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To cite this article: Almar J. Zwets, Ruud H. J. Hornsveld, Peter Muris, Thijs Kanters, Egbert Langstraat & Hjalmar J. C. van Marle (2016): Psychomotor Therapy as an Additive Intervention for Violent Forensic Psychiatric Inpatients: A Pilot Study, International Journal of Forensic Mental Health, DOI: [10.1080/14999013.2016.1152613](https://doi.org/10.1080/14999013.2016.1152613)

To link to this article: <http://dx.doi.org/10.1080/14999013.2016.1152613>



Published online: 30 Mar 2016.



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Psychomotor Therapy as an Additive Intervention for Violent Forensic Psychiatric Inpatients: A Pilot Study

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ABSTRACT

The first results of psychomotor therapy (PMT) as an additional component to Aggression Replacement Training (ART) were explored in a group of forensic psychiatric inpatients ($N = 37$). Patients were divided into two groups: ART+PMT (experimental group) and ART+Sports (control group). Primary outcome measures of aggression, anger, and social behavior, and secondary outcome measures of coping behavior and bodily awareness during anger were administered on three occasions: pretreatment, posttreatment (after 35 sessions), and follow-up (15 weeks after the final session). The combined group (experimental and control group) showed clinically significant improvements on observed social behavior, observed aggressive behavior, and self-reported anger, but there were no differences in treatment effects between the experimental group and the control group on these primary outcome measures. However, on secondary outcome measures of bodily awareness during anger and coping behavior, the experimental group displayed somewhat more improvement than the control group. Altogether, the results of this pilot study indicate that the addition of PMT to a treatment program for violent forensic inpatients may indeed result in improvements on specific treatment goals of PMT, whereas its effects on aggressive behavior needs further examination.

KEYWORDS

Psychomotor therapy; aggressive behavior; treatment outcome; psychopathy

Several treatment programs for forensic psychiatric inpatients with a personality disorder as their main diagnosis have yielded promising results (Bernstein, Nijman, Karos, Keulen-De Vos, & Lucker, 2012; Hornsveld, 2004a). Most of the interventions that appear to be beneficial for aggressive forensic inpatients include cognitive behavioral techniques (CBT; e.g., Lipsey, Landenberger, & Wilson, 2007; Lipton, Pearson, Cleland, & Yee, 2003). In The Netherlands, a special intervention has been developed for Dutch forensic psychiatric inpatients, which is largely based on the Aggression Replacement Training of Goldstein, Glick, and Gibbs (1998). This intervention comprises seven modules of five weekly sessions each, namely Anger management, Social skills, Moral reasoning, Prosocial thinking, Character formation, Prosocial network, and Attitudes towards women (Hornsveld, 2004a; Hornsveld, Soe-Agnie, Donker, & Van der Wal, 2008). The main objectives of this inpatient version of ART are that patients become more aware of their dysfunctional emotions, cognitions, and overt

behaviors, and that they learn to alter their behavior in such a way that they can achieve their goals in a socially acceptable way. A study on the effects of the ART version that only included the first three modules indicated that ART indeed produces positive results in both forensic psychiatric in- and outpatients (Hornsveld, Nijman, & Kraaimaat, 2008), although the authors also note that programs such as ART preferably should be a part of a more intensive intervention program that also targets other criminogenic factors.

Frequently applied additive interventions to CBT programs for violent offenders are arts therapies (Smeijsters & Cleven, 2006), such as music therapy (Hakvoort & Bogaerts, 2013), drama therapy (Thompson, 1999), and creative therapy (Bennink, Gussak, & Skowran, 2003). Another commonly indicated intervention for violent offenders is psychomotor therapy (PMT), which is an experience-based intervention during which patients learn to gain more control over their anger to prevent them from engaging in aggressive behavior (e.g., Boerhout &

Van der Weele, 2007; Langstraat, Van der Maas, & Hekking, 2011). Whereas cognitive-behavioral interventions focus on cognitive change and the improvement of social skills to prevent aggression, the main target of PMT for violent offenders is the physiological component of anger. A high level of anger-related arousal is considered to be a determinant of (impulsive) aggressive behavior because of its undermining effect on cognitive control processes (Kahneman, 2003; Olson & Fazio, 2009; Strack & Deutsch, 2004; Tyson, 1998). When patients are able to recognize bodily sensations as a component of anger and learn to deal effectively with these symptoms, they may gain more control over this emotion (e.g., Novaco, 2007; Tyson, 1998) and for this reason PMT has been proposed as a viable intervention for aggressive behavior (e.g., Langstraat et al., 2011; Zwets, Hornsveld, Kraaimaat, Kanters, Muris, & Van Marle, 2014).

The goal of the present study was to explore the results of PMT as an additive intervention for violent forensic psychiatric inpatients with a personality disorder who received ART. While ART focused on aggression-related cognition and behavior using a variety of generic CBT techniques, the main objective of PMT was to improve emotion regulation skills (bodily awareness during anger and coping behavior). Participants were randomly assigned to two groups: an experimental group that received ART+PMT or a control group that received ART+a placebo intervention that also focused on physical activity, namely Sports. So far, controlled studies on the treatment effects of PMT on aggressive behavior are sparse (e.g., Boerhout & Van der Weele, 2007; Langstraat et al., 2011) and most of these studies have only included primary outcome measures of anger or aggression. In the present study, secondary outcome measures for the evaluation of specific PMT treatment goals (i.e., recognition of bodily sensations during anger and improvement of coping skills) were also included. Because the present study only included a relatively small number of patients, which in addition were divided into two treatment groups, its statistical power was rather limited. Therefore, treatment effects were evaluated by the minimum clinically important difference (MCID) method (Jaeschke, Singer, & Guyatt, 1989), which provides a threshold for the smallest difference that can be regarded as a clinically meaningful change as compared to the pretreatment assessment (Lee, Whitehead, Jacques, & Julious, 2014).

