

# Testosterone-Lowering Medication and Its Association With Recidivism Risk in Individuals Convicted of Sexual Offenses

Sexual Abuse  
2021, Vol. 33(4) 475–500  
© The Author(s) 2020



Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/1079063220910723  
journals.sagepub.com/home/sax



Julia Sauter<sup>1,2</sup> , Daniel Turner<sup>3,4</sup>, Peer Briken<sup>4</sup>,  
and Martin Rettenberger<sup>2,5</sup> 

## Abstract

For a particular subgroup of individuals with severe paraphilic disorders and a high risk of sexual recidivism, the combination of sex drive-reducing medications and psychotherapy is a promising treatment approach. The present quasi-experimental study aims at comparing differences in clinical characteristics and dynamic risk factors between persons receiving (+TLM,  $n = 38$ ) versus not receiving (–TLM,  $n = 22$ ) testosterone-lowering medications (TLMs). Individuals receiving TLM were more frequently diagnosed with paraphilic disorders. Neither the criminal history nor average risk scores differed between the two groups. In the +TLM, Stable-2007 scores showed a stronger decrease after TLM treatment was started. This accounted especially for the general and sexual self-regulation subscales. Individual variations in risk, however, were not predicted by TLM but were significantly related to treatment duration and Psychopathy Checklist–Revised (PCL-R) Factor I. Paraphilic patients with problems in self-regulatory abilities seem to profit most from pharmacological sex drive-reducing treatment. Furthermore, therapists seem to underestimate deviant sexual fantasies in medicated patients.

<sup>1</sup>Charité–Universitätsmedizin Berlin, Germany

<sup>2</sup>Johannes Gutenberg-University Mainz, Germany

<sup>3</sup>University Medical Center Mainz, Germany

<sup>4</sup>University Medical Center Hamburg-Eppendorf, Germany

<sup>5</sup>Kriminologische Zentralstelle, Wiesbaden, Germany

## Corresponding Author:

Julia Sauter, Institute of Forensic Psychiatry, Charité—Universitätsmedizin Berlin, Oranienburger Str. 285 (Haus 10), Berlin 13437, Germany.

Email: julia.sauter@charite.de

**Keywords**

paraphilic disorder, antiandrogens, GnRH-agonists, sexual offender treatment, risk assessment

With the aim of preventing sexual recidivism by reducing sexual urges, fantasies, and behaviors, the treatment of individuals who committed sexual offenses with testosterone-lowering medication (TLM) has not only been established in Germany and Europe, but also in the Anglo-American area in the 1960s (Eher et al., 2007; Laschet & Laschet, 1967). While cyproterone acetate (CPA; Androcur<sup>®</sup>), a competitive testosterone antagonist, is preferably being used in European countries and Canada, medroxyprogesterone acetate (MPA; Depo-Provera<sup>®</sup>), a synthetic progestogen, has mainly been used in the United States. Since the 1990s, gonadotropin-releasing-hormone (GnRH)-agonists, such as leuprolide (Lupron<sup>®</sup>) and triptorelin (Decapeptyl<sup>®</sup>, Salvacyl<sup>®</sup>), have been introduced to the treatment of severe paraphilic disorders in individuals who have committed a sexual offense. In Germany, the use of triptorelin was approved by official authorities in 2009. Although not officially approved for the treatment of paraphilic disorders by the Food and Drug Administration (FDA) agency, in clinical practice, GnRH-agonists are frequently applied in the United States and Canada as well (McGrath et al., 2010; Turner et al., 2017).

With its desired and undesired effects, TLM can have a considerable impact on the physical integrity of the patient (Hebebrand et al., 2002; Hill et al., 2003) and long-term consequences have not yet been sufficiently studied (Koller, 2008; Turner & Briken, 2018). Nevertheless, the number of individuals convicted of sexual offenses and treated with TLM under a hospital treatment order (HTO) in German forensic psychiatric hospitals has substantially increased over the past decades. While 12% of all patients convicted of a sexual offense and placed in a forensic psychiatric hospital had been treated with CPA or GnRH-agonists in 2001 (Czerny et al., 2002), the number had increased to almost 16% in 2011 (Turner et al., 2013). Specifically, the number of patients convicted of sexual offenses and being treated with GnRH-agonists increased markedly during the according time period (Czerny et al., 2002; Turner et al., 2013, 2018). Given that sexually deviant interests are seen as one of the strongest predictors for sexual recidivism (Etzler et al., 2018; Hanson & Morton-Bourgon, 2005), TLM could be considered as a treatment option for all patients with severe sexual deviant interests as it may reduce the overall sex drive and sexual fantasies. However, due to the serious side effects, it should always be critically scrutinized whether or not there are any other kinds of treatment (e.g., psychotherapy) that could be equally effective for the individual patient (Association for the Treatment of Sexual Abusers [ATSA], 2012; Briken & Berner, 2010).

