed teams with more female nurses, mixed teams with 50 to 75% male nurses and teams with more than 75% male nurses. Teams with only female nurses are the reference category. The variable nurses' stature is analyzed in four about equally sized groups (quartiles) of the mean team stature, using the quartile with the lowest mean stature as reference category. The six nursing team personality characteristics are divided into three categories with cut-offs at the 17th and 83 centiles of the distribution (1/6th 2/3rd, and 1/6th) using the lowest categories as the reference categories. The code of the logistic cross-classified multilevel model is explained in Online Supplement 1.

<sup>a</sup> Cut-offs at centile 17 and 83.

<sup>b</sup> Effect size of patient's age is reported in age differences (steps) of 5 years.

2007). Despite of some overlap in the confidence intervals, the majority of these results in these studies varied substantially, on both precision and direction of the effect.

Concerning psychological factors, internal consistencies were congruent with several samples within the Dutch population (Hoekstra & De Fruyt, 2014). The lower alpha of openness and agreeableness is consistent with findings in other populations, including the general population (Hoekstra & De Fruyt, 2014). Included nurses differed slightly from the reference categories in the general Dutch population (Hoekstra & De Fruyt, 2014). Visual inspection suggested that average team scores of our participants are higher on extraversion, agreeableness and openness and lower on neuroticism. To our knowledge, there is no evidence that compared personality traits of nurses that work on closed mental health admission wards with general populations. Comparisons between general populations with general nurses and nurses from psychiatric emergency services might indicate differences in neuroticism (lower than reference population) and agreeableness (higher than reference population) (Eley, Eley, Bertello, & Rogers-Clark, 2012; Penterman, Smeets, van der Staak, & Nijman, 2011). We found some evidence of less seclusion with teams scoring higher on the personality trait of openness. Earlier studies on nurses' personality in relation to seclusion used measurement scales other than the Big Five personality traits, which makes the comparison with our finding challenging (Pawlowski & Baranowski, 2018; Yang et al., 2014). Since, the openness personality trait is associated with creativity (McCrae et al., 2005) our findings can be seen as in line with the finding of Pawlowski and Baranowski (2018) that nurses with creative personalities seem to seclude less. People who score high on openness are generally curious, open to their own emotions and those of others and open to new experiences (McCrae et al., 2005). Absence of an open, supportive patient-staff interaction has been described in the literature as a risk factor for patient-initiated violence in mental healthcare (Salzmann-Erikson & Yifter, 2019). Open and supportive communication between nurses and patients and between nurses themselves is associated with improved patient safety, quality of care and patient satisfaction (Efkemann et al., 2019; Kuosmanen, Tiihonen, Repo-Tiihonen, Eronen, & Turunen, 2017; Kurjenluoma et al., 2017). Openness is a helpful characteristic in achieving a ward atmosphere to accomplish high quality of care (Brunt & Rask, 2007). Subsequently, positive ward atmosphere is associated with less restrictive measures (Kurjenluoma et al., 2017). Thereby, an open personality of nurses might contribute to a supportive attitude towards patients and thereby, be helpful in preventing seclusions.

Several patient characteristics were associated with seclusion: young age, bipolar disorder and other diagnosis compared to psychotic disorder, involuntary admission and psychiatric comorbidity. Frequently mentioned (and plausible) patient risk factors for seclusion are young age and male gender, but the existing literature show equivocal results. We observed no significant association between the patient's gender and seclusion, which is in line with several earlier findings (Bullock et al., 2014; Dumais et al., 2011; Flammer et al., 2013; Georgieva et al., 2012; Happell & Koehn, 2010), but in contrast to others (Beghi et al., 2013; Cullen et al., 2018; Lay et al., 2011; Thomsen et al., 2017). Our finding that young age is associated with more seclusion is also in line with earlier studies (Beghi et al., 2013; Cullen et al., 2018; Dumais et al., 2011; Happell & Koehn, 2010; Lay et al., 2011; Thomsen et al., 2017), but contradictory to several others (Flammer et al., 2013; Georgieva et al., 2012; Miodownik et al., 2019). In general, patients with psychotic disorders are most frequently associated with seclusion, which is contrary to our findings (Beghi et al., 2013). However, Cullen et al. (2018) also report a strong association between bipolar disorder and seclusion. Small sample sizes could explain some of the equivocalness of current literature, but it also may reflect the context-dependent nature of these findings. Involuntary admission is the only factor that is strongly

associated with seclusion in almost all studies (Beghi et al., 2013; Cullen et al., 2018; Dumais et al., 2011; Happell & Koehn, 2010; Lay et al., 2011; Thomsen et al., 2017).

