The disruption of a patient

A longitudinal study about the association between global functioning and disruptive behaviour of patients in the acute psychiatric care.

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ABSTRACT

Coercion is a frequently applied method in the acute psychiatric care to manage disruptive behaviour. To improve the health, safety and wellbeing of both patients and staff, coercion need to be reduced to a minimum by the prevention of disruptive behaviour. Disruptive behaviour arises from different patient related risk factors. The internal signs of impending disruption of a patient has to be understood. For this, the global functioning of a patient could be helpful. The global functioning of a patients is a multidimensional look on a patients functioning. It captures psychological symptoms, social skills, symptoms of violence and activities of daily living of a patient. A deeper understanding of a patient's global functioning within the acute psychiatric care can be helpful to predict disruptive behaviour at an early stage and thereby prevent this behaviour from being aggravated. While there are previous studies investigating the association of global functioning and disruptive behaviour resulting in seclusion, there is a dearth of research investigating the association between global functioning and disruptive behaviour. The aim of the present study was to investigate this association over time. To intervene at an early stage, we wanted to know if and which subscales of global functioning had an association with disruptive behaviour over time. Also, the global functioning could be a better predictor of disruptive behaviour in some subgroups of patients. In longitudinal retrospective study we used the daily measurements with the Brøset Violence Checklist (BVC) and the Kennedy Axis V (K-As) of each patient admitted over a period of three years in two different acute psychiatric care units. The data of the first 28 days of hospitalisation of 483 patients were used for a series of linear mixed models for repeated measurements. Patient-related static factors such as sex, age, type of unit and type of diagnosis were investigated as moderators. In the cross-sectional analyses, global functioning was moderately negatively associated with disruptive behaviour over time. In the multivariate cross-sectional analysis the subscales psychological functioning, social functioning and violence (to self/others) showed an independent but weak negative association with disruptive behaviour over time. Patients at an age < 35 or diagnosed with a psychotic disorder appeared to have a stronger association between global functioning and disruptive behaviour. Patients diagnosed with a neurobiological development disorder had a weaker association. The within-patients analyses indicated that a change in a patients global functioning influenced their disruptive behaviour, or vice versa. Monitoring a patients global functioning could be useful in the prediction and prevention of disruptive behaviour of a patient in the acute psychiatric care.

INTRODUCTION

In 25.9% of all patients admitted to acute psychiatric care units in the Netherlands coercion is applied (Argus Informatie Centrum, 2016). Coercion is restricting a patient's movement using environmental, physical, or mechanical means (Gerace & Muir-Cochran, 2019). Restricting a patient's movement using environmental means, such as seclusion, is the most often used method with a prevalence of 11.6% (Argus Informatie Centrum, 2016). Coercion is frequently applied to prevent and manage the risk of harm caused by a patient's disruptive behaviour (Gerace & Muir-Cochrane, 2019; Janssen et al., 2008). However, the use of coercion could have negative consequences for both patients and staff. This includes psychological consequences such as emotional damage (National Mental Health Consumer & Carer Forum, 2009), post-traumatic stress (Chieze, Hurst, Kaiser, & Sentissi, 2019) and physical consequences even resulting in death of the patient (Currier, 2003). For the staff the use of coercion could also result in post-traumatic stress (Bonner et al., 2002) and serious injury (Renwick et al., 2016). To improve the health, safety and wellbeing of both patient and staff, coercion needs to be reduced to a minimum by predicting and preventing disruptive behaviour.

Disruptive behaviour is a combination of behaviours and symptoms of a patient. It includes aggressive behaviour such as spitting, scratching and pinching. But also violent behaviour such as physical force by slapping, punching, kicking and biting or the use of an object as a weapon. Furthermore, verbal threats involving no physical contact may also be classified as disruptive behaviour (Clarke, Brown, & Griffith, 2010). The symptoms of disruptive behaviour can include confusion and disorientation, whereby a patient has no idea of time, location and/or their identity. Irritation is another symptom, in these cases a patient is not capable of tolerating other people. The final symptom of disruptive behaviour is noisiness, whereby the patient shows loud behaviour such as throwing with doors or yelling at people (van de Sande, Mulder, & Nijman, 2013). The website of Triasweb (https://ppsso.triasweb.nl/form /webMeldplein.aspx) provides information about the amount of disruptive behaviour. In the province Gelderland of the Netherland, the acute psychiatric care reported 3296 counts of unacceptable behaviour/aggression and 949 counts of risky/unsafe situations in 2016 and 2017. Disruptive behaviour is common in patients in the acute psychiatric care and might result in the use of coercion.

Disruptive behaviour is a complex and dynamic phenomena, that arises from different patient-related risk factors. One risk factor is the psychopathology (Fiorillo et al., 2011). Different psychiatric diagnoses seem to be related to a higher risk of disruptive behaviour. Patients diagnosed with psychosis, anti-social personality and autism have a higher risk of

disruptive behaviour (Brendel, Wei, & Edersheim, 2010; Steinert & Whittington, 2013; Krippl & Karim, 2011). Furthermore, patients with personality disorders who are in a crisis accompanied by self-destructive behaviour, appear to be more at risk for disruptive behaviour (van de Sande et al., 2013). However, the nature of the connection between psychiatric diagnoses and disruptive behaviour is unclear. Mental illness appears to be a mediating factor rather than a primary cause (Steinert & Whittington, 2013; Clarke et al., 2010). So, it makes sense that disruptive behaviour occurs frequently in the psychiatry because the mediating factor of the psychopathology. This indicates that disruptive behaviour is developed when combining multiple risk-factors.

The expression of disruptive behaviour is different in specific situations. For this reason, situational circumstances can stimulate disruptive behaviour (Faay, van de Sande, Gooskens, & Hafsteinsdóttir, 2012; Steinert & Whittington, 2013). Many violent outbursts are preceded by frustrations or restrictions, frequently imposed by mental health professionals (Duxbury, 2002; Steinert & Whittington, 2013). Misperceptions of situations and misunderstanding of other people's intentions and attitudes may also trigger disruptive behaviour (Steinert & Whittington, 2013). These external factors indicate the development of disruptive behaviour, it does not arise suddenly. It's a reaction on the situational circumstances, but when it can be stimulated it might also be prevented. For this, a complete understanding of the development of disruptive behaviour is needed.

The internal sign of impeding disruption of a patient has to be understood. For this, a deeper understanding of a patient's functioning can be helpful (van de Sande et al., 2017). A multidimensional look at a patient's functioning is the global functioning. According to Kennedy (2003) captures the global functioning four domains of symptoms of skills. Firstly, it includes psychological symptoms such as psychotic symptoms, motivation, mood disturbance, personality disturbance, focal attention and eating disturbance. Secondly, social skills such as interpersonal skills, communication skills, awareness of social norms and sexually inappropriate behaviour. Furthermore it entails symptoms of violence, such as threatening, arson and assaultive, suicidal, homicidal and sexually violent behaviour. A final domain of global functioning are activities of daily living and occupational skills, such as job skills, skills to care for self, workmanship, basic survival skills and personal hygiene skills (Kennedy, 2003). Some skills and symptoms of global functioning are largely stable characteristics of a patient or have an overlap with disruptive behaviour. However, it can still show strong changes. The global functioning of a patient can fluctuate in a matter of hours (Steinert et al., 2007). Changes in the subscales of global functioning of a patient might be an early sign of disruptive behaviour.

There are multiple observational tools for mental health professionals that focus on disruptive behaviour and the global functioning of a patient. The most studied observational questionnaire focusing on disruptive behaviour is the Brøset Violence Checklist (BVC). It is a valuable tool in acute psychiatry care units (Anderson & Jenson, 2019). The BVC measures disruptive behaviour on the basis of three types of behaviour (verbal threats, physical threats and violence against objects), and three patient related symptoms (confusion, irritability, and noisiness) as present or absent (Clarke et al., 2010; van de Sande, Mulder, & Nijman, 2013). The Kennedy Axis V (K-As) is a observational tool in evaluating a patient's functioning (van de Sande et al., 2013; Kennedy, 2003). It has four subscales: psychological functioning, social functioning, violence (to self/others) and activities of daily living (ADL) – occupational skills (Kennedy, 2003). The four subscales together, the global functioning, capture the major clinical areas of a patient (Kennedy, 2003). The BVC has been previously used in studies about the association between disruptive behaviour and coercion or violent incidents (Partridge & Affleck, 2018; van de Sande et al., 2013). The K-As has been previously used in studies about the association between global functioning and coercion (van de Sande et al., 2013, 2017). However, no previous study researched the association between global functioning and disruptive behaviour. The existing research only gives some indication about the association between global functioning and disruptive behaviour.

Disruptive behaviour does not arise suddenly. In a study about disruptive behaviour among patients in the acute psychiatric care units, assessed with the BVC, the positive predictive values (PPV) for committing a violent incident in the next 24 hours was 16.7% for a score ≥ 1 (Partridge & Affleck, 2018). For patients who scored ≥2 on the BVC, the PPV for an incident in the next 24 hours was 34.3% and patients who scored ≥3 on the BVC, had a PPV of 55.2%. A longitudinal study of van de Sande et al., (2013) about the association between the BVC and seclusion considered a score of ≥2 on the BVC, enough to intervene with de-escalation interventions. So, a higher presence of disruptive behaviour indicated a higher likelihood of a violent incident.

Different subscales of global functioning might have different associations with disruptive behaviour. A longitudinal study of van de Sande et al., (2017) looked at the association between the K-As and seclusion and found dysfunctional scores in the subscales psychological functioning, social skills, and violence (to self/others), during the week that the seclusion took place. The subscale violence (to self/other) was significantly negatively associated with seclusion (van de Sande et al., 2017). This is to be expected, but in another study of van de Sande et al. (2013), psychological functioning and social functioning showed a

significant negatively association with seclusion. The association of global functioning and seclusion indicates that multiple subscales of global functioning might have an association with disruptive behaviour. To intervene at an early stage, it is important to know if and which subscales of global functioning have an association with disruptive behaviour over time.

The characteristics of a patient might in turn have an influence the association between global functioning and disruptive behaviour. Male sex, age < 35 years, having a personality disorder and having a substance abuse disorder were all significantly associated with a higher likelihood of seclusion (van de Sande at al., 2013, 2017). This could also indicate a higher likelihood of developing disruptive behaviour or a stronger association between global functioning and disruptive behaviour. Itself, indicating that global functioning may be a better predictor of disruptive behaviour in some subgroups of patients.

To date, it is unknown how global functioning and disruptive behaviour are associated over time. Early notice of disruptive behaviour through global functioning gives the opportunity to prevent disruptive behaviour. Therefore, the aim of this study is to examine the association between global functioning and disruptive behaviour of patients in the acute psychiatric care units. The research question in the present study is 'Is the global functioning of a patient in the acute psychiatric care units associated with disruptive behaviour over time?'. To select the best predictors, we want to know if and which subscales of global functioning have an association with disruptive behaviour. Finally, the global functioning could be a better predictor of disruptive behaviour in some subgroups of patients. The characteristics sex, age, type of unit and diagnosis were examined for their potential moderating effect on the association between global functioning and disruptive behaviour. The examined associations are illustrated in Figure 1.