**Empirical Findings on the Efficacy of TLM Treatment**

Several studies have shown that CPA, MPA, and GnRH-agonists are all able to reduce sex drive as well as nondeviant and deviant sexual fantasies and behaviors (Ahn

et al., 2013; Bradford & Pawlak, 1993; Busmann & Finger, 2009; Cooper, 1981; Jordan et al., 2014; Koo et al., 2014; Moulner et al., 2012; Rösler & Witztum, 1998; Schober et al., 2005; Turner et al., 2013). Previous meta-analyses about the effectiveness of treatment on the rate of recidivism of individuals who committed sexual offenses have reported medium effect sizes for both hormonal treatments and cognitive behavioral therapy (Hall, 1995; Lösel & Schmucker, 2005). Despite these findings, in their current meta-analysis, Schmucker and Lösel (2015) could not find even one study on the efficacy of pharmacological treatments of individuals who have committed a sexual offense, which fulfilled their inclusion criteria. In contrast, Khan and colleagues (2015) conducted a Cochrane review and identified seven studies with sufficient methodological quality; however, due to the great heterogeneity of the study designs, control and experimental groups, and intervention forms, the authors could not conduct a meta-analytical review. Furthermore, the last randomized controlled trial (RCT) concerning the use of MPA or CPA was conducted in the early 1990s and RCTs about the effectiveness of GnRH-agonists are missing completely and will probably not be conducted in the near future due to ethical concerns (Briken et al., 2017). Taken together, the current state of research about the effects of pharmacological treatment options for severe sexual deviant individuals who committed sexual offenses has to be regarded as scarce.

A recent quasi-experimental study was able to show that the 25 individuals who committed a sexual offense and who have been treated with a combination of GnRH-agonists and cognitive behavioral therapy had a lower recidivism rate than the 22 individuals from the comparison group who were treated with cognitive behavioral therapy only (Gallo et al., 2018). While none of the patients who had been treated with GnRH-agonists reoffended sexually during the follow-up period ( $M = 5.7$  years,  $SD = 2.2$  years), one individual in the psychotherapy-only group (follow-up period:  $M = 6.4$  years,  $SD = 2.0$ ) committed a sexual reoffense although patients in the GnRH-agonist group had a significantly higher initial risk level. Furthermore, concerning violent recidivism, it was found that one patient (4.0%) in the GnRH-agonist treatment group reoffended with a violent offense, whereas four patients (18.2%) of the psychotherapy-only group were charged or convicted because of a new violent (including sexual) offense during the follow-up period. Although significant differences were found between the two groups, the low recidivism numbers limit the generalizability of the study results.

In a recently published study from Germany, 20 patients who had discontinued TLM treatment after the end of the supervision of conduct or because of severe side effects were compared with 20 patients who had not discontinued TLM treatment in the same forensic outpatient clinic in Berlin, Germany (Sauter et al., 2018). The patients for whom it was decided to stop TLM treatment were significantly older but showed no significant differences in risk(-needs) assessment (Level of Service Inventory-Revised [LSI-R], Andrews & Bonta, 2011; Stable-2007, Hanson et al., 2007; Static-99, Hanson & Thornton, 2000; Harris et al., 2003; HCR-20, Webster et al., 1997) or the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Up to now, 10% of the patients who had discontinued TLM treatment came into contact with offi-

cial authorities because of a new sexual offense, while a new sexual offense was documented in none of the patients for whom TLM treatment is still ongoing.