It was hypothesized that both groups (ART+PMT and ART+Sports) would show a decrease in anger and aggression and an increase of prosocial behavior, with the ART+PMT group exhibiting more improvements than the ART+Sports group on measures related to the specific goals of PMT, namely bodily awareness during anger

and adaptive coping skills. Meanwhile, it should be kept in mind that although treatment programs for violent offenders often produce positive results, effect sizes are often fairly small (Dowden & Andrews, 2000; McGuire, 2013) and that this is particularly true for offenders with a personality disorder as their main diagnosis (e.g., Derks, 1996; Timmermans & Emmelkamp, 2005).

Since various studies have indicated that psychopathy (Hare, 1991) is associated with poor treatment outcome (e.g., Harris & Rice, 2006; Hemphill & Hart, 2002; Stokes, Dixon, & Beech, 2009; Olver, Stockdale, & Wormith, 2011), it was also explored whether psychopathy would be associated with a higher dropout rate. This is especially relevant within the context of the present study, because research has shown that psychopathy is related to deficits in the experience of emotions (e.g., Gao, Raine, & Schug, 2012; Nentjes, Meijer, Bernstein, Arntz, & Medendorp, 2013).

Method

Setting

The present study was conducted at Forensic Psychiatric Center “De Kijvelanden,” a facility with 178 beds in Poortugaal, The Netherlands. The patient-to-staff ratio is 1:1.8. Patients are accommodated on high-security wards for seven to fourteen patients. During a period of approximately four months after admission, the patients’ behaviors are observed on the ward, psychiatric and psychological evaluations are carried out, and a treatment plan is established. Depending on their dynamic criminogenic needs, patients receive specialized treatment programs (mostly cognitive-behavioral in nature) that focus on (sexual) violence (Hornsveld & Kanters, 2015; Hornsveld, Soe-Agnie et al., 2008), addiction, or chronic psychotic disorders (Lieberman, Wallace, & Blackwell, 1994). When indicated, they also follow additional treatment programs such as creative art therapy, and/or general education and occupational training. Pharmacotherapy is applied to patients with a psychotic disorder and to personality-disordered patients for whom it is indicated and who do not refuse medication.

Participants

In The Netherlands, offenders who have committed a crime that is punishable with a maximum imprisonment of more than four years (e.g., murder, manslaughter, aggravated assault, or rape) can be detained under TBS order. It concerns offenders who, based on an extensive psychiatric and/or psychological evaluation at a special assessment center of the Ministry of Security and Justice,

are judged to have diminished responsibility for the offense that they have committed (Van Marle, 2002). The current study included 37 male inpatients who were detained under TBS order because they had committed a severe violent offense. All of them were assigned to an ART intervention to reduce aggressive behavior. Patients with a psychotic disorder and patients with intellectual disabilities ($IQ < 80$) were excluded. These patients were offered an alternative program. In the current study, most patients met the criteria of an Axis II personality disorder as defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). Twenty-two of them (59.5%) had an antisocial personality disorder, 11 (29.7%) had a personality disorder not otherwise specified with cluster B traits (mostly antisocial), 2 (5.4%) had a narcissistic personality disorder, and 2 (5.4%) had a personality disorder not otherwise specified with cluster C traits. Furthermore, 20 of these patients (54.1%) had a substance abuse diagnosis on Axis I of the DSM-IV-TR, which was in remission at the time of the study. Twenty-two patients received the ART+PMT intervention (mean age = 35.45 years; $SD = 9.26$; range = 19–52 years) and 15 patients received ART+Sports (mean age = 33.73 years; $SD = 8.21$; range = 24–55 years). The mean psychopathy score of the total group, as measured with the Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003), was 23.53 ($SD = 8.42$). This average score was comparable to the mean PCL-R score of a larger sample of 269 Dutch forensic inpatients ($M = 21.82$; Zwets, Hornsveld, Neumann, Muris, & Van Marle, 2015). The ART+PMT group and the ART+Sports group did not differ significantly from each other with respect to age and psychopathy scores.

Twenty-seven patients (73.0%) completed the multimodal program (the extended version of ART in combination with either PMT or Sports). The data of two of these patients were incomplete because they refused to fill out the self-report questionnaires during the follow-up assessment. Ten patients (27.0%) were considered to be noncompleters as they did not finish the intervention.

Three of these patients did not complete the full program because they appeared to show very low levels of aggression on the ward and therefore the ART intervention was no longer considered to be indicated. One other patient dropped out because of a decision of the court to terminate treatment. Six patients were forced drop-outs because they continuously displayed serious misbehavior during the therapy sessions. Eventually, a total of 16 patients completed the combined ART+PMT program, and 11 patients completed the ART+Sports program.

Measures

In this study, four self-report questionnaires, an observation scale, and a semi-structured diagnostic interview were used for the evaluation of both conditions. Measures of aggressive behavior, anger, and prosocial behavior were considered as primary outcome measures, whereas measures of bodily awareness during anger and coping behavior were considered as secondary outcome measures. All outcome measures were administered on three occasions (Figure 1): pretreatment, posttreatment (after 25 sessions), and follow-up (15 weeks after the completion of 35 ART sessions).