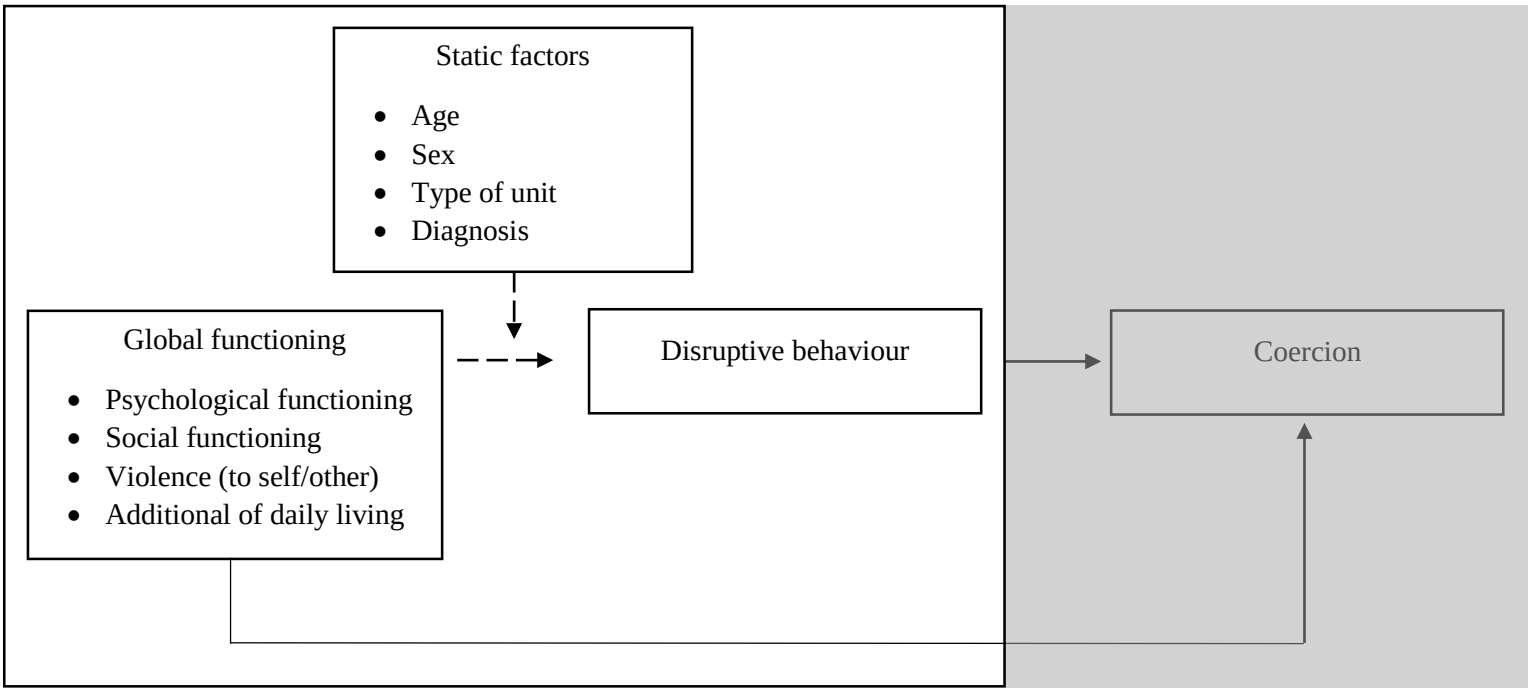


Figure 1. An Overview of the Hypothesized and Known Associations Between Global functioning, Static Factors, Disruptive Behaviour and Coercion.

METHOD

The current study had a retrospective longitudinal design. Routine data was collected with the Brøset Violence Checklist (BVC) and Kennedy Axis V (K-As). This study contains daily measurements from these two instruments for each patient, admitted in two acute psychiatric care units, over a period of three years. The mental health professionals were trained to use these observational measurements as the basis for their daily report in the 'Crisis Monitor'. All admitted patients were monitored twice a day, in the afternoon and evening, by different mental health professional working in their acute psychiatric care units.

Sample

Data regarding all admitted patients of two acute psychiatric care units, of the same institute in different cities, were collected and used in the present study. The data was from the periods of 2016, 2017 and 2018. The data of the BVC and K-As was already collected in a database for patient related treatment processes. All patients admitted were included, but a minimum stay of 7 days was required for data analysis inclusion. Patients who were younger than 18 years and older than 65 years were excluded, because these patients belong in the youth psychiatric care

units or elderly psychiatric care units. Data from the first 28 days of hospitalization were used to reduce the proportion of missing values of the K-As. To reduce more missing values on the K-As, the mean percentage of the missing values in the first 28 days of the sample was calculated. Patients who had more than the mean percentage (48.38%) of missing values on the K-As were removed. The sample had a range of 0% till 48.15% (*M*=17.34, *SD*=13.14) missing values on the K-As. The BVC had less missing values, a total of 43 missing values were found. Stepwise selection of patients included in the final analyses showed a removal of 418 patients (Fig. 2). The final sample consisted of 483 patients (Table.1). There were 247 male patients and 236 female patients. The patients had a minimum age of 18 and a maximum age of 63 years old (*M* = 37.21, *SD* = 11.94). The patients were divided in two groups, under 35 years old and above 34 years old according to van de Sande et al. (2013). The 85 different diagnoses were categorized according to van der Molen, Perreijn, and van den Hout (2007) in five commonly used main diagnosis. The most common diagnoses were mood or anxiety disorders and psychotic disorders. The total sample was divided in the two Units. Unit 1 consisted 140 patients, 89 male patients and 51 female patients. The mean age of the patients in Unit 1 was 34.23 years old (*SD* = 11.57) and the most common diagnoses was psychotic disorder. Unit 2 consisted 343 patients, 158 male patients and 185 female patients. The mean age of the patients in Unit 2 was 38.43 years old (*SD* = 11.89) and the most common diagnoses was mood or anxiety disorders and psychotic disorder. A significant difference between Unit 1 and Unit 2 in sex ($p < 0.001$), age ($p < 0.001$) and diagnosis ($p < 0.001$) was found.

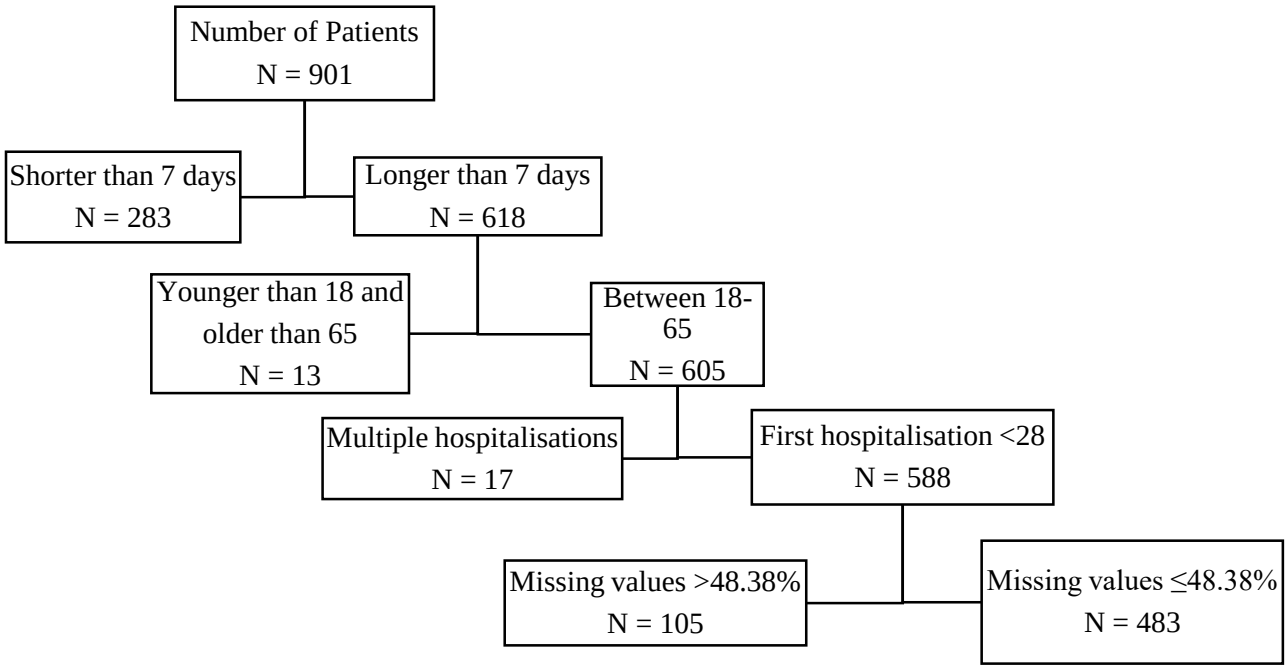


Figure 2. Selection of sample group based on the exclusion and inclusion criteria.

Table 1. *Number of Patients and Percentage of the Sex and Main Diagnoses Divided in Unit and the Total Sample.*

	Unit 1		**Unit 2**		**Totaal**	
	N	%	N	%	N	%
Sex						
Men	89	63.6%	158	46.1%	247	51.1%
Female	51	36.4%	185	53.9%	236	48.9%
Age						
Age < 35	77	55.4%	135	39.4%	212	43.9%
Age > 35	62	44.6%	208	60.6%	271	56.1%
Main diagnoses						
Mood or anxiety disorders	28	20%	129	37.6%	157	32.5%
Psychotic disorders	94	67.1%	125	36.4%	219	45.3%
Personality disorder	8	5.7%	45	13.1%	53	11.0%
Neurobiological development disorder	3	2.1%	19	5.5%	22	4.6%
Other disorders	7	5.0%	25	7.3%	32	6.6%
Totaal	140	29.0%	343	71.0%	483	100%

Instruments

The Brøset Violence Checklist (BVC) is a validated observation instrument for measuring disruptive behaviour by patients in acute psychiatric care units. It identifies the risk of disruptive behaviour in the next period of four till eight hours (van de Sande et al., 2013). The BVC consists the following six items: confusion; irritability; noisiness; physical threat; verbal threat; and attack on objects. A patient with a score of two or more, on a range of zero till six, is more likely to become violent (van de Sande et al., 2013). A patient scoring 0 is at very low risk of disruptive behaviour, a patient scoring 1-2 is at moderate risk and when a patient scores more than 2 there is a very high risk (van de Sande et al., 2013). For a score of two or more points, a sensitivity of 0.657 and a specificity of 0.978 for prediction of violence in the next 24 hours was found (Partridge & Affleck, 2018). The BVC has a fair overall inter-rater reliability (k = 0.44) (Almvik, Woods, & Rasmussen, 2000). A Cronbach's alpha of 0.71 was found for the first time point in days in this study.

The global functioning of the patients was assessed using the Kennedy Axis V short version (K-As). This questionnaire covers the following four subscales: psychological functioning; social functioning; violence (to self/others); Activities of Daily Living (ADL) and occupational skills. These subscales capture the clinician's impression of the patients' overall level of current functioning during the day (Kennedy, 2003). The Kennedy axis V is an anchored scale that includes 20 different descriptions of the severity scores with five points at the lowest score and 100 points as the highest (van de Sande, 2017). A score above 50 indicates a strength in the patients' functioning on the specific subscale and, subsequently, a score of 50

or lower indicates problematic functioning in a specific area (Kennedy, 2003). Patients with a score of 50 or less, are often associated with the need of hospitalization. With the individual scores for each of the subscales, mental health professionals can generate a patient profile using the K-As. Also a Dangerousness Level (DL) of a patient can be generated. The numbers used to derive the DL are on the scoring sheet directly below each subscale score. The lowest score becomes the DL (Kennedy, 2003). The K-As has an outstanding overall inter-rater reliability (0.79) calculated with the intraclass correlation coefficient and Pearson's *r* (Faay et al., 2012). A Cronbach's alpha of 0.83 was found for the total score on first time point in days in this study.

Statistical analyses

Data were analysed using IBM SPSS version 23. A database was constructed that contained the highest daily assessment scores, as determined by the Brøset Violence Checklist (BVC) and the lowest daily assessment scores, as determined by the Kennedy Axis V (K-As). A high score on the BVC indicates disruptive behaviour and a low score on the K-As indicates poor global functioning. For each patient, the measurements between the first day till 28 days of hospitalization were used for analysis. Patients' sex, age, main diagnosis, time of hospitalization and type of unit obtained for the hospital's admissions database were also added. Descriptive statistics were used to characterize the sample. One way Anova and Chi-square test were used to find differences in mean age, frequency of sex and frequency of diagnoses between unit 1 and unit 2.

A series of linear mixed modelling for repeated measurements (LMM) with maximum likelihood estimation was used in this study (Field, 2017). LMM is a type of analysis method that can handle nested data and missing values (Field, 2017). A basic model is used with further expansion dependent on the specific research question. In the basic model the subjects were identified with the ID and the time point was repeated. A compound symmetry structure was selected for the repeated measurements covariance matrix, assuming a constant variance at each time point and a constant correlation between dependent measurements time (Field, 2017). The parameter estimates and tests for covariance parameters were selected as test statistics. Additionally, standardized z-scores were calculated for the dependent and independent variables using descriptive statistics to analyse the strength of the associations (Cohen, 1988). With the standardizes additional LMM is conducted, to calculated standardized Beta (β) estimates for the fixed effect.