## The Course of Treatment and Treatment Outcomes

Briken et al. (2003) and Bradford (2001) were among the first to suggest that TLM treatment in individuals who committed sexual offenses should follow a risk-adapted approach. Current guidelines for the pharmacological treatment of paraphilic disorders in adults, published by the *World Federation of Societies of Biological Psychiatry* (WFSBP; Thibaut et al., 2010), also propose a risk-adapted approach: With increasing intensity of paraphilic urges and increasing risk to show sexually violent behaviors, psychotherapy alone should be accompanied by different kinds of pharmacological treatment: first, by selective serotonin reuptake inhibitors (SSRIs), second, in more severe cases of sexual deviance and a medium to high risk of sexual recidivism by CPA, and third, in most severe cases with the highest risk of sexual recidivism by the use of GnRH-agonists, possibly in combination with CPA.

Despite the existing treatment guidelines, the current treatment practice in Europe and North America cannot (yet) be described as uniform, mainly because of differing legal statutes regulating TLM treatment (Turner et al., 2017). In some countries, TLM is not used at all, others have the possibility of court-ordered mandatory TLM treatment and most countries provide TLM treatment on a voluntary basis only (Turner et al., 2017). While the number of institutions using TLM to treat individuals who have committed a sexual offense is comparable between Canada and Germany, TLM seems to be provided less frequently in the United States (McGrath et al., 2010; Turner et al., 2013). Furthermore, in Europe, TLM treatment seems to be applied most frequently in Eastern European countries (Turner et al., 2017).

Although the current guidelines provide useful and extensive recommendations concerning the question as to who should be treated with TLM, no recommendations are given about when and for whom the medication should be reduced or stopped again. In the context of an expert survey, apart from therapeutic variables (e.g., motivation and compliance) and patients' age, the level of control, duration of treatment, and the PCL-R score (Hare, 2003) were mentioned as important factors that should be considered before TLM treatment is terminated. With a PCL-R score above 25, the experts recommended not to stop the sex drive-reducing medication as a high value is associated with a high risk of recidivism (Briken et al., 2018). It can be assumed that the risk of recidivism increases again in this group without medical protection even after psychotherapeutic treatment. This expert recommendation corresponds to current scientific findings, suggesting that Facet 1 (affective) of the PCL-R significantly predicts decreased progress in therapy. Therapeutic progress, in turn, is associated with a decrease in sexual and violent relapses (Sewall & Olver, 2019).

So far, only little is known about the influence of TLM on the treatment process and possible treatment outcomes other than sexual recidivism or a reduction of sexual urges and sexual fantasies. Clinicians reported an increase in responsiveness to psychotherapy through the suppression of previously existing deviant sexual fantasies by

raising behavioral control and victim empathy (Bussmann & Finger, 2009). However, instruments developed for measuring offense-supporting attitudes, like rape myth acceptance or endorsement of violence, indicated no changes during treatment with a GnRH-agonist (Ahn et al., 2013). Furthermore, a German study showed that patients treated with TLM were considered earlier for home leave steps (e.g., regular activities or work outside prison/hospital and visits to family and friends) than nonmedicated patients who committed sexual offenses, probably because the risk of sexual recidivism was perceived to be lower in individuals being treated with TLM than in persons not being treated pharmacologically (Briken et al., 2009). Up to now, though, the possible risk-reducing effect of TLM treatment measured, for example, through a change in dynamic risk factors has not been tested.

## **Aim of the Present Study**

The aim of the present study was to identify differences in clinical characteristics and dynamic risk factors between persons receiving versus not receiving TLM. First, with reference to the indication algorithm presented in current treatment guidelines (Thibaut et al., 2010), it was expected that intense paraphilic sexual fantasies and urges, represented by a paraphilic disorder diagnosis, would be a precondition for treatment. It was also proposed that participants treated with psychotherapy and TLM had a more severe criminal history and a higher likelihood of sexual recidivism than the participants treated with psychotherapy but without TLM.

The main objective of the present study was to examine the association between TLM and reductions in criminogenic needs. It was hypothesized that the use of TLM would be associated with decreases in Stable-2007 scores (Hanson et al., 2007) in individuals convicted for a sexual offense and currently placed in a forensic psychiatric hospital. Corresponding with the current state of research, it was anticipated that patients with a higher PCL-R Factor 1 score would show less changes in the Stable-2007 (Sewall & Olver, 2019).