Primary outcome measures

The *Aggression Questionnaire-Short Form* (AQ-SF; Bryant & Smith, 2001; Dutch version: Hornsveld, Muris, Kraaijmaat, & Meesters, 2009) is a short version of the Aggression Questionnaire (Buss & Perry, 1992) and contains 12 items that can be allocated to four subscales, namely Physical Aggression, Verbal Aggression, Anger, and Hostility. Respondents rate the items using a five-point scale ranging from 1 = “entirely disagree” to 5 = “entirely agree.” In the present study, only the AQ-SF total score was applied. Internal consistency was acceptable ($\alpha = .73$) and comparable with that obtained by Hornsveld, Muris et al. (2009) in a sample of 138 male forensic psychiatric inpatients. Furthermore, these authors found that the validity of the AQ-SF total score

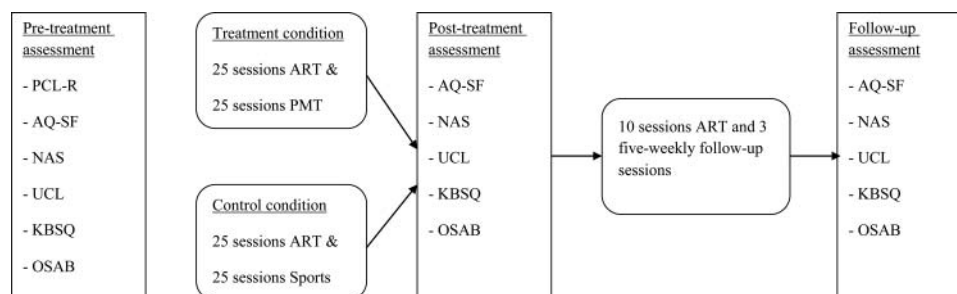


Figure 1. Study design: measures applied at the pretreatment, posttreatment and follow-up assessment.

was good as demonstrated by meaningful correlations with alternative measures of aggression.

The NAS part of the *Novaco Anger Scale-Provocation Inventory* (NAS-PI; Novaco, 1994; Dutch version: Hornsveld, Muris, & Kraaimaat, 2011) was used to measure self-reported anger. The 48 items of the NAS-PI are scored on a three-point Likert scale: 1 = *never true*, 2 = *sometimes true*, and 3 = *always true*. In the present study, the internal consistency of the NAS-PI at the pre-treatment measurement was excellent ($\alpha = .91$). This is in line with a study by Hornsveld et al. (2011) who also found very good internal consistency ($\alpha = .90$) and validity for this questionnaire in a sample of 142 male forensic psychiatric inpatients.

The *Observation Scale for Aggressive Behavior* (OSAB; Hornsveld, Nijman, Hollin, & Kraaimaat, 2007) assesses patients' behavior on the ward. The scale comprises 40 items representing the following subscales: Irritation/anger, Anxiety/gloominess, Aggressive behavior, Prosocial behavior, Antecedent, and Sanction. A staff member rates the behavior of the inpatients in the preceding week on a four-point scale ranging from 1 = *never* to 4 = *frequently*. The OSAB was completed by experienced staff members in the same week when the patients filled out the self-report questionnaires. In the present study, only the Aggressive behavior and the Prosocial behavior subscales were used. Internal consistency could not be computed for the present study because subscales were automatically created by the OSAB computer program. However, the psychometric properties of the OSAB were studied in a sample of 74 male forensic psychiatric inpatients (Hornsveld et al., 2007). Results indicated that the Aggressive behavior subscale had acceptable internal consistency ($\alpha = .79$) and moderate test-retest reliability ($r = .57$), whereas the Prosocial behavior subscale displayed excellent internal consistency ($\alpha = .93$) and acceptable test-retest reliability ($r = .79$). Furthermore, significant correlations were found with self-report measures of aggressive behavior and social behavior to support the validity of both subscales.

Secondary outcome measures

The *Utrecht Coping Scale* (UCL; Schreurs, Van de Wilige, Brosschot, Tellegen, & Graus, 1993) assesses several aspects of coping behavior. The respondent has to answer 47 items about specific coping behaviors on a four-point Likert scale ranging from 1 = *seldom or never* to 4 = *very often*. The questionnaire contains seven subscales that refer to coping strategies: Active problem solving (e.g., "Regarding problems as a challenge"), Social support (e.g., "Sharing your worries with somebody else"), Expression of emotions (e.g., "Showing your

annoyance"), Reassuring thoughts (e.g., "Thinking that after rain there will be sunshine"), Palliative response (e.g., "Trying to relax"), Avoidance (e.g., "Admitting in order to avoid difficult situations"), and Passive response (e.g., "Isolating yourself completely from others"). The subscales Avoidance and Passive response were considered as dysfunctional coping behaviors, whereas all other subscales were considered as adaptive coping behaviors. In the present study, the internal consistency coefficients of the subscales Palliative response ($\alpha = .71$) and Social support ($\alpha = .80$) were acceptable to good, whereas the internal consistency of the subscales Avoidance ($\alpha = .66$), Active problem solving ($\alpha = .65$), Expression of emotions ($\alpha = .62$), Reassuring thoughts ($\alpha = .59$), and Passive response ($\alpha = .56$) were in the modest to sufficient range. The psychometric properties of the UCL have not been studied in other forensic psychiatric samples. However, good validity and reliability have been demonstrated in the general population (Schreurs et al., 1993).

An abbreviated, three-item version of the *Anger Bodily Sensations Questionnaire* (ABSQ; Zwets et al., 2014), namely the Kijvelanden Bodily Sensations Questionnaire (KBSQ), was used to measure bodily awareness during anger. The items were: "Certain bodily sensations tell me that I am tense," "Anger is accompanied by sweating, a red skin, or shaking," and "When I am tense, I have physical symptoms, such as headache, muscle aches or stomach aches." They had to be scored on a five-point Likert-scale ranging from 1 = *entirely disagree* to 5 = *entirely agree*. The applicability of this three item version was investigated in a sample of 46 other forensic psychiatric patients with a cluster B disorder. Test-retest reliability was found to be sufficient ($r = .72$) and validity was supported by a positive correlation ($r = 0.31$, $p < 0.05$) with the *Somatic Awareness Questionnaire* (SAQ; Kolk, Schagen, & Hanewald, 2004).

Other measures

The *Psychopathy Checklist-Revised* (PCL-R; Hare, 1991, 2003; Dutch version: Vertommen, Verheul, De Ruiter, & Hildebrand, 2002) was employed to measure psychopathy. The checklist consists of 20 items, which have to be rated on a three-point scale with 0 = *does not apply*, 1 = *applies to some extent*, and 2 = *applies*. Vertommen et al. (2002) found support for the reliability of the Dutch version of the PCL-R in a group of 1,192 inmates. In the present study, the four-factor structure was used (Hare, 2003; Hare & Neumann, 2006), which implies the following facets: Interpersonal, Affective, Lifestyle, and Antisocial. Support for this four-factor structure was also

found in a comparable Dutch sample of 411 forensic psychiatric inpatients (Zwets et al., 2015).