Scores of the instruments over time

Descriptive statistics were used to calculated the minimum, maximum, mean and standard deviation of the BVC, the K-As and the subscales of the K-As. Also a histogram was made to indicate the presence or absence of a normal distribution of data points over time of the BVC and the K-As. Furthermore, a graph was made to analyse the Estimated Marginal (EM) Mean score over time of the BVC, the K-As and the subscales of the K-As with LMM. The BVC, the K-As and the subscales of the K-As were indicated as dependent variable, time point as fixed factor and EM means display means for time point. To identify the associations between the subscales of the K-As, the Pearson correlation between the standardized scores were analysed at time point 0, 14 and 28 days (Cohen, 1988). At last, to analyse the EM mean of the BVC and the K-As over time divided in sex, age, unit and diagnose, the static factors were categorised in dummy's. A graph was made with the databases selected on the dummy.

Static predictors of BVC

The association between the static factors and the BVC was analysed with LMM. The BVC was indicated as the dependent variable and the static factors sex, age, unit and type of diagnose were indicated as the fixed factor. The analyses were univariate and multivariate conducted.

Association with BVC over time

To analyse the association between the K-As and the BVC over time, the BVC was indicated as a dependent variable and the total K-As score as fixed covariant in the LMM. The association between the subscales of the K-As and the BVC over time was analysed using the subscales of the K-As indicated as fixed covariates in the LMM. This analyses was univariate and multivariate conducted.

To further analyses the association of the K-As with the BVC, the between and within patient effects were analysed. The between-patient effect is the variability in the overall K-As and the BVC across different patients. The within-patient effect is a specific individual variation in the K-As and variation in the BVC over time (Curran & Bauer, 2011). The standardized scores were used to calculated a patient mean of the K-As of each patient. The patient mean was subtracted from each individual time-specific K-As score, this was the patient centred mean (Curran & Bauer, 2011). The BVC was indicated as the dependent variable and both the patient mean and the patient centred mean were used as fixed covariates in the LMM.

Interaction effect

Finally, the interaction effect of the static factors on the association between the K-As and the BVC was analysed with LMM. The static factors sex, age, unit and type of diagnosis were indicated as factor. The static factors, the covariate K-As, and the static factors * covariate were indicated as fixed effects. The analyses were univariate and multivariate conducted. To compare the static factor, the database was selected on the dummy of the static factor for a simple slope test for interpreting.

RESULTS

Scores of the instruments over time

In the present study, data of the Brøset Violence Checklist (BVC) and the Kennedy Axis V (K-As) of 483 patients were analysed. The observed frequency of the BVC Total score ranged from 0 (*n*=6724, 72.1%), 1 (*n*=1309, 14.0%), 2 (*n*=609, 6.5%), 3 (*n*=323, 3.5%), 4 (*n*=181, 1.9%), 5 (*n*=99, 1.1%) and 6 (*n*=34, 0.4%) across all data points. As Figure 3 shows, data were severely skewed to the right. Table 2 shows the mean score of the BVC (M=0.53, SD=1.07). The item irritability had the highest mean (M = 0.19, SD = 0.40), and the item physical threat had the lowest mean (M = 0.03, SD, 0.18), over all measurements. As would be expected during the course of treatment, the Estimated Marginal (EM) mean score of the BVC decreased and tended to stabilize over time. The EM mean score showed a lot of fluctuation in the 28 day period (Fig. 4). Also, the mean score of the K-As is shown in Table 2, these scores were more normally distributed. The mean score of K-As was 52.89 with a standard deviation of 10.25. The subscale violence had the highest mean (M = 57.90, SD = 11.24) and the subscale psychological functioning had the lowest mean (M = 49.77, SD = 11.32). As expected the EM mean score of the K-As increased and tended to stabilize over time (Fig. 5).

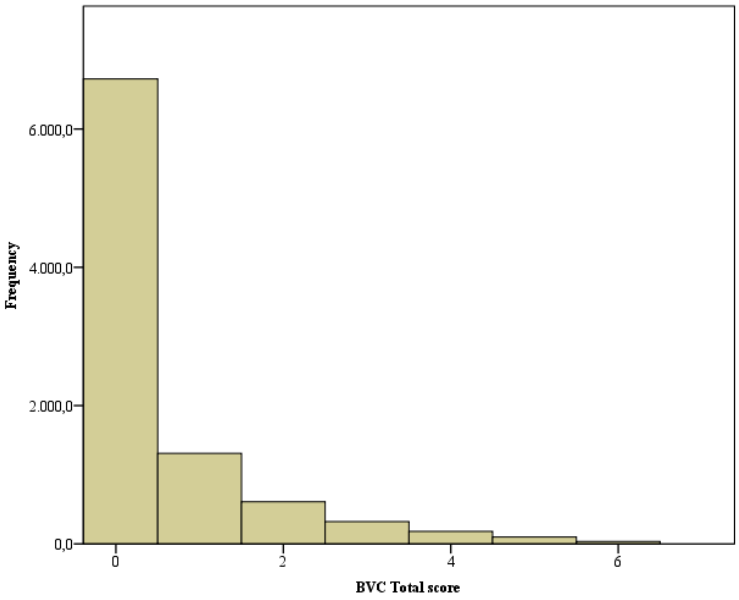


Figure 3. Normality distribution of the Brøset Violence Checklist.

Table 2. *Number of data points, Minimum, Maximum, Mean, Standard Deviation (SD) and Cronbach's Alpha of the Kennedy Axis V and the Brøset Violence Checklist.*

	N	Minimum	Maximum	Mean	Standard deviation	Cronbach's alpha
Kennedy Axis V						0.83
Total score	8948	0	98	52.89	10.25	
Psychological functioning	8934	0	90	49.77	11.32	
Social functioning	8937	0	100	53.52	11.70	
Violence	8850	0	100	57.90	11.24	
ADL	8932	0	100	52.61	11.21	
Brøset Violence Checklist						0.71
Total score	9257	0	6	0.53	1.07	
Confused	9265	0	1	0.13	0.34	
Irritability	9277	0	1	0.19	0.40	
Noisness	9278	0	1	0.10	0.30	
Physical threat	9276	0	1	0.03	0.18	
Verbal threat	9276	0	1	0.05	0.23	
Attack	9273	0	1	0.04	0.19	

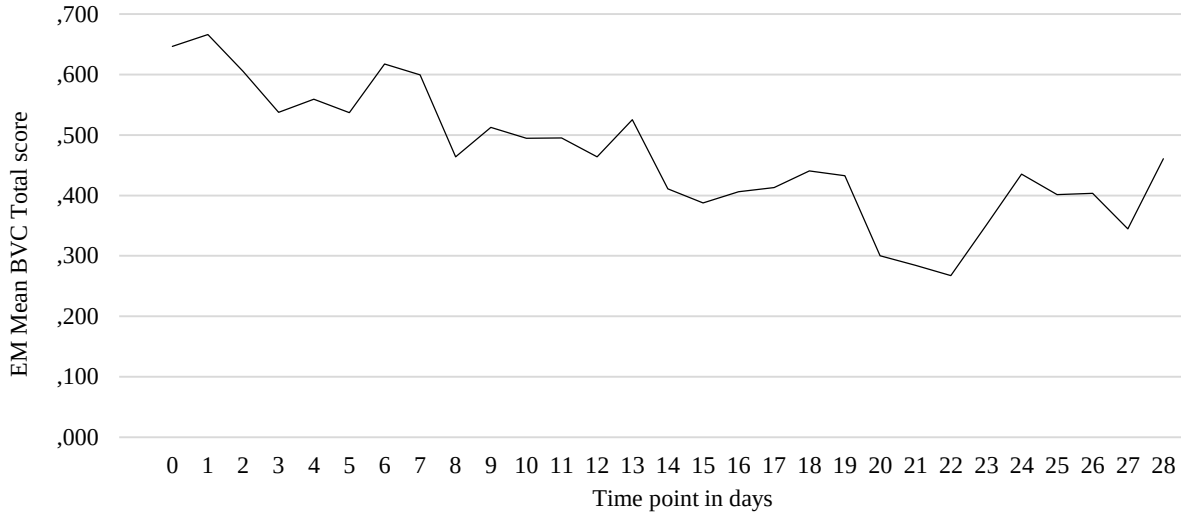


Figure 4. Estimated Marginal Mean Scores of the Brøset Violence Checklist Over Time

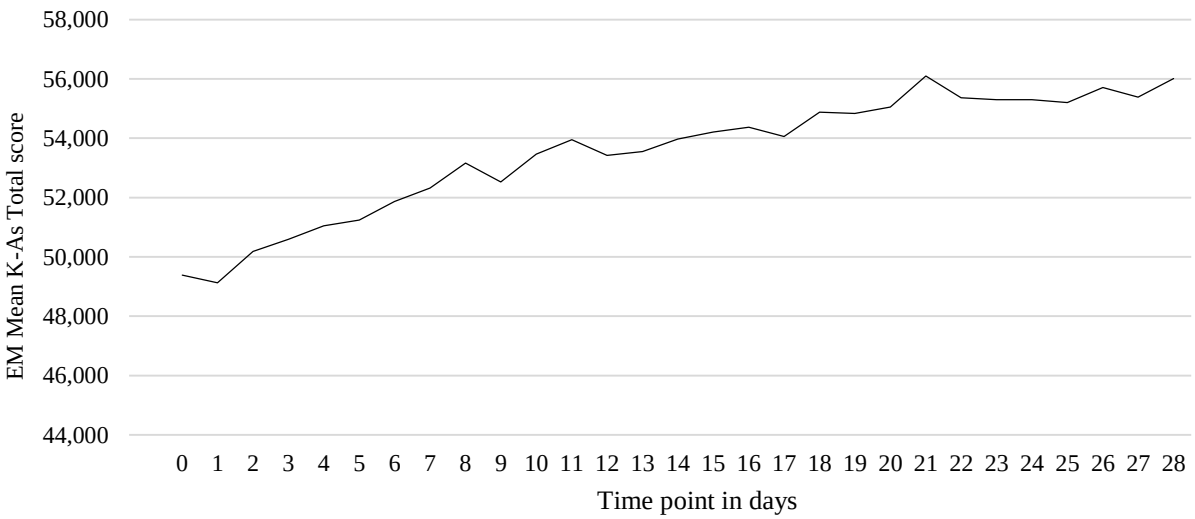


Figure 5. Estimated Marginal Mean Scores of the Total Kennedy Axis V Over Time

Subscales of the K-As

The EM mean score of the subscales of the K-As increases and tended to stabilize over time (Fig. 6). Of the four subscales psychological functioning had the highest increase of 9.491 in 28 days. The subscale social functioning showed the smallest increase of 5.544 in 28 days.