Finally, if TLM treatment actually leads to an increase in responsiveness to psychotherapy (Bussmann & Finger, 2009), patients and psychiatrists/psychotherapists should be able to communicate more openly, especially with regard to their sexual interests and fantasies. Therefore, changes in self-reported sexual fantasies were compared with the external assessments of the physician/psychotherapists' ratings, concerning the type of sexual fantasies of their patients, to examine the degree of correspondence between both ratings.

## **Method**

### *Participants*

On December 31, 2015, there were 481 (414 male and 67 female) patients treated under an HTO in Berlin, Germany. At T3 (June 30, 2016) there were 78 (16.2%) male patients who have been convicted for a sexual offense. After exclusion of 18 patients

(13 committed a sexual offense in an acute psychotic state, three deceased, one was diagnosed with Klinefelter's syndrome, and one was surgically castrated), the sample consisted of 60 participants, with 38 (63.3% of the study sample and 7.9% of the total sample) receiving medications to reduce their sex drive in addition to psychotherapeutic treatment (psychotherapy and TLM treatment [+TLM] group). Of these, 92.1% (35/38) received a GnRH-agonist (mainly Salvacyl® or Enantone®), 5.3% (2/38) a GnRH-agonist and CPA (Androcur®), and 2.6% (1/38) CPA only. None of the persons who had committed a sexual offense were treated with an SSRI to reduce their sex drive. The average duration of TLM treatment (i.e., treatment with a GnRH-agonist and/or CPA) was 7.6 years ( $SD = 3.6$ ). During the interview conducted between January and March 2015, the members of the +TLM were asked about their current sexual fantasies. Eight participants (21.1%) explained that they had completely lost their sexual fantasies; one person (2.6%) stated that he had no longer deviant, but still nondeviant, sexual fantasies; and 15 (39.5%) reported still existing deviant sexual fantasies.

Twenty-two (36.7%) of the 60 participants were treated psychotherapeutically but did not receive TLM (psychotherapy without TLM treatment [-TLM] group). Overall, 60% (36/60) took part in the interview, that is, 65.8% (25/38) of the +TLM and 50% (11/22) of the -TLM. External assessments could be acquired for 92.1% (35/38) of the +TLM and 86.3% (19/22) of the -TLM. At the time of the reporting date (June 30, 2016), the average age of participants from the +TLM was 48.5 years ( $SD = 10.6$ , range = 29.3–74.8), whereas the average age of patients from the -TLM was 44.0 years ( $SD = 13.1$ , range = 23.6–71.9),  $t(37.05) = 1.367$ ,  $p = .180$ .

### Study Design and Procedure

The German legal system is organized in a dual path: While culpable individuals are sent to prison, individuals who have committed severe offenses due to a mental illness can be referred to a psychiatric facility for treatment until they no longer represent a danger to the general public. In accordance with this legal requirement, the so-called HTO is a potentially open-ended treatment whose necessity for continuation is regularly monitored by the courts (for an extensive review of the different legal and medical contexts in which paraphilic patients are treated in Germany, see Briken et al., 2019).

Sociodemographic data, criminal history, and relevant treatment variables of our study participants were collected from the hospital treatment files. All mental disorder diagnoses were made during the initial assessment of the patient at the beginning of the stay at the forensic psychiatric hospital by the treating psychiatrist/psychotherapist, according to International Classification of Diseases–10th Revision (ICD-10), and were available in the treatment files as well. On the basis of all available information (treatment protocols, court judgments, experts' opinions at several time points, and interviews with participants from the previous year; see the section "Measures") PCL-R, Static-99, and Stable-2007 were rated retrospectively by the first author who has been extensively trained in the application of the abovementioned instruments.

Static-99 and Stable-2007 were used for risk-needs assessment. The Static-99 was rated once at the beginning of the project, whereas the Stable-2007 was repeatedly used, that is, (a) at the time of index offense (T1), (b) at the start of TLM (T2), and (c) at the reporting date (T3, June 30, 2016), on average 7.6 ( $SD = 3.6$ ) years after TLM treatment has started. For several reasons, we choose the time of the index offense (T1) for the initial risk assessment: On one hand, sufficient information was available about all persons at this time (conviction and expert opinion). In particular, the availability of a detailed expert opinion conducted immediately after the index offense for all persons allowed us to reliably score those Stable-2007 items related to emotional and affective functioning. On the other hand, some persons had already been in treatment at other places (e.g., prison, correctional facility, and external therapy facility) after the index offense but before the HTO was requested. Subsequently, it was examined as to what extent the individual changes between the index offense and the reference date can be attributed to TLM or other treatment- and risk-relevant variables.