As far as we know, the current study is the first to address nursing staffs Big Five personality traits and feelings of safety in a prospective follow-up design with a statistical analysis that takes into account the cross-classified data structure. This study also has several limitations. First, we conducted this study in one acute mental health admission ward in the Netherlands only, possibly limiting the generalizability to other settings. Since we used a naturalistic follow-up design, we need to be very cautious inferring causality because of residual confounding. We tried to minimize the influence of alternative explanations (confounding) by adding a comprehensive set of covariates, however residual confounding is still possible, for example by interaction between nurses in a shift. Another potential cause of residual confounding was the psychiatric state of the patient. We measured the psychiatric state of the patients with GAF and HoNOS, but the quality of the data was poor due to inadequate use of the scales by clinical staff and many missing data. Because of the poor data quality, we decided not to include these variables in the final analysis. The stature of the nurse was a subjective variable with moderate to low interrater reliability. Due to several seclusion reduction programs, the frequency of seclusion events is low and therefore, the power of this study is limited. The complexity of our statistical model in combination with modest numbers of seclusions precluded us from including interaction terms. The effects we found on nurses' psychological variables were weak to moderate and these findings were not statistically significant at a 5% level and should be interpreted with caution.

Nevertheless, our findings on psychological characteristics serve as an incentive to further explore the subject in research and clinical practice. To our knowledge, no validated scale exists to measure feelings of safety of nursing staff in the context of mental health wards with the risk of violence. Measurement of the feeling of safety of staff often focuses on the perceived interactional safety in teams, such as the concept of psychological safety (Edmondson, 1999). Future research could explore this concept further and develop measurement scales to measure this construct in a rigorous manner in order to attempt replication of these findings. The final limitation is the analysis of the variables at the team level. Because of this, we can draw conclusions on the influence of team variables (e.g. high proportion of male nurses), but we cannot draw conclusions on the specific influence of individual nurses on the decision to use seclusion.

## Conclusion

We conclude that more male nurses on shift seem to lower the probability of the decision to seclude patients and that there is some indication that the extent to which nursing teams have more open personality characteristics may influence the decision whether to seclude patients. We found no other associations between psychological factors and seclusion. The absence of effect, if true, might be an indication that, to prevent seclusion, psychological characteristics of nurses are no valid selection criteria for nursing teams to prevent seclusion.

Although causality cannot be proven, these findings could serve as an incentive to look beyond patient characteristics and reflect on staff mix if prevention of seclusion is an important aim. Staff members and policy makers on acute psychiatric wards could include information on nurses' personal and psychological traits in decisions around team composition. The care for psychiatric inpatients might benefit from nurses with open personalities. Our findings highlight that nursing team composition might influence the use of seclusion and might serve as an incentive to address the issue of team composition in order to diminish its use. Replication of current findings is needed. In addition, we consider it important to evaluate other factors influencing the psychological well-being of nurses, such as traumatic experiences with aggressive behavior, shortage of nursing staff and team culture. Finally, the influence of

openness of teams on decision-making concerning the decision to use seclusion is a relevant subject for future research. Thereby, these findings might contribute to the ambition to abolish or severely minimize the use of seclusion in acute mental health care.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.apnu.2021.07.003>.

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## Ethics approval statement

The Medical Ethics Review Committee of the Academic Medical Center reviewed our protocol and declared that our study observed routine practice and no interventions or behavioral rules were introduced for patients or nurses. Therefore, formal approval of the Medical Ethics Review Committee was not required according to the Dutch Medical Research Involving Human Subject Act.

## CRediT authorship contribution statement

Criteria	Author initials
Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;	PD, GtR, CL, LdH
Involved in drafting the manuscript or revising it critically for important intellectual content;	PD, GtR, JV, CL, LLB, LdH
Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content;	PD, GtR, JV, CL, LLB, LdH
Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.	PD, GtR, JV, CL, LLB, LdH

## Declaration of competing interest

No conflict of interest has been declared by the authors.

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