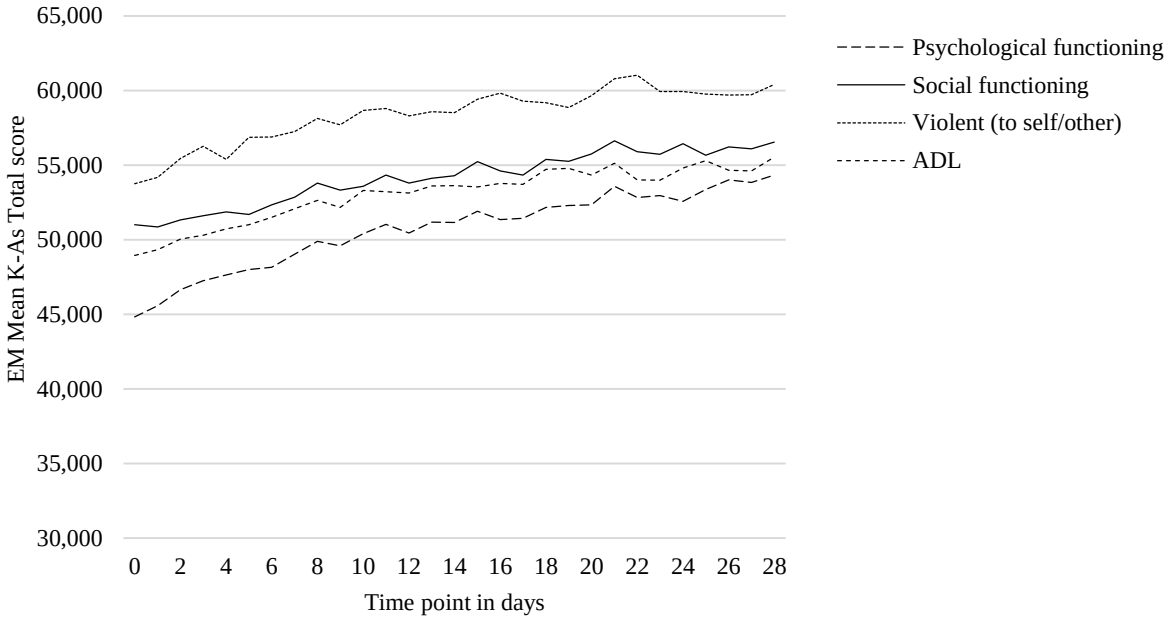


Figure 6. Estimated Marginal Mean Scores of the subscale of the Kennedy Axis V Over Time

The Pearson correlation of the standardized scores of the BVC and the subscales of the K-As are shown in Table 3. The subscales of the K-As were all significantly correlated with disruptive behaviour. Psychological functioning had a low and medium correlation ($p < 0.001$), social functioning had a medium correlation ($p < 0.001$), violence (to self/other) had a low and medium correlation ($p < 0.001$) and ADL had a low correlation ($p < 0.001$). Over time the subscale violence (to self/other) tended to show a stronger correlation with disruptive behaviour and ADL showed a weaker correlation. Furthermore, the subscales were significantly correlated to each other. Psychological functioning and social functioning showed a strong correlation with each other ($p < 0.001$). Psychological functioning, social functioning and ADL had a low and medium correlation with violence (to self/other) ($p < 0.001$). Psychological functioning and social functioning had a medium and high correlation with ADL ($p < 0.001$). The subscale psychological functioning tended to a stronger correlation with the other subscales over time. The correlation of the other subscales tended to increases and then decreases over time.

Static factors

The EM Mean of the BVC and the EM mean of the K-As is shown in figure 7-14 and appendix II stratified by the static factors over time. The BVC and K-As scores were not so different between male and female patients (Appendix II, Figure 1 and 2). In contrast, patients with an age < 35 years had a higher BVC score in almost all time points, this variable fluctuated a lot (Fig. 7). The K-As score was lower in all time points when compared to patients with an age ≥35 years (Fig. 8).

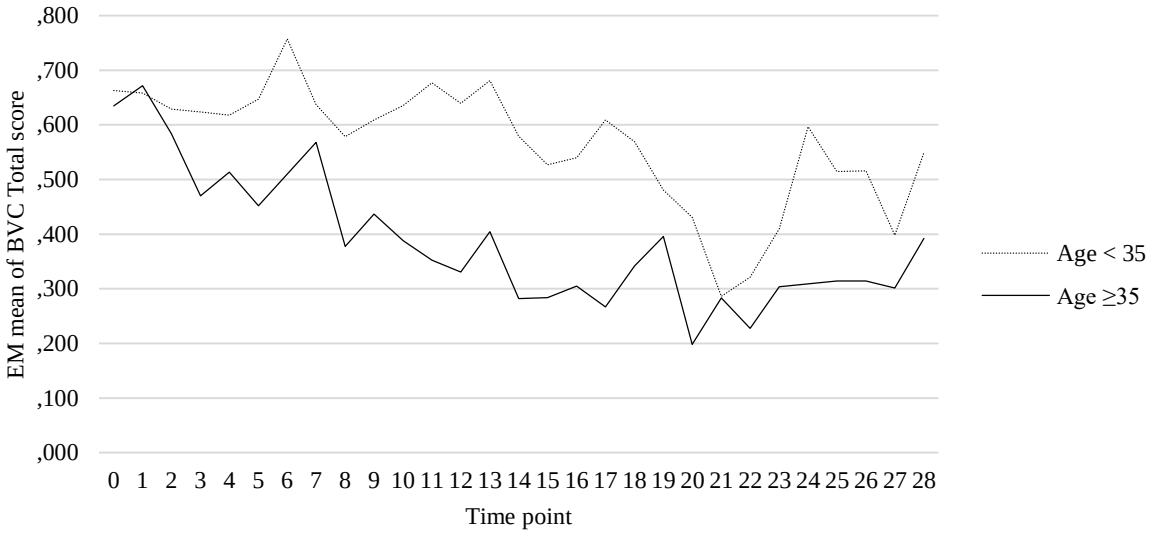


Figure 7. Estimated Marginal Mean Scores of Age of the Brøset Violence Checklist Over Time

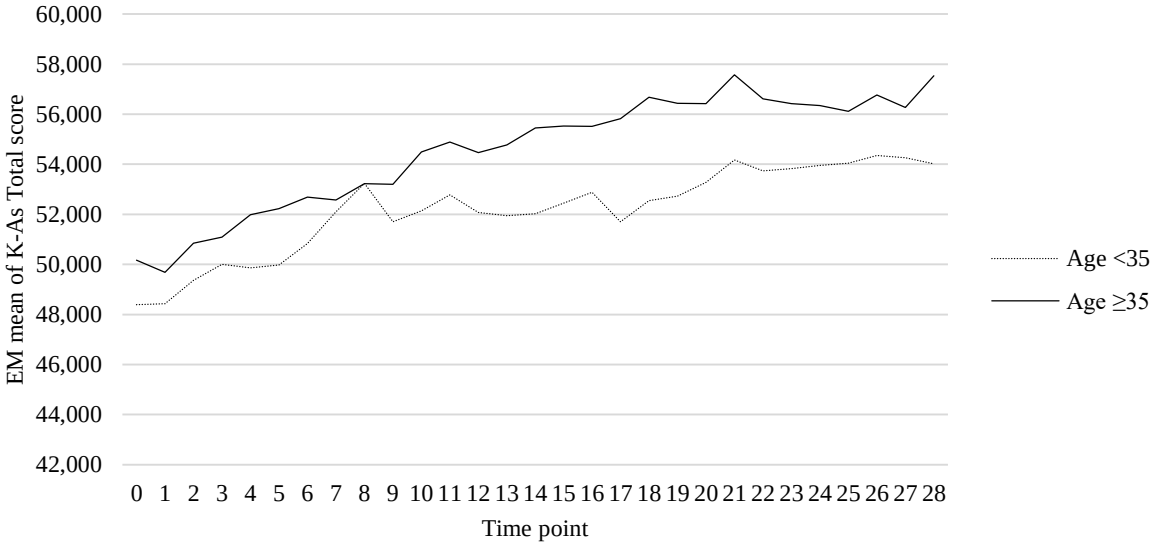


Figure 8. Estimated Marginal Mean Scores of Age of the Kennedy Axis V Over Time

Furthermore, a difference between the two units is present. Figure 9 and 10 show a higher score on the BVC and a lower score on the K-As, for unit 1 compared to unit 2. The BVC score fluctuates a lot in unit 1, with a large decrease and increase between days 19 and 22. Also, patients with a mood or anxiety disorder had a lower score on the BVC and a higher score on the K-As, when compared to patients with other psychiatric disorders (Appendix II, Figure 3 and 4). Further, figure 11 and 12 show a higher score on the BVC and a lower score on the K-As, for patients with a psychotic disorder, compared to patients with other disorders than psychotic disorders.

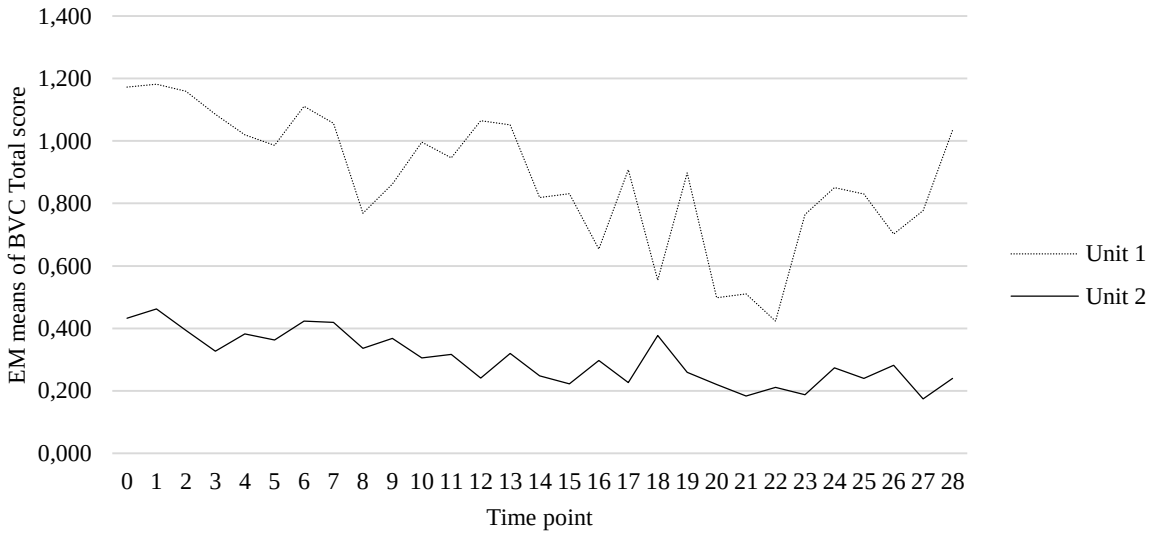


Figure 9. Estimated Marginal Mean Scores of the Unit of the Brøset Violence Checklist Over Time

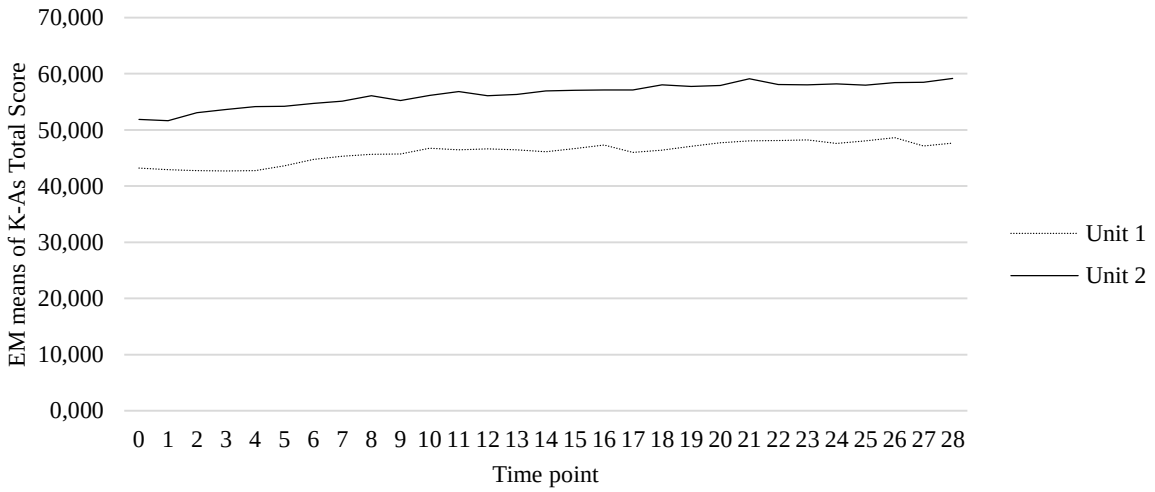


Figure 10. Estimated Marginal Mean Scores of the Unit of the Kennedy Axis V Over Time