Interventions: Psychomotor therapy, sports, and aggression replacement training

PMT (Langstraat et al., 2011) consisted of 25 weekly sessions of 90 minutes for a maximum of six patients per group (for an overview of the PMT treatment program, see Appendix A). Groups were trained by experienced psychomotor therapists, who all had a master's degree in psychomotricity. The therapists had a training protocol at their disposal, and patients had a workbook that included homework assignments. The goal of PMT is (1) to better recognize situations in which anger may occur, (2) to increase awareness of bodily sensations related to anger, (3) to be more accepting of anger as a normal emotional reaction, and (4) to improve anger and aggression regulation skills. In order to achieve the first goal, a personal inventory was constructed that included triggers and events that may result in anger and aggression. Patients received a registration form and had to make notes of each situation in which they experienced anger or aggression. Constructing an inventory of anger- or aggression-eliciting situations is considered to be the first step towards better emotion regulation (e.g., Feindler & Ecton, 1986).

Since offenders with an antisocial personality disorder usually show little emotional awareness in relation to their aggressive behavior (e.g., Gao, Raine, & Schug, 2012; Nentjes et al., 2013), improvement of their ability to recognize anger-related bodily sensations is also regarded as an important element of treatment programs for aggressive behavior (e.g., Novaco, 2007; Tyson, 1998). Therefore, during PMT, patients had to engage in situations that evoke emotions (i.e., role-playing in which the patient is confronted with anger-eliciting triggers) in order to improve awareness. During these exercises, the PMT therapist prompted the awareness of bodily sensations by asking the patients to focus on and describe their sensations.

To improve the acceptance of anger as a normal emotion, psychoeducation was provided in which it was explained that anger is an emotion which may be expressed in an appropriate way. Patients were explained that when people do not allow themselves to become angry and tend to suppress this emotion, this might increase the risk of aggressive outbursts to occur (Chambers, Gullone, & Allen, 2009). Therefore, patients had to learn to express their irritations and anger without becoming aggressive. These skills were first practiced during PMT sessions, but also had to be applied in real-life situations on the wards.

For the improvement of emotion regulation skills, patients practiced coping skills to reduce the evoked bodily sensations. This was achieved by using relaxation techniques (Jacobson, 1938; Sanderlin, 2001), impulse regulation exercises (Kuin, 2000), and elements from Sensory Awareness training. Finally, patients learned that emotion-related bodily sensations often reduce automatically after a certain period and that a time-out procedure may therefore also be helpful to reduce arousal.

The Sports intervention consisted of 25 weekly sessions of 90 minutes for a maximum of six patients per group, and included cardio workouts, such as running and cycling. The sports intervention was guided by at least one sports instructor. There were no treatment goals for this intervention and exercises were purely recreational. During the sessions, patients were allowed to communicate with each other.

The inpatient version of the ART consisted of 35 weekly training sessions of 90 minutes, 35 homework sessions of 45 minutes, and three follow-up sessions of 90 minutes (Hornsveld, Soe-Agnie et al., 2008). The follow-up sessions were provided at five, ten, and fifteen weeks after the final session. The inpatient ART is meant for groups with a maximum of six forensic psychiatric inpatients who have committed a violent offense, and was guided by two experienced clinical psychologists. Treatment manuals were available with detailed descriptions of each session, and patients received a workbook containing homework assignments (Hornsveld, 2004b; Hornsveld & De Vries, 2009). A more detailed description of the extended ART (Hornsveld, Soe-Agnie et al., 2008) is provided in Appendix B. In the present study, PMT and Sports sessions were provided in the same 25 weeks as the first 25 ART sessions.

Data analysis

As noted earlier, the present study applied the minimum clinically important difference (MCID) method (Jaeschke et al., 1989) because comparative statistical testing (i.e., between-group analyses of variance with repeated measures) was considered to be seriously underpowered given the small sample size. The MCID is an estimation of the clinically meaningful difference between measurements on various occasions. In this study, the distribution-based method was used to determine the MCID, which implies that the mean baseline *SD* score of the total sample has to be multiplied with 0.2 (i.e., small effect size; Samsa et al., 1999). When the mean difference between the pretreatment measurement and the posttreatment or follow-up measurement is larger than the MCID, that would suggest a clinically meaningful change between both measurement moments (Jaeschke et al., 1989).

Furthermore, effect sizes (Cohen's d ; Cohen, 1988) were calculated with the adjusted means and standard deviations to evaluate differences in change scores between measurements.

To explore whether psychopathy was related to treatment drop-out, multiple binomial regression analyses were carried out with the PCL-R. First, the total dataset was used to compare completers with noncompleters, who were defined as patients who did not complete the program due to any reason. For the second analysis, completers were compared with drop-outs, who were defined as patients who dropped out prematurely because they were forced by the therapists to stop with the program. It was expected that the PCL-R would be predictive in differentiating completers from noncompleters, and completers from drop-outs.

Results

Differences between groups at the pretreatment assessment

Before the start of treatment, t tests were conducted to compare the pretreatment scores between the ART+PMT and the ART+Sports groups. It was found that the mean OSAB Social behavior score of the ART+Sports group, $M = 34.21$, $SD = 5.37$, was significantly higher than the mean score of the ART+PMT group, $M = 30.36$, $SD = 5.58$, $t(34) = 2.05$, $p = .048$. No further significant differences between both groups were found for any of the primary and secondary outcome measures at the pretreatment measurement.