Furthermore, between January and March 2015, all participants were asked to take part in a semi-structured interview. After a detailed explanation of the aim and design of the study, a signed informed consent form had to be returned to the first author. The participation was voluntary and was compensated with €10. The length of the semi-structured interviews was between 2 to 3 hr, including standardized questionnaires and other psychometric measures, and were conducted by the first author.

For the external assessment, semi-structured and standardized questionnaires were handed over to the treating physician/psychotherapist. The external assessments were returned between January and September 2015.

The ethical review board of the Department of Psychology at the Johannes Gutenberg-University Mainz (JGU), Germany, approved the present study.

## Measures

**Static-99.** The Static-99 (Hanson & Thornton, 2000; Harris et al., 2003) is the most commonly used risk assessment instrument for adult male individuals who have committed sexual offenses. It consists of 10 static risk factors: (a) age when exposed to risk, (b) any live-in intimate relationship for 2 or more years, (c) any index offense of nonsexual violence, (d) prior offenses of nonsexual violence, (e) prior charges or convictions for sexual offenses, (f) prior offenses in general, (g) any convictions for noncontact sexual offenses, (h) any unrelated victims, (i) any stranger victims, and (j) any male victims. Risk factors are added up to a maximum total score of 12. Individuals may be assigned to one of four risk categories (i.e., a total score of 0 to 1 indicating low, from 2 to 3 indicating medium-low, from 4 to 5 indicating medium-high, and from 6 to 10 indicating high risk) or to relative and absolute risk estimates by their Static-99 total scores. The interrater reliability of the Static-99 has been shown to be high (usually intraclass correlation coefficient [ICC]  $>.90$ ; Anderson & Hanson, 2010), which also holds for its German version (ICC =  $.98$ ; Rettenberger et al., 2010). Interrater reliability for this study was calculated for 17 randomly selected cases of the total sample ( $n = 60$  persons) at T1 (ICC =  $.93$ ,  $p < .001$ ; mixed on both



sides and absolute agreement). Recently, Helmus et al. (2012) argued that the age at the time of release should be weighted more heavily. This led to the development of a revised version of the Static-99, the Static-99R. Rettenberger et al. (2013) compared the predictive accuracy of the German version of the Static-99 and the new Static-99R in a population-based sample of prison-released individuals who have committed sexual offenses and revealed that the original Static-99 performed better than the age-corrected Static-99R. Therefore, the authors recommended the use of the original Static-99 rather than the Static-99R at least for German-speaking countries. The German-speaking version of the instrument was also shown to be a reliable and valid risk assessment measure in a sample of forensic patients deemed as high risk with predictive validities ranging from area under the curve (AUC) = .72 to AUC = .86 (Eher et al., 2013; Etzler et al., 2018).

**Stable-2007.** The Stable-2007 (Hanson et al., 2007) is an actuarial risk assessment tool that covers 13 stable-dynamic risk factors and addresses adult male individuals who have committed a sexual offense. It encompasses the following items: (a) Significant Social Influences, (b) Capacity for Relationship Stability, (c) Emotional Identification with Children, (d) Hostility Toward Women, (e) General Social Rejection/Loneliness, (f) Lack of Concern for Others, (g) Impulsive Acts, (h) Poor Cognitive Problem Solving, (i) Negative Emotionality/Hostility, (j) Sex Drive/Preoccupation, (k) Sex as Coping, (l) Deviant Sexual Interests, and (m) Cooperation with Supervision. Rating of the Stable-2007 requires a semi-structured interview and a comprehensive file review of the individuals' criminal history. Each item is scored on a 3-point rating scale, with 0 = *no problem*, 1 = *some concern/slight problem*, and 2 = *present/definite concern*. In accordance with the classification system proposed by McGraw and Wong (1996; ICC[A,1]; random effects, single measure, and absolute agreement), the interrater reliability (ICC = .90,  $p < .001$ ) for the German version of the Stable-2007 can be regarded as excellent (Rettenberger et al., 2011). For this study, interrater reliability was calculated for 17 randomly selected cases of the total sample ( $n = 60$  persons) at T1 (ICC = .94,  $p < .001$ ; mixed on both sides and absolute agreement). Similarly, the predictive and incremental validity of the instrument provided evidence for its predictive quality also in the German-speaking area (e.g., Etzler et al., 2018). Previous studies have mainly found medium-sized predictive validities ranging from AUC = .62 to AUC = .71 (Eher et al., 2013; Etzler et al., 2018).