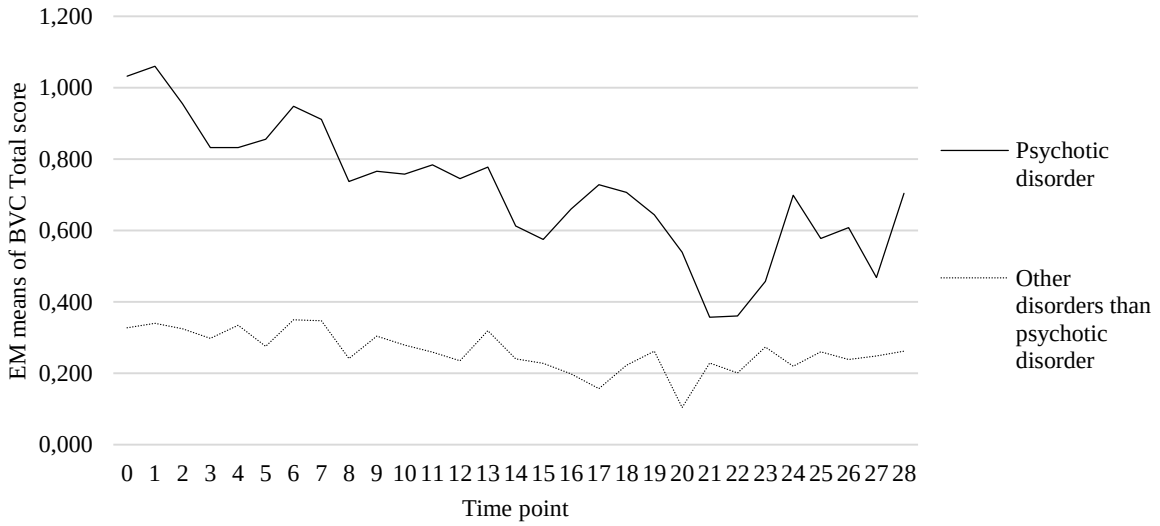


Figure 11. Estimated Marginal Mean Scores of Psychotic Disorder of the Brøset Violence Checklist Over

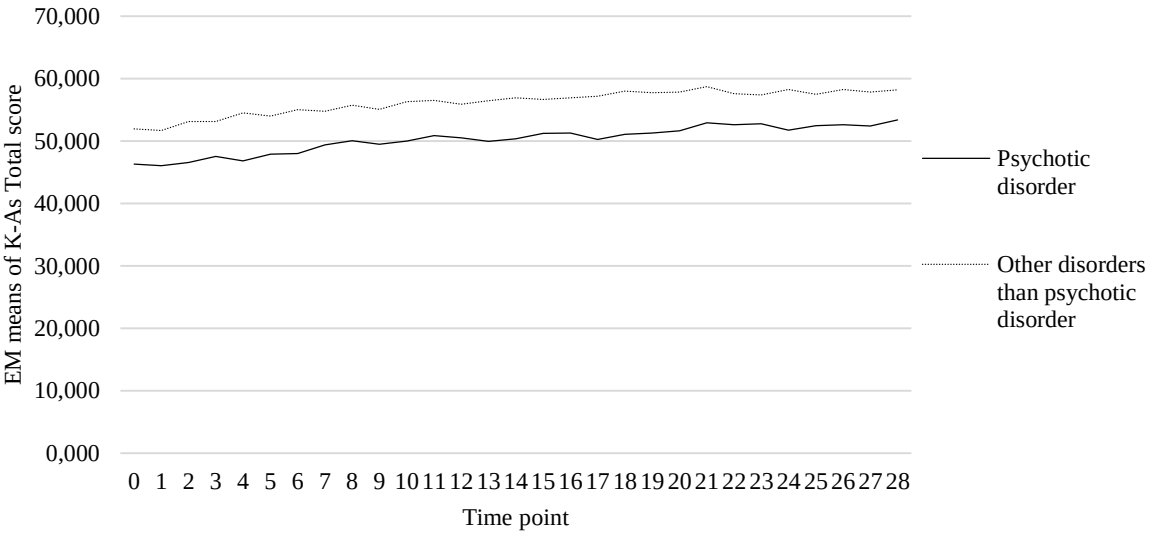


Figure 12. Estimated Marginal Mean Scores of Psychotic Disorder of the Kennedy Axis V Over Time

For patients with a personality disorder, there is a clear deviation of the overall trend of a decreasing BVC score over time. Furthermore, there is a lot of fluctuation within the BVC score, possibly through the decreasing number of patients over time (Fig. 13). Also, in the K-As score there is a lot of fluctuation over time (Fig. 14). At last, patients with a neurobiological development disorder had a lower score on the BVC (Fig. 15) compared to other patients. In the K-As score, were no big differences noticed (Fig. 16).

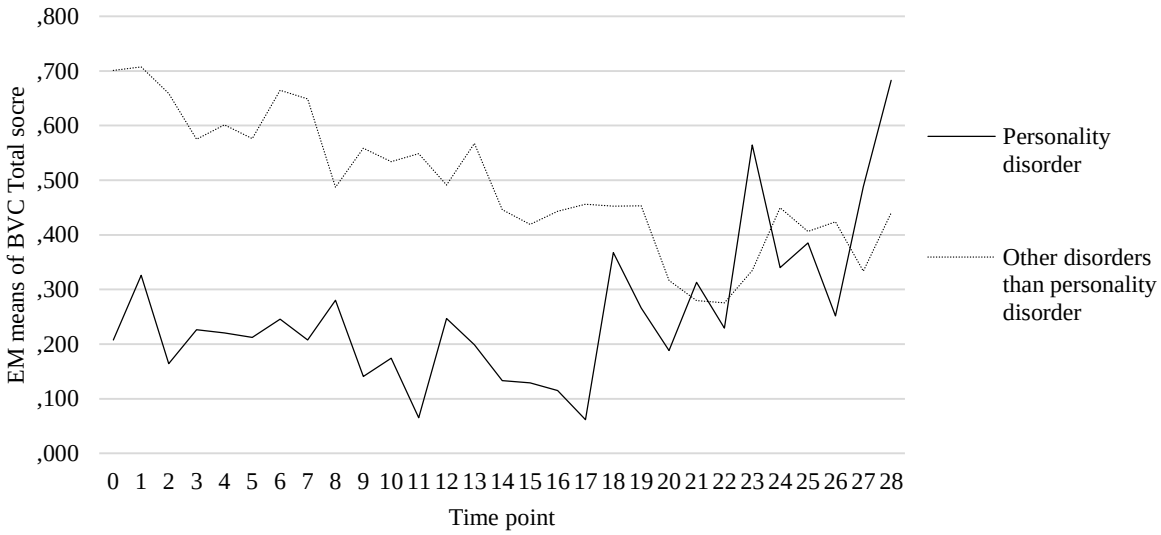


Figure 13. Estimated Marginal Mean Scores of Personality disorder of the Brøset Violence Checklist Over Time

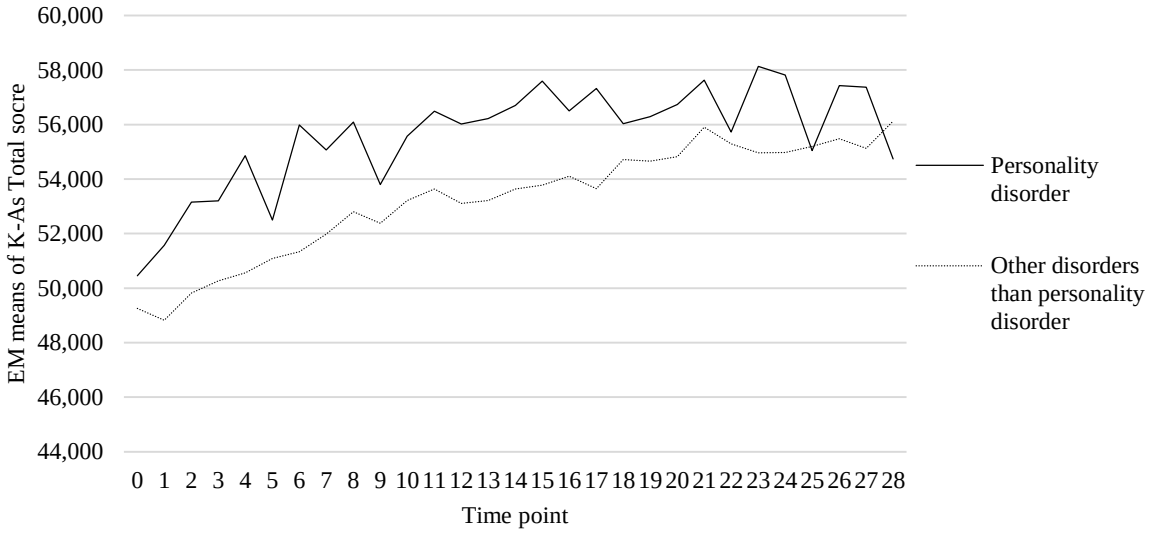


Figure 14. Estimated Marginal Mean Scores of Personality Disorder of the Kennedy Axis V Over Time

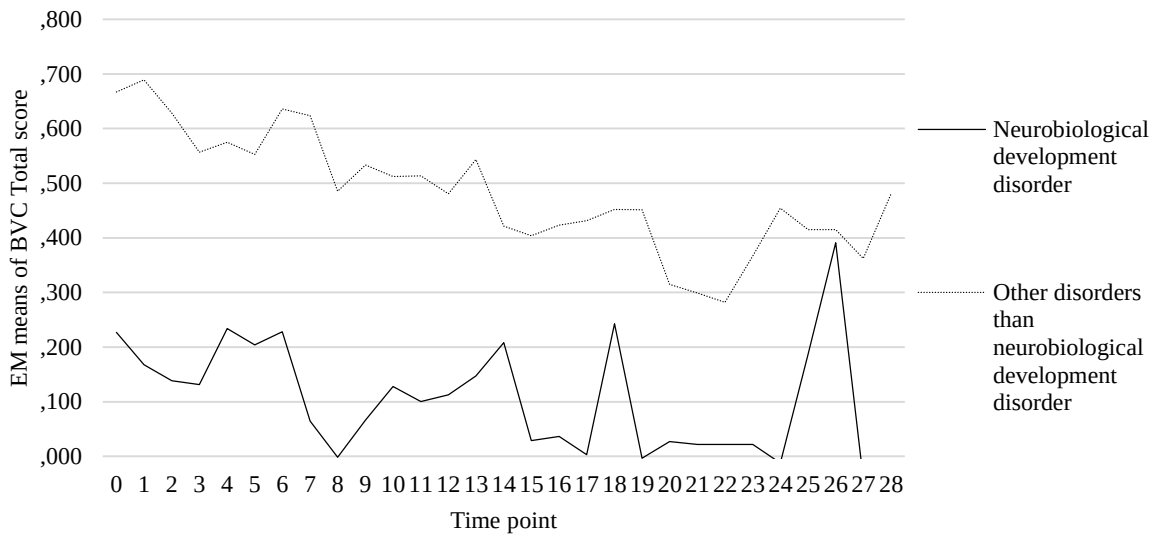


Figure 15. Estimated Marginal Mean Scores of Neurobiological Development Disorder of the Brøset Violence Checklist Over Time

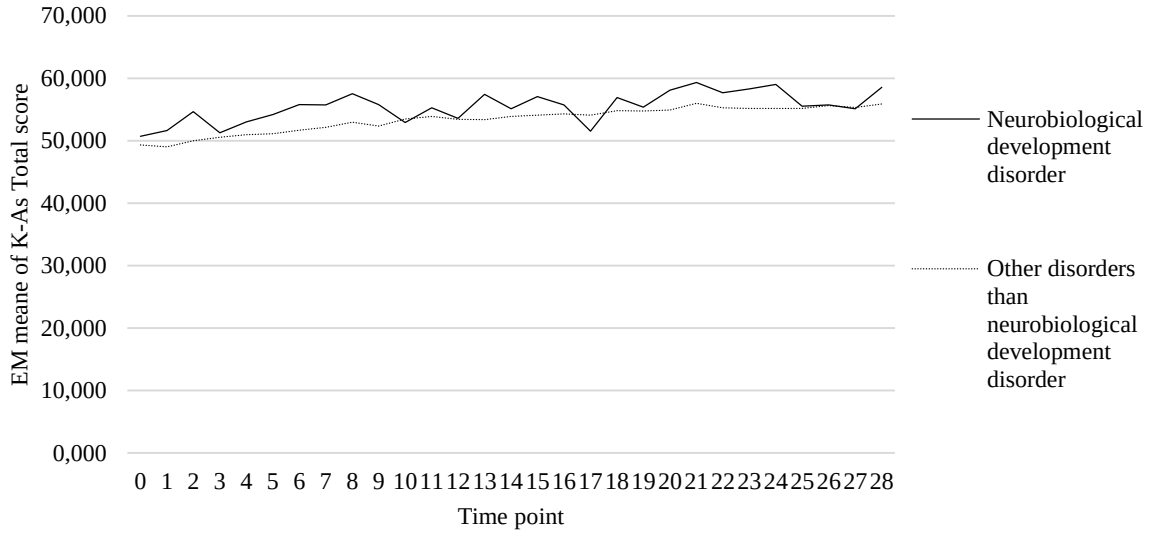


Figure 16. Estimated Marginal Mean Scores of Neurobiological Development Disorder of the Kennedy Axis V Over Time