Primary outcome measures

Table 1 shows the mean scores and Cohen's d effect sizes on the four primary outcome measures (i.e., AQ-SF Aggression,

NAS Anger, OSAB Aggressive behavior, and OSAB Social behavior). Based on the MCID values, the combined group (ART+PMT and ART+Sports) showed improvements on two primary outcome measures (NAS Anger and OSAB Social behavior) at the posttreatment measurement and on three measures (NAS Anger, OSAB Aggressive behavior, and OSAB Social behavior) at the follow-up measurement. The combined group did not display a deterioration on any of the primary outcome measures. The ART+PMT group showed improvements on two subscales (NAS Anger and OSAB Social behavior) at the posttreatment measurement, but at the same time also displayed a deterioration on AQ-SF Aggression. The ART+Sports group improved on two primary outcome measures (AQ-SF Aggression and OSAB Aggressive behavior) and deteriorated on one outcome variable (OSAB Social behavior). At the follow-up measurement, the ART+PMT group improved on two primary outcome measures (NAS Anger and OSAB Social behavior) and deteriorated on none of the measures, whereas the ART+Sports group improved on one (OSAB Aggressive behavior) and showed deterioration on another primary outcome measure (OSAB Social behavior).

It should be noted that the effect sizes for the improvements that were documented on the primary outcome measures were mostly in the small to moderate range. The only exception to this rule concerned the treatment effect found within the PMT group on the OSAB social behavior measure, for which large effect sizes were observed for the improvement from pre- to post-treatment ($d = -0.90$) and from pretreatment to follow-up ($d = -1.19$).

Secondary outcome measures

Table 2 shows the mean scores and Cohen's d effect sizes on the secondary outcome measures (UCL and KBSQ). Based

Table 1. Mean scores and effect sizes on primary outcome measures in the total group ($N = 27$), the ART+PMT group ($n = 16$), and ART+sports group ($n = 11$).

Variable	Subscale	Group	Pretreatment	Posttreatment	Follow-up	Pretreatment vs.	Pretreatment vs. Follow-up
						Posttreatment	Cohen's d [95% CI]
AQ-SF	Total aggression (MCID = 1.18)	Total ($n = 25$)	29.20 (5.89)	29.12 (8.29)	28.72 (8.32)	0.01 [-0.54, 0.57]	0.07 [-0.49, 0.62]
		PMT ($n = 14$)	29.50 (5.50)	31.71 (7.31) ⁻	29.43 (8.73)	-0.34 [-1.09, 0.40]	0.01 [-0.73, 0.75]
		Sports ($n = 11$)	28.82 (6.62)	25.82 (8.61) ⁺	27.82 (8.08)	0.39 [-0.36, 1.14]	0.14 [-0.61, 0.88]
NAS	Anger (MCID = 2.30)	Total ($n = 25$)	84.56 (11.50)	81.76 (11.05) ⁺	82.08 (11.06) ⁺	0.25 [-0.31, 0.80]	0.22 [-0.34, 0.78]
		PMT ($n = 14$)	88.07 (9.68)	84.29 (10.52) ⁺	82.29 (13.10) ⁺	0.37 [-0.37, 1.12]	0.46 [-0.13, 1.05]
		Sports ($n = 11$)	80.09 (12.50)	78.55 (11.34)	81.82 (8.38)	0.13 [-0.71, 0.97]	-0.16 [-1.00, 0.67]
OSAB	Aggressive behavior (MCID = 1.22)	Total ($n = 27$)	17.81 (6.10)	17.56 (6.52)	16.33 (4.57) ⁺	0.04 [-0.49, 0.57]	0.27 [-0.26, 0.81]
		PMT ($n = 16$)	18.06 (6.10)	18.63 (6.28)	17.44 (5.22)	-0.09 [-0.79, 0.60]	0.11 [-0.58, 0.80]
		Sports ($n = 11$)	17.45 (6.15)	16.00 (6.84) ⁺	14.73 (2.94) ⁺	0.22 [-0.62, 1.06]	0.56 [-0.29, 1.42]
	Social behavior (MCID = 1.20)	Total ($n = 27$)	31.15 (5.99)	33.81 (6.15) ⁺	33.74 (5.17) ⁺	-0.44 [-0.98, 0.10]	-0.46 [-1.00, 0.08]
		PMT ($n = 16$)	29.56 (6.06)	35.25 (6.60) ⁺	35.75 (4.22) ⁺	-0.90 [-1.63, -0.17]	-1.19 [-1.94, -0.43]
		Sports ($n = 11$)	33.45 (5.32)	31.73 (4.98) ⁻	30.82 (5.19) ⁻	0.33 [-0.51, 1.18]	0.50 [-0.35, 1.35]

Note. MCID = minimum clinically important difference, AQ-SF = Aggression Questionnaire Short Form, NAS = Novaco Anger Scale, OSAB = Observation Scale for Aggressive Behavior, UCL = Utrecht Coping List, - = Clinically meaningful deterioration in comparison to the pretreatment assessment, + = Clinically meaningful improvement in comparison to the pretreatment assessment.

on the MCID values, the combined group (ART+PMT and ART+Sports) improved on two secondary outcome measures (UCL Expression of emotions and UCL Avoidance) at posttreatment, and on four measures (three UCL subscales and KBSQ Bodily awareness) at the follow-up measurement. The combined group did not display deterioration on any of the secondary outcome measures. The ART+PMT group improved on five secondary outcome measures (four UCL subscales and KBSQ Bodily awareness) at the posttreatment measurement and deteriorated on one (UCL Passive response), whereas the ART+Sports group improved on two secondary outcome measures (UCL Expression of emotions and Passive response) but also showed a deterioration on two measures (UCL Social support and Reassuring thoughts). At the follow-up measurement, the ART+PMT group improved on five secondary outcome measures (four UCL subscales and KBSQ Bodily awareness) and deteriorated on two subscales (UCL Active problem solving and Palliative response). The ART+Sports group improved on one measure (UCL Avoidance) but also deteriorated on another (UCL Reassuring thoughts). The effect sizes of the within-treatment improvements on the secondary outcome measures were all in the small to medium range.

Completers and noncompleters

To determine whether the PCL-R total score and facet scores could differentiate completers ($n = 27$) from non-completers ($n = 10$), several binomial logistic regression

analyses were carried out. Results show that the PCL-R could not significantly differentiate between completers and noncompleters. In a second analysis, it was investigated whether completers ($n = 27$) could be differentiated from drop-outs who were forced to drop out of the program because of their behavior during therapy ($n = 6$). For this analysis, four patients who dropped out prematurely because of a valid reason were removed from the dataset. Results (see Table 3) indicated that the PCL-R could independently differentiate completers from drop-outs, $B = 0.35$, $OR = 1.41$, $p = .037$. More specific, the interpersonal facet, $B = 0.45$, $OR = 1.57$, $p = .046$, and the lifestyle facet, $B = 1.24$, $OR = 3.45$, $p = .027$, of the PCL-R could differentiate completers from drop-outs.

Discussion

The first results of Psychomotor Therapy (PMT) were explored by comparing a group of forensic psychiatric inpatients who were treated with ART+PMT with a group of forensic psychiatric inpatients who received ART+Sports. Because of the small sample size, results were evaluated by the minimum clinically important difference (MCID) method. Although both groups showed some progression on the primary outcome measures, patients who completed the ART+PMT intervention showed more improvement than the patients of the ART+Sports condition on the secondary outcome measures. The ART+PMT group did not show better results

Table 2. Mean scores and effect sizes on secondary outcome measures of the total group ($N = 27$), the ART+PMT group ($n = 16$), and ART+sports group ($n = 11$).

Variable	Subscale	Group	Pretreatment	Posttreatment	Follow-Up	Pretreatment vs. Post treatment Cohen's d [95% CI]	Pretreatment vs. Follow-up Cohen's d [95% CI]
UCL	Active problem solving (MCID = 0.52)	Total ($n = 20$)	17.60 (2.62)	18.00 (3.29)	17.20 (2.65)	-0.13 [-0.76, 0.49]	0.15 [-0.47, 0.77]
		PMT ($n = 9$)	18.11 (2.62)	18.56 (3.78)	17.33 (2.69) -	-0.14 [-1.06, 0.79]	0.29 [-0.64, 1.22]
		Sports ($n = 11$)	17.18 (2.68)	17.55 (2.95)	17.09 (2.74)	-0.13 [-0.97, 0.71]	0.03 [-0.80, 0.87]
	Social support (MCID = 0.49)	Total ($n = 20$)	14.25 (2.43)	14.15 (3.12)	14.80 (3.50) +	0.04 [-0.58, 0.66]	-0.18 [-0.80, 0.44]
		PMT ($n = 9$)	14.22 (1.56)	14.78 (3.46) +	15.44 (2.30) +	-0.21 [-1.14, 0.72]	-0.62 [-1.57, 0.33]
		Sports ($n = 11$)	14.27 (3.04)	13.64 (2.87) -	14.27 (4.29)	0.21 [-0.63, 1.05]	0.00 [-0.84, 0.84]
	Expression of emotions (MCID = 0.30)	Total ($n = 20$)	6.90 (1.52)	7.55 (1.47) +	7.35 (1.18) +	-0.43 [-1.06, 0.19]	-0.33 [-0.95, 0.29]
		PMT ($n = 9$)	6.89 (1.05)	7.22 (1.30) +	7.56 (1.01) +	-0.28 [-1.21, 0.65]	-0.65 [-1.60, 0.30]
		Sports ($n = 11$)	6.91 (1.87)	7.82 (1.60) +	7.18 (1.33)	-0.52 [-1.37, 0.33]	-0.17 [-1.00, 0.67]
	Reassuring thoughts (MCID = 0.42)	Total ($n = 20$)	11.40 (2.09)	11.60 (2.52)	11.65 (2.18)	-0.09 [-0.71, 0.53]	-0.12 [-0.74, 0.50]
		PMT ($n = 9$)	11.22 (1.30)	12.33 (2.00) +	12.33 (1.94) +	-0.66 [-1.61, 0.29]	-0.67 [-1.62, 0.28]
		Sports ($n = 11$)	11.55 (2.62)	11.00 (2.83) -	11.09 (2.30) -	0.20 [-0.64, 1.04]	0.19 [-0.65, 1.02]
Palliative response (MCID = 0.65)	Total ($n = 20$)	18.80 (3.24)	19.05 (3.80)	18.40 (2.87)	-0.07 [-0.69, 0.55]	0.13 [-0.49, 0.75]	
	PMT ($n = 9$)	20.00 (2.69)	20.11 (2.93)	18.89 (2.93) -	-0.04 [-0.96, 0.88]	0.39 [-0.54, 1.33]	
	Sports ($n = 11$)	17.82 (3.43)	18.18 (4.33)	18.00 (2.90)	-0.09 [-0.93, 0.74]	-0.06 [-0.89, 0.78]	
Avoidance (MCID = 0.49)	Total ($n = 20$)	17.65 (2.43)	17.15 (2.52) +	16.50 (2.09) +	0.20 [-0.42, 0.82]	0.51 [-0.12, 1.14]	
	PMT ($n = 9$)	18.00 (2.96)	17.44 (1.74) +	16.56 (2.40) +	0.23 [-0.70, 1.16]	0.53 [-0.41, 1.47]	
	Sports ($n = 11$)	17.36 (2.01)	16.91 (3.08)	16.46 (1.92) +	0.17 [-0.66, 1.01]	0.46 [-0.39, 1.30]	
Passive response (MCID = 0.47)	Total ($n = 20$)	12.55 (2.33)	12.30 (2.49)	12.15 (1.93)	0.10 [-0.52, 0.72]	0.19 [-0.43, 0.81]	
	PMT ($n = 9$)	12.56 (2.60)	13.67 (2.60) -	12.11 (1.76)	-0.43 [-1.36, 0.51]	0.20 [-0.72, 1.13]	
	Sports ($n = 11$)	12.55 (2.21)	11.18 (1.83) +	12.18 (2.14)	0.68 [-0.18, 1.53]	0.17 [-0.67, 1.01]	
KBSQ Bodily Awareness (MCID = 0.56)	Total ($n = 20$)	9.45 (2.78)	9.85 (2.37)	10.25 (2.51) +	-0.15 [-0.78, 0.47]	-0.30 [-0.93, 0.32]	
	PMT ($n = 9$)	9.22 (3.42)	9.89 (2.37) +	10.56 (2.74) +	-0.23 [-1.15, 0.70]	-0.43 [-1.37, 0.50]	
	Sports ($n = 11$)	9.64 (2.29)	9.82 (2.48)	10.00 (2.41)	-0.08 [-0.91, 0.76]	-0.15 [-0.99, 0.68]	