Table 3. *Pearson Correlation of the Standardized Scores of the Brøset Violence checklist and the Subscales of the Kennedy Axis V on Time Point 0, 14 and 28 in Days.*

	BVC Totaal			**Psychological functioning**			**Social functioning**			**Violent (to self/other)**			**ADL**		
	TP 0	TP14	TP28	TP0	TP14	TP28	TP0	TP14	TP28	TP0	TP 14	TP28	TP0	TP14	TP28
BVC Totaal	1	1	1												
Psychological functioning	-.569 (n=456)	-.488 (n=296)	-.505 (n=189)	1	1	1									
Social functioning	-.579 (n=456)	-.516 (n=296)	-.567 (n=189)	0.721 (n=457)	0.807 (n=297)	0.828 (n=189)	1	1	1						
Violent (to self/other)	-.398 (n=452)	-.517 (n=293)	-.534 (n=186)	0.392 (n=453)	0.561 (n=294)	0.597 (n=186)	0.455 (n=454)	0.630 (n=294)	0.591 (n=186)	1	1	1			
ADL	-.453 (n=454)	-.428 (n=294)	-.392 (n=189)	0.681 (n=455)	0.791 (n=295)	0.728 (n=186)	0.653 (n=455)	0.784 (n=295)	0.696 (n=189)	0.378 (n=452)	0.528 (n=292)	0.436 (n=186)	1	1	1

n indicates the number of patients.

Table 4. *Linear Mixed Modelling for Repeated Measurement of the Brøset Violence Checklist*

		Univariate						Multivariate					
		b	*SEь*	*95% CI*	*β*	*SEβ*	*P-value*	*b*	*SEь*	*95% CI*	*β*	*SEβ*	*P-value*
Static factors	Sex	-.054	0.063	-.177, 0.068	-.051	0.058	0.384	0.118	0.06	0.005, 0.231	0.109	0.054	0.042*
	Age	-.165	0.063	-.288, -.042	-.154	0.058	0.009*	-.079	0.057	-.190, 0.032	-.074	0.053	0.163
	Unit	-.529	0.058	-.643, -.414	-.494	0.055	0.000*	-.435	0.058	-.550, -.321	-.407	0.055	0.000*
	Mood or anxiety disorder	0.311	0.065	0.183, 0.439	0.291	0.061	0.000*	0.058	0.116	-.170, 0.286	0.054	0.108	0.617*
	Psychotic disorder	-.496	0.059	-.612, -.382	-.464	0.055	0.000*	-.325	0.116	-.551, -.099	-.304	0.107	0.005*
	Personality disorder	0.308	0.099	0.113, 0.503	0.288	0.093	0.002*	0.165	0.135	-.101, 0.430	0.154	0.126	0.224
	Neurobiological development disorder	0.384	0.150	0.088, 0.679	0.358	0.141	0.011*	0.199	0.168	-.131, 0.529	0.186	0.157	0.237
	Other disorders	0.129	0.126	-.118, 0.377	0.121	0.118	0.305	0[a]	0[a]		0[a]	0[a]	
Kennedy	Total score	-.045	0.001	-.048, -.043	-.435	0.011	0.000*						
Axis V	Psychological functioning	-.041	0.001	-.043, -.039	-.431	0.011	0.000*	-.014	0.002	-.017, -.011	-.151	0.016	0.000*
	Social functioning	-.041	0.001	-.044, -.040	-.457	0.011	0.000*	-.020	0.001	-.023, -.017	-.219	0.015	0.000*
	Violent	-.039	0.001	-.041, -.037	-.409	0.010	0.000*	-.023	0.001	-.025, -.021	-.238	0.012	0.000*
	ADL	-.030	0.001	-.032, -.028	-.318	0.011	0.000*	-.001	0.001	-.003, 0.002	-.005	0.014	0.730
Interaction	K-As Total score * Male	-.007	0.002	-.011, -.002	-.064	0.021	0.002*	0.002	0.002	-.003, 0.006	0.017	0.022	0.430
effect	K-As Total score * Age <35	-.015	0.002	-.019, -.010	-.520	0.166	0.000*	-.011	0.002	-.016,-.007	-.108	0.022	0.000*
	K-As Total score * Unit 1	-.035	0.003	-.040, -.030	-.330	0.024	0.000*	-.027	0.003	-.032, -.022	-.261	0.025	0.000*
	K-As Total score * Mood or Anxiety disorder	0.019	0.002	0.015, 0.024	0.183	0.022	0.000*	0.001	0.005	-.009, 0.011	0.008	0.048	0.873
	K-As Total score * Psychotic disorder	-.030	0.002	-.034, -.026	-.289	0.021	0.000*	-.021	0.005	-.031, -.011	-.202	0.048	0.000*
	K-As Total score * Personality disorder	0.020	0.004	0.012, 0.027	0.188	0.036	0.000*	0.009	0.006	-.003, 0.020	0.084	0.057	0.139
	K-As Total score * Neurobiological development disorder	0.036	0.006	0.024, 0.047	0.341	0.057	0.000*	0.022	0.008	0.007, 0.036	0.208	0.071	0.004*
	K-As Total score * Other disorders	0.009	0.005		0.086	0.047	0.067	0[a]	0[a]		0[a]	0[a]	

Analyses was conducted on 483 patients. Table presents estimate (b), which indicated the analyses with the unstandardized scores and β, which indicate the analyses with the standardized scores.
P value of <0.05 as significant. [a] this parameter is set to zero because it is redundant

Static predictors of BVC

The outcomes of the linear mixed models for repeated measurements are shown in Table 4. The association between the static factors sex, age, unit and type of diagnoses and disruptive behaviour was analysed. In the univariate model patients aged < 35, hospitalized in unit 1 (F(1, 702.348) = 82.181, t = -9.065, β = -.494) or patients with a psychotic disorder (F(1, 489.058) = 71.642, t = -8.464, β = -.464) had a significantly higher BVC score. Patients with a mood or anxiety disorder, personality disorder or a neurobiological development disorder had a significantly lower BVC score (Table 4.). In the multivariate model patients hospitalized in unit 1 (F(1, 702.291) = 55.520, t = -7.451, β = -.407) or diagnosed with a psychotic disorder had a significant higher BVC score (t (486.154) = -2.826, β = -.304). Unexpectedly male patients had a significantly lower BVC score (F(1, 483.437) = 4.177, t = 2.044, β = 0.109) (Table 4.).

Association with BVC

Total K-As

The association of global functioning with disruptive behaviour was analysed (Table 4.)

Global functioning was significantly associated with disruptive behaviour over time (F (1,7764.55) = 1721.46, t = -41.49. The standardized score indicates a moderate association (β = -.436, SE_β = 0.011).

Subscales of K-As

In the univariate model, the subscales psychological functioning (F(1,7060.48) = 1536.40, t = -39.20, β = -.431), social functioning (F(1,7108.55) = 1793.51, t = -42.35, β = -.458), violent (to self/other) (F(1,8696.75) = 1746.83, t = -41.80, β = -.409) and ADL (F(1,7926.92) = 830.15, t = -28.81, β = -.318), were all significantly associated with disruptive behaviour over time. The standardized scores indicate a moderate association between all subscales and disruptive behaviour. In the multivariate model, the subscales psychological functioning (F(1,8790.31) = 94.56, t = -9.73, β = -.151), social functioning (F(1,8791.83) = 211.39, t = -14.54, β = -.219) and violent (to self/other) (F(1,8648,15) = 424.57, t = -20.61, β = -.238) were significantly associated with disruptive behaviour. The standardized scores indicate a weak independent association with disruptive behaviour. These findings showed that ADL did not remain independently associated (p = 0.730) with disruptive behaviour when controlled for the other subscales.

Between – within patient

The association of global functioning with disruptive behaviour was next analysed between-patients and within each individual patient. The between-patient correlation of the K-As was significantly negatively associated with disruptive behaviour over time (F(1, 488.443) = 474.701, t = -21.788, β = -.588, SE_β = 0.027, p < 0.001). The standardized score indicated a strong association. This indicated that the variability in the overall K-As is associated with the BVC across patients. The within-patient correlation of the K-As was also significantly negatively associated with disruptive behaviour over time (F(1, 8420.672) = 1314,037, t = -36.250, β = -.411, SE_β = 0.011, p < 0.001). The standardized score shows a moderate association, this indicates that a specific individual variation in the K-As is associated with the BVC. In conclusion it can be stated, that an individual decrease in global functioning has a negative effect on the disruptive behaviour of that patient or vice-versa.

Interaction effect

The interaction effect of the static factors sex, age, unit and type of diagnosis on the association between global functioning and disruptive behaviour were analysed (Table 4.). Sex, the diagnosis mood or anxiety disorder and personality disorder all had a significant interaction effect in the univariate model. However, in the multivariate model there was no interaction effect present between these static factors and the association of global functioning with disruptive behaviour.

Age

In the univariate model a significant negative interaction effect was found for the age < 35 (F (1, 7696.056) = 43.246, t = -6.576, β = -.520) on the association. In the multivariate model, a significant negative interaction effect remained for the age < 35 (F (1, 7643.997) = 24.768, t = -4.977, β = -.108) on the association. The estimate β of patients with an age < 35 (β = -.521) was stronger than the estimate β of patients with an age ≥ 35 (β = -.378) (Table 5.). Indicating that patients aged < 35 had a stronger association between global functioning and disruptive behaviour.

Unit

In the univariate model a significant negative interaction effect was found for Unit 1 *(F* (1,8610.96) = 183.55, *t* = -13.55, *β* = -.330) on the association. In the multivariate model, a significant negative interaction effect remained for Unit 1 (*F* (1,8534.701) = 111.074, *t* = -10.54, *β* = -.261) on the association. The estimate β of patients in Unit 1 (*β* = -.679) was stronger that the estimate β of patients in Unit 2 (*β* = -.342) (Table 5.). Unexpectedly patients in unit 1 had a stronger association between global functioning and disruptive behaviour when compared to patients in unit 2.

Psychotic disorder

In the univariate model a significant negative interaction effect was found for the diagnosis psychotic disorder (*F* (1, 8080.67) = 188.33, *t* = -13.72, *β* = -.289) on the association when compared to the other diagnoses. In the multivariate model, a significant negative interaction effect remained for the diagnosis psychotic disorder (*t* = -4.233, *β* = -.202). The estimate β of patients with a psychotic disorders (*β* = -.583) was stronger that the estimate β of patients with other disorders than psychotic disorder (*β* = -.295) (Table 5.). This indicates that patients with a psychotic disorder had a stronger association between global functioning and disruptive behaviour.

Neurobiological development disorder

In the univariate model a significant positive interaction effect was found for the diagnosis neurobiological development disorder (*F* (1, 8900.51) = 36.37, *t* = 6.03, *β* = 0.341) on the association when compared to the other diagnoses. In the multivariate model, a significant negative interaction effect remained for the diagnosis neurobiological development disorder (*t* = 2.915, *β* = 0.207). The estimate β of patients with a neurobiological development disorder (*β* = -.107), was weaker than the estimate β of patients with other psychiatric disorders (*β* = -.448) (Table 5.). This indicates that patients with a neurobiological development disorder had a weaker association between global functioning and disruptive behaviour.