Note. MCID = minimum clinically important difference, UCL = Utrecht Coping List, KBSQ = Kijvelanden Bodily Sensations Questionnaire, - = Clinically meaningful deterioration in comparison to the pretreatment assessment, + = Clinically meaningful improvement in comparison to the pretreatment assessment.

Table 3. Main results of the binary logistic regression analyses predicting completers versus drop-outs out of PCL-R scores.

Variable	Completers (<i>n</i> = 27) vs. drop-outs (<i>n</i> = 6)			
	Subscale	<i>B</i>	OR [95% CI]	<i>P</i>
PCL-R	Total	0.35	1.41 [1.02, 1.96]	.037
	Interpersonal	0.45	1.57 [1.01, 2.43]	.046
	Affective	1.36	3.89 [0.78, 19.41]	.098
	Lifestyle	1.24	3.45 [1.15, 10.31]	.027
	Antisocial	0.21	1.24 [0.83, 1.86]	.302

Note. PCL-R = Psychopathy Checklist – Revised.

than the ART+Sports group on the primary outcome measures referring to anger and aggression. Improvements were found on self-reported anger and observed social behavior in the ART+PMT group, but no meaningful differences were found on measures of self-reported and observed aggressive behavior. Altogether, this seems to indicate that the combination of ART and PMT did not result in additional reductions of aggressive behavior.

One explanation for the lack of a decrease in aggressive behavior in the ART+PMT group compared to the ART+Sports group might be related to certain treatment goals of PMT, namely the improvement of bodily awareness in anger-eliciting situations and the expression of anger in a socially accepted way. In order to achieve these goals, patients were repeatedly asked to practice these skills on the ward and had to report on how they showed their anger in their homework assignments. Psychomotor therapist and psychologists who provided ART and PMT also noted that some patients often showed their anger on the ward and that staff members reported to be surprised by the new way these patients expressed their feelings. As a result, it may well be that the increase in self-reported and observed aggression as observed by the staff members was actually a socially accepted expression of anger.

For the ART+Sports group, a decrease in observed and self-reported aggression was found which may be explained by the fact that sports are often associated with improvements in mood (e.g., Berger & Motl, 2000) and an amelioration of deficits in executive functions (Dishman et al., 2006), which both play a key role in the control of aggressive impulses (Krämer, Kopyciok, Richter, Rodriguez-Fornells, & Münte, 2011). Therefore, the ART+Sports group may actually have profited from the additional sports exercises.

The overall results on the primary outcome measures were mainly in the positive direction for the combined groups (ART+PMT and ART+Sports). Improvements were found on self-reported anger, observed aggression, and observed social behavior, whereas self-reported aggression did not change. These results are in line with

several other studies which have concluded that treatment programs on violent behavior generally only show small positive effects in violent offenders (e.g., Dowden & Andrews, 2000; Lipsey, Chapman, & Landenberger, 2001; McGuire, 2013). However, it has to be kept in mind that changes in aggressive behavior are often difficult to assess in a clinical environment. For example, a study by Hornsveld et al. (2014) showed that observed aggressive behavior did not change over a period of three years in a group of 70 forensic psychiatric inpatients with a personality disorder, whereas their prosocial behavior improved.

The results on the secondary outcome measures showed several clinically meaningful increases for the ART+PMT group, whereas most of these improvements were not found in the ART+Sports group. Improvements were particularly found on scales measuring the specific treatment goals of PMT, namely self-reported bodily awareness during anger, expression of emotions and reassuring thoughts. These findings would indicate that PMT may produce an additional effect to cognitive-behavioral programs for violent forensic psychiatric inpatients. However, although several improvements were found on coping behaviors, it should be noted that the instrument used to assess coping (i.e., the UCL) displayed modest reliability for several subscales. This means that the results involving these measures should be interpreted with caution.

Six patients were removed from the treatment group because of their disruptive behavior during the sessions, and tentative support was found suggesting that psychopathy may be predictive of these drop-outs. This result is in line with previous studies (Hemphill & Hart, 2002; Olver & Wong, 2009; Stokes, Dixon, & Beech, 2009), although one should be careful with drawing firm conclusions on the basis of the relatively small sample size of the present study. Psychomotor therapists regularly reported that patients with relatively high levels of psychopathy often had difficulties in recognizing bodily sensations during the exercises, which might be related to their deficits in the affective experience of emotions (e.g., Gao, Raine, & Schug, 2012; Nentjes et al., 2013). As a result, these patients repeatedly showed their discomfort during therapy to such an extent that they could no longer participate in the program and had to be removed from the treatment group. However, this disruptive behavior was not only displayed during PMT sessions but also during ART group sessions, which supports the assumption that psychopathy is related to treatment attrition in general (e.g., Olver, Stockdale, & Wormith, 2011).

The present study suffers from several limitations. First, it was not possible to compare a treatment group with a

nontreatment control group, mainly because the primary goal of a forensic psychiatric clinic is to provide treatment. Second, only a selection of patients completed the full program and were also willing to complete the questionnaires on all measurement moments, which points at the presence of a selection bias. We only evaluated the patients who completed the full treatment program (Treatment Received method; Sherman, 2003) and could not evaluate the results for the initial group, including noncompleters. Third, multiple self-report questionnaires were applied, which might be susceptible to socially desirable response tendencies (Gannon, Ward, & Collie, 2007; Kroner, Mills, & Morgan, 2007) and demand a certain level of insight from the respondents regarding their own psychological functioning (Hollin & Palmer, 2001). This limitation applies especially to the secondary outcome measures, which did not include any observed measures. Fourth, the self-reported and observed measures were probably influenced by the controlled environment of a forensic psychiatric hospital. Particularly aggression is difficult to assess in a highly structured environment, such as the FPC in the present study, because of its attenuating effect on aggressive behavior, resulting in a low base rate (e.g., Hornsveld et al., 2014; Vitacco et al., 2009). Fifth, several other factors which may have contributed to the treatment results were not assessed, such as motivation for treatment (Prochaska, Diclimente, & Norcross, 1992), length of stay in the hospital, living group climate, and applied pharmacotherapy (e.g., Coccaro & Kavoussi, 1997; Comai, Tau, Pavlovic, & Gobbi, 2012; Salzman et al., 1995). Sixth, the sample of the present study mainly consisted of patients with a personality disorder. Therefore, generalizability of the results to other violent offender samples cannot be done without caution. Seventh, the psychometric properties of several measures, including the PCL-R and OSAB could not be calculated in the present study. Although other studies (Hornsveld et al., 2007; Zwets et al., 2015) have indicated that these measures have sufficient psychometric properties in forensic psychiatric inpatients, it remains unclear whether this was also true in the current sample.

To our knowledge, the present study is the first to explore possible additional treatment effects of PMT as a component of a multimodal program for aggressive forensic inpatients. The present study indicated that the ART+PMT group may show the expected improvement on the secondary outcome measures, but that there may be no differences between the addition of PMT or Sports on the primary outcomes measures of aggression. Thus, for the time being, it remains unclear to what extent the inclusion of PMT may have additional positive effects for the main goal of a treatment program for violent

forensic psychiatric inpatients, i.e., the prevention of aggressive recidivism. However, the present study may point to possible directions for future research. For instance, the relation between improvements on bodily awareness and coping skills on the one hand and (future) anger and aggression on the other still can be a topic for further investigation. Furthermore, future research might also focus on the most optimal assessment of aggression in closed settings. At this moment, it remains unclear whether it is possible to assess aggression in a valid and reliable way in a closed setting (e.g., Hornsveld et al. 2014). Finally, because the present study was one of the first to explore the possible treatment effects of PMT, research with larger samples (e.g., multicenter studies) is needed to further evaluate the additional value of PMT as a supplementary treatment program for violent forensic inpatients.

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Appendix A

Psychomotor Therapy for violent forensic psychiatric inpatients

Sessions	Description and goals
1–6	Improving the awareness of bodily sensations. Patients are instructed to focus on their sensory perceptions in order to recognize possible changes within the body. During these exercises the patients can be at rest (e.g., focusing on breathing), but physical changes are also often provoked using physical exercises. During the homework assignments, patients are instructed to report a situation in which they focused exclusively on their sensory perceptions. Furthermore, learning to focus on bodily sensations is practiced repeatedly during the whole treatment program.
7–11	Practicing coping techniques, including (1) breathing exercises, (2) Jacobson's progressive muscle relaxation technique (1934, 1938), (3) reassuring thoughts, and the (4) time-out procedure. Every technique coping is practiced during the session, but also as homework assignment on the ward. All coping techniques are repeatedly practiced during the whole treatment program and during session 11, all techniques are practiced again in one single session.
12–13	Exercises that evoke an impulsive reaction to explore how a patient tends to respond during elevated levels of arousal (in a safe and structured treatment environment).
14–16	The personal triggers of frustration are explored for every individual patient. These triggers are first verbally explored and skills to cope with these situations are subsequently practiced during exercises (e.g., role-playing).
17	Exercises to provide insight in impulsive reflexes which are associated to aggression.
18–19	Patients practice communication skills during elevated levels of physiological arousal.
20–25	The aggression profile of each individual patient, which includes triggers which can lead to high levels of anger, possible reaction tendencies during anger, and protective skills which can help to decrease the level of anger. These protective skills are also practiced during these sessions.

Appendix B

Aggression Replacement Training for violent forensic psychiatric inpatients

Sessions	Description and goals
1–5	<i>Anger control.</i> Participants learn to recognize and manage feelings of irritation and anger more adequately. For that purpose, five aspects of problem situations are analyzed, namely (1) event, (2) thoughts, (3) feelings, (4) behavior, and (5) consequences
6–10	<i>Social Skills Training.</i> The focus is on the improvement of prosocial skills. Five skills are selected by the patients from a list of twelve skills. For each exercise, the patients receive a hand-out with possible targets ('What do you want to achieve?') and criteria ('Where do you pay attention to?').
11–15	<i>Moral Reasoning Training.</i> Patients take note of the prevailing norms and values and learn how to solve moral problematic situations.
16–20	<i>Prosocial thinking.</i> Knowing how to convert cognitions which may lead to antisocial behavior into cognitions which may lead to prosocial behavior. Five distorted cognitions are discussed, namely putting you in another's place, self-centeredness, minimizing, assuming the worst, and blaming others.
21–25	<i>Character formation.</i> Learning to focus on the short-term and long-term consequences of prosocial and antisocial behaviors. This is done on the basis of five themes, namely accountability, subservience, respect, cooperation, and honesty.
26–30	<i>Prosocial network.</i> Learning how to engage in prosocial contacts and how to hold off or to end antisocial contacts. Five problem situations are practiced, namely making acquaintance, making an appointment, intensifying a contact, informing others about your offense, and responding on a rejection.
31–35	<i>Attitude towards women.</i> Male patients learn how to behave towards women. Participants practice five problem situations, namely showing your need to intimacy, responding on a rejection, responding on approaches, intensifying the relation, and dealing with relational problems.