Table 5. βeta estimates of Kennedy Axis V on the association with the BVC conducted with Standardized Scores

	β	***SEβ***	***95% CI***	***P-value***
Male	-.471	0.016	-.0502, -.441	0.000*
Female	-.400	0.014	-.428, -.373	0.000*
Age < 35	-.521	0.019	-.558, -.485	0.000*
Age ≥ 35	-.378	0.012	-.402, -.354	0.000*
Unit 1	-.679	0.030	-.737, -.621	0.000*
Unit 2	-.342	0.010	-.361, 0.321	0.000*
Mood or Anxiety disorder	-.313	0.015	-.341, -.284	0.000*
Other disorders than Mood or Anxiety	-.497	0.014	-.525, -.469	0.000*
Psychotic disorder	-.583	0.018	-.619, -.547	0.000*
Other disorders than psychotic disorder	-.295	0.012	-.317, -.272	0.000*
Personality disorder	-.279	0.027	-.332, -.226	0.000*
Other disorders than personality disorders	-.453	0.011	-.475, -.430	0.000*
Neurobiological development disorder	-.107	0.027	-.160, -.054	0.000*
Other disorders than neurobiological development disorder	-.448	0.011	-.469, -, 427	0.000*

DISCUSSION

The aim of this study was to examine the longitudinal association between global functioning and disruptive behaviour. Disruptive behaviour of a patient in the acute psychiatric care might be predicted and prevented by analysing the global functioning of a patient. Preventing disruptive behaviour assures coercion could be reduced to a minimum and the health, safety and wellbeing of both patient and staff could be improved. Global functioning and disruptive behaviour can both fluctuate in a matter of hours (Steinert et al., 2007). To find an association that is time-varying, a longitudinal database was used of registrations during 28 days of hospital admission of 483 patients from two acute psychiatric care units.

As expected, global functioning was negatively and moderately associated with disruptive behaviour over time. The association was found within the individual patient, indicating that a decrease in the global functioning of a patient increases the disruptive behaviour of this patient, or vice versa. In the final model, the subscales psychological functioning, social functioning and violence (to self/others) remained independently negatively and weakly associated with disruptive behaviour over time. Patients aged < 35 or diagnosed with a psychotic disorder demonstrated a stronger association compared to the other patients in the present study. Patients diagnosed with a neurobiological development disorder demonstrated a weaker association than the other patients in the present study.

Dynamic factors

The findings of this study showed that, global functioning was associated with disruptive behaviour over time. However, the causal direction is unclear. It is hypothesised that global functioning has an influence on disruptive behaviour as shown in fig. 1. As disruptive behaviour arises through different symptoms and behaviours that are part of the global functioning of a patient (Silver, as cited in Brendel, 2010). A change in the global functioning of a patient has an effect on development of disruptive behaviour of that patient, or vice versa. However, a decrease in global functioning does not have to be the cause of an increase of disruptive behaviour. It could also just indicate a worse global functioning of a patient and that disruptive behaviour may occur. To predict disruptive behaviour through the changes in the global functioning, the causal direction has to be confirmed. Further research is needed explained in 'Research implications and recommendations'.

In the current study we found that the subscale psychological functioning, social functioning and violence (to self/others) were significantly and independently associated with disruptive behaviour over time. This did not satisfy the expectation that also ADL had an independent association with disruptive behaviour. However, the results were in line with those of previous studies. In de study of van de Sande et al. (2013), psychological functioning and social functioning were both associated with seclusion. In the study of van de Sande et al. (2017), violence (to self/others) was associated with a higher likelihood of being secluded. Both studies do not indicate an association between ADL and seclusion. So, assuming that seclusion is a consequence of disruptive behaviour, they also did not find evidence that an association between ADL and disruptive behaviour exist. Furthermore, the study of Higgins and Purvis (2000) showed a strong correlation of ADL with psychological functioning and social functioning, which is in line with the result of the present study. This explains the association of ADL with disruptive behaviour in the univariate model and may explain its disappearance in the multivariate model. It is also interesting to note that violence (to self/others) has a low correlation with psychological functioning and social functioning such as in the study of Higgins and Purvis (2000). It is possible, therefore, that violence (to self/others) has an unique association with disruptive behaviour, possibly through the fact that violence (to self/others) similarities has with disruptive behaviour. The global functioning captures a broad scope of symptoms and skills. The association between the subscales and disruptive behaviour suggest that disruptive behaviour may arise from multidimensional aspects of a person's functioning. Monitoring the best predictors of disruptive behaviour might prevent disruptive behaviour.

Static factors

Some static factors of patients were related to a higher likelihood of disruptive behaviour. In this study we did not find higher scores on disruptive behaviour for male patients. Male patients had a lower score of disruptive behaviour compared with female patients. This is not in line with the higher likelihood of seclusion of male patients in previous studies (van de Sande et al., 2013). Male sex is one of the strongest individual predictors of violent behaviour according to Bonta et al., (as cited in Steinert & Whittington, 2013). It is possible that male patients have a higher likelihood of seclusion because they are considered to be more dangerous. Disruptive behaviour captures more than only violent behaviour and seclusion is a consequence of disruptive behaviour.

Furthermore, patients hospitalized with the diagnosis psychotic disorder had a higher risk of disruptive behaviour. Figure 11 showed how patients with a psychotic disorder had a higher score of disruptive behaviour over time compared with patients with another psychiatric disorder. This is in line with the study of Brendel et al., (2010) were patients with a psychotic disorder had a higher likelihood of disruptive behaviour.

Patients with a personality disorder have a strong association with disruptive behaviour (van de Sande et al., 2013; Brendel et al., 2010), this study was unable to demonstrated this conclusion. However, it is interesting to note, that patients with a personality disorder had an increase in disruptive behaviour after day 22. It might be possible that the chance of a crisis accompanied by self-destructive behaviour gets higher for these patients during hospitalization. On the other hand, there could be changes in treatment plans or other influential changes happening for these type of patients. Also, on day 22 the data-base consisted less patients. The data-base consisted only patients who were hospitalized of a longer period of time and had possibly a higher case load. This effects the interpretation of the data. In future research the hospitalization process of patients with a personality disorder is interesting to examine.

Some patients showed a stronger association between global functioning and disruptive behaviour. For the variable age, patients with aged < 35 had a stronger association. Also, patients with a psychotic disorder had a stronger association and patients with a neurobiological development disorder had a weaker association between global functioning and disruptive behaviour. Furthermore, we found a stronger association for patients hospitalised in Unit 1. A difference between the two units was present in age, sex and type of diagnose. The interaction effect can be confounded through age and the type of diagnose. It could be speculated that there were different types of methods used in the two units but eventually, it is unclear why unit 1

has a stronger association. In conclusion, the global functioning may be a better predictor of disruptive behaviour in some subgroups of patients.

Methodological strengths and weaknesses

The present study had some limitations. A clear limitation were the many missing values on the Kennedy Axis V (K-As) as a lot of patients had to be excluded from the data. The exclusion of patients with missing values was based on the mean percentage of missing values and may have let to sampling bias. Also, the data of the Brøset Violence Checklist (BVC) had a severely skewed distribution. A normal distribution of the data on the BVC could expand the validity of the study, but this is obviously not desired in the clinical acute psychiatric care. However, the number of data points collected in this study could be considered as reasonably high. Longitudinal studies in similar settings conducted in the Netherlands had weekly assessments (van de Sande et al., 2017) or were only conducted for the duration of one year (van de Sande et al., 2013). This study had data from daily assessments for the duration of three years conducted in two different acute psychiatric care units. Nevertheless the number of data points does not clear the problem of the skewed distribution of the BVC. In further research Generalized Linear Mixed Modelling (GLMM) can be used to better handle the skewed distribution of the dependent variable.

A strength of the present study was the scores of the subscales of global functioning. The score of the subscales expand the generalizability of the study. The mean score of the subscales were consistent with data obtained from the study of Higgins and Purvis (2000) who also showed that psychological functioning had the lowest mean and violence (to self/other) had the highest mean. In a longitudinal study conducted in a group of schizophrenic patients, psychological functioning had the lowest mean score compared the other subscales (Kennedy, 2003). Finally, the subscale violence (to self/other) had the highest mean compared to the other subscales in the study of van de Sande et al., (2013). The scores of the subscales are generalizable to the acute psychiatric care units in the Netherlands.

Another limitation of the present study was the clustering of the diagnoses. The diagnoses of the patients were clustered based on the classification system instead of symptoms of disruptive behaviour of a patient. A patient with a mood disorder might show different symptoms than a patient with anxiety and a patient with a borderline personality disorder shows different behaviour than a patient with an anti-social personality. This might have interfered the analyses of the association between the diagnoses and disruptive behaviour, and thereby the validity of the study.

Research implications and recommendations

To improve the health, safety and wellbeing of both patient and staff, coercion needs to be reduced to a minimum extend by preventing disruptive behaviour. Previous studies have revealed that disruptive behaviour needs to be controlled at an early stage (Faay et al., 2012; Steinert & Whittington, 2013). Therefore, integration of the use of the BVC and the K-As, assessed in daily reports, can help mental health professionals to identify current signals on psychological functioning, social functioning and violence (to self/other). Using these instruments on a daily basis during hospitalisation can support teams to analyse changes over time, because the patients global functioning can fluctuate in the matter of hours (Steinert el al., 2007). It gives more information for tailoring individualized treatment plans to prevent disruptive behaviour.

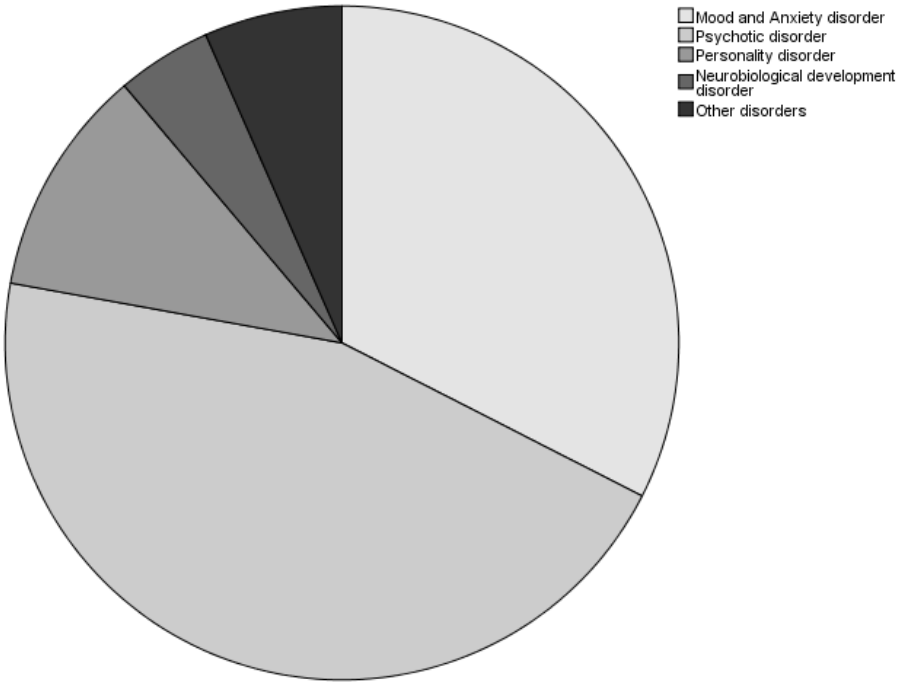
A next step is to analyse the direction of the association between global functioning and disruptive behaviour, for instance with a cross-lagged panel model. It is hypothesized that global functioning has an effect on disruptive behaviour. However, it is unknown to what extent global functioning influences disruptive behaviour, or vice versa. Also a deeper understanding of the process of disruptive behaviour and patterns in the global functioning within a patient is important to tailor individualized treatment plans. In a study conducted by van de Sande et al. (2013), a cut-off score of <30 for psychological- social functioning and <50 on violence (to self/others) was advised for the possible presence of violence behaviour. However, difference were found in subgroups of patients, personal cut-off scores as Kennedy (2003) recommend could be conducted through single-case studies. With a personal cut-off score on the subscales, the time to develop disruptive behaviour could be predicted with for instance survival analyses.

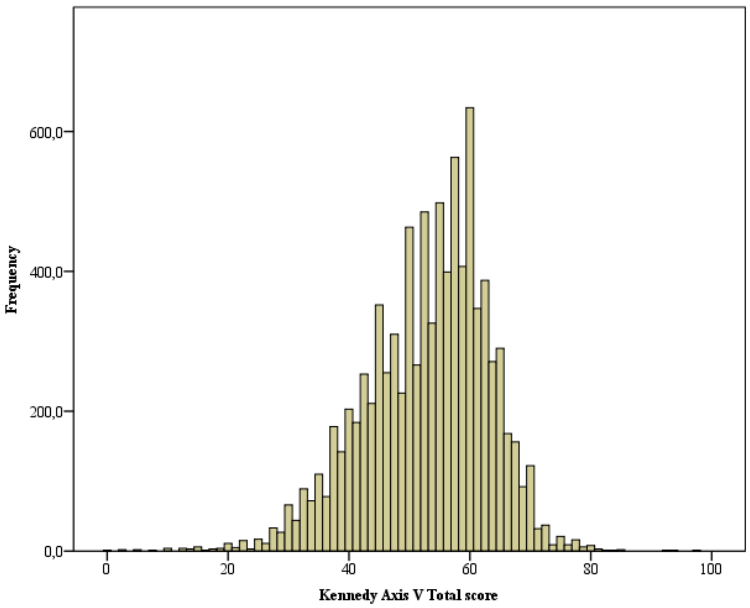
In the prediction of disruptive behaviour, the static factors have to be taken into account. The findings in the present study showed that patients aged < 35 and patients with a psychotic disorder had a stronger association between global functioning and disruptive behaviour. Also patients with a neurobiological development disorder showed a weaker association between global functioning and disruptive behaviour. Further research should be undertaken to explore the difference in the development of disruptive behaviour for the different static factors. This can be conducted by dichotomising the BVC score into < 2 and ≥ 2 according to van de Sande et al., (2013). If it is possible to look at these static factors and predict the development of disruptive behaviour it could be used to tailor and individualize treatment plans.

Conclusion

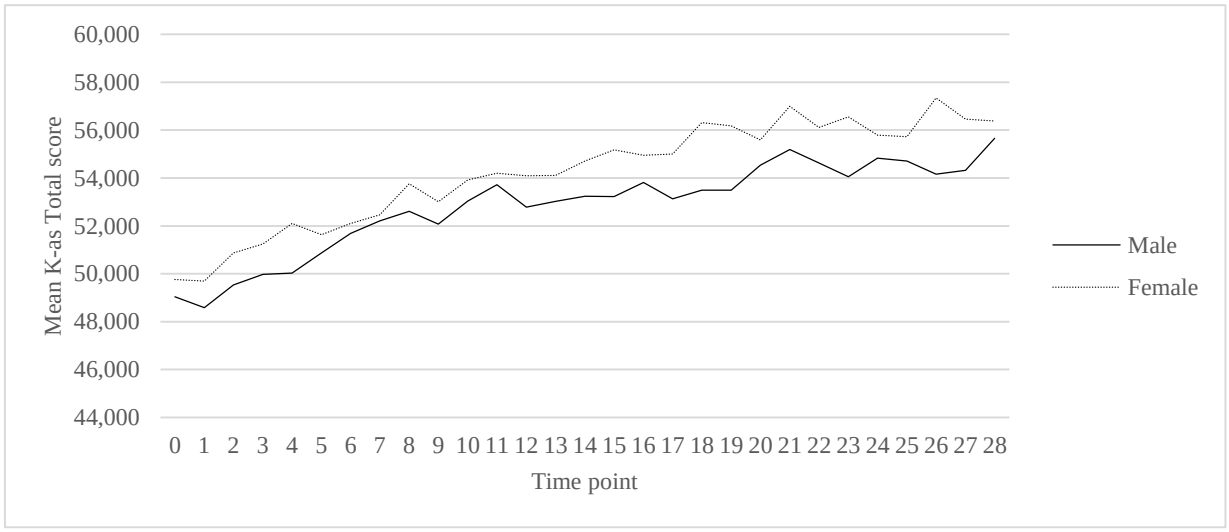
The current study focussed on the association between global functioning and disruptive behaviour and the influence of patient characteristics. The study showed that global functioning was associated with disruptive behaviour over time. Patients diagnosed with a psychotic disorder showed a higher score on disruptive behaviour. Psychological functioning, social functioning and violence (to self/others) were all associated with disruptive behaviour over time. These might be the best predictors of disruptive behaviour through their independent association. The global functioning may be a better predictor of disruptive behaviour for patients aged < 35 or patients with a psychotic disorder. In contrast to the weaker association of global functioning with disruptive behaviour at patients with a neurobiological development disorder. The within-patient analysed indicate that a change in a patients global functioning had influence on a patients disruptive behaviour, or vice versa. This indicate that the global functioning might be helpful in the prevention of disruptive behaviour. Further longitudinal research has analyse the predictive effect of a patients global functioning. So disruptive behaviour could be predicted and prevented.

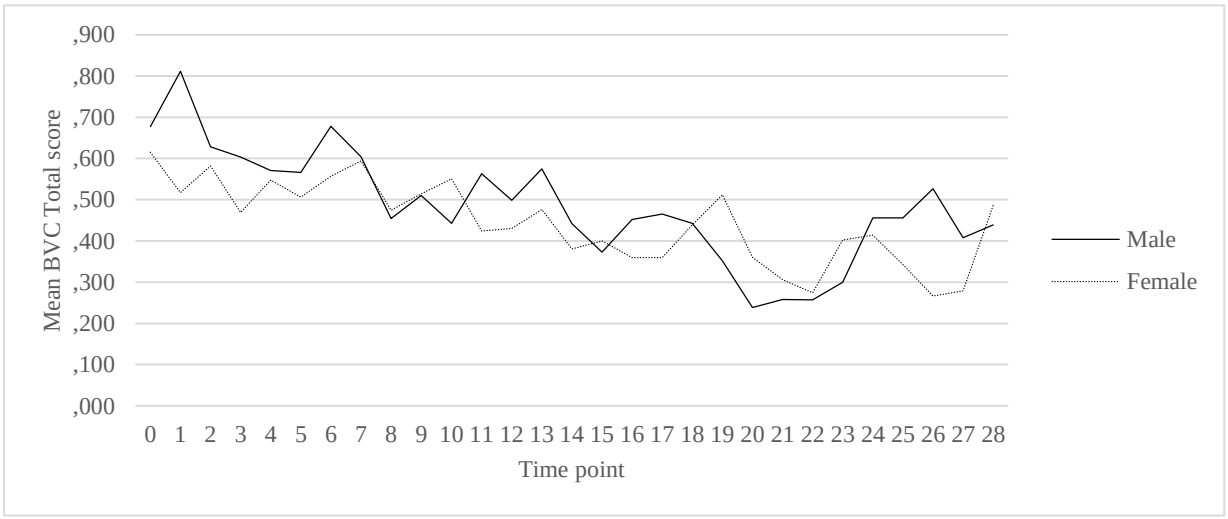
Appendix I

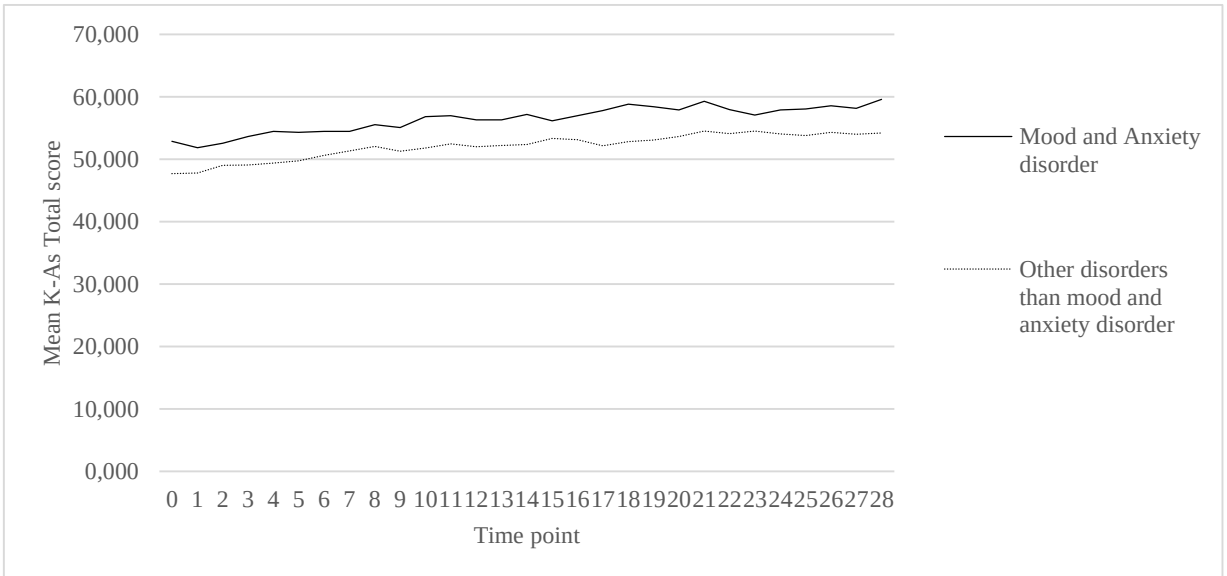

Mood and Anxiety disorder
Psychotic disorder
Personality disorder
Neurobiological development disorder
Other disorders

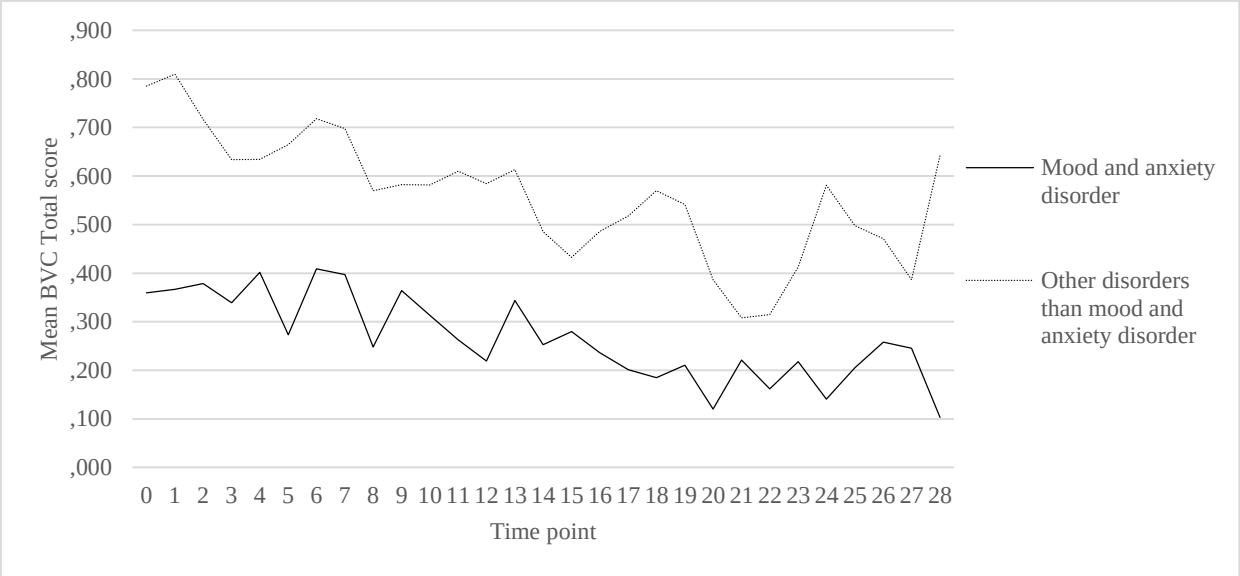

Frequency
600,0
400,0
200,0
0,0
0
20
40
60
80
100
Kennedy Axis V Total score

Appendix II Graph of Estimated Marginal Mean scores over time








,900
,800
,700
,600
,500
,400
,300
,200
,100
,000
Mean BVC Total score
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Time point
Mood and anxiety disorder
Other disorders than mood and anxiety disorder

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