**PCL-R.** The PCL-R is a diagnostic tool for measuring psychopathic traits (Hare, 2003). Although it is not a risk assessment instrument, it has consistently shown to predict violence with moderate effect sizes in both prison and forensic psychiatric populations (e.g., Quinsey et al., 1995; Salekin et al., 1996). The PCL-R total score ranges from 0 to 40 points and is obtained by summing up the 20 individual item scores. The scores can be categorized in levels of psychopathy, with 0 to 16 indicating a low level, 17 to 24 a medium level, and  $\geq 24$  a high level of psychopathy (Hare, 2003). The PCL-R measures psychopathic traits on two superordinate factors. Factor I is labeled as the selfish, callous, and remorseless use of others and consists of two facets (Facet 1 =



interpersonal, for example, superficial charm, grandiose sense of self-worth, and manipulative, and Facet 2 = affective, for example, lack of remorse or guilt and failure to accept responsibility for actions). Factor 2, on the contrary, is labeled as a chronically unstable, antisocial, and socially deviant lifestyle (Facet 3 = lifestyle, for example, need for stimulations, parasitic lifestyle, and lack of realistic long-term goals, and Facet 4 = antisocial, for example, poor behavioral control and early behavior problems; Hare & Neumann, 2008). For the German version of the PCL-R, the interrater reliability ( $n = 35$ , ICC = .77, one-way random and single measure) can also be regarded as substantial (Mokros et al., 2017). A meta-analysis conducted exclusively with data from German-speaking countries indicated that the PCL-R is also, in these countries, a reliable and valid measure of psychopathy and a viable instrument for the prediction of violent recidivism, with predictive validities ranging from AUC = .64 to AUC = .84 (Mokros et al., 2014).

*Interviews with the participants.* Among various other questions, the participants were asked about their current sexual fantasies, using a forced choice decision (predominantly not deviant/predominantly deviant/not specified). Furthermore, patients currently being treated with TLM were asked in an open question about the impact of TLM on their sexual fantasies (“Have your sexual fantasies changed since the beginning of TLM?”). Answers were subsequently assigned to four categories (complete loss of sexual fantasies/loss of paraphilic sexual fantasies/still deviant sexual fantasies, but no drive anymore/no answer). All interviews were conducted in 2015 by the first author. As the files could only be examined in 2016, the researchers were blind to any external assessment at the time of the interviews. Apart from the fact that the person to be interviewed was under an HTO due to a sexual offense, no information was available to the interviewer. Information about a possible TLM treatment (+TLM or -TLM), diagnoses, and risk assessment became available to the author only after the examination of the treatment files.

*External assessment.* In the questionnaire, the treating psychiatrists/psychotherapists were asked about their opinion concerning the sexual fantasies of their patients, using a forced choice decision (not deviant/deviant). Afterward, they were asked to give their impression of the patients’ openness regarding the description of the sexual fantasies they had obtained from the patients during the psychotherapeutic process (credible/not credible).

### *Statistical Analyses*

To find out whether or not the +TLM and the -TLM groups differ concerning sociodemographic, clinical, and criminological variables, chi-square analyses and a one-way multivariate analysis of variance (MANOVA) were used. One-way repeated measure analyses of variance (ANOVAs) were conducted to evaluate potential changes in Stable-2007 and its subscales by using the three survey times for the +TLM (T1, T2, and T3) and two for -TLM (T1 and T3). Corrections according to Greenhouse and

Geisser (1959) were applied. For a more detailed investigation of the influence of group membership (TLM: yes/no) on the changes in Stable-2007, analyses of covariance (ANCOVAs) using the  $z$ -standardized difference values were calculated to control for the initial risk in the Stable-2007 or its subscales at T1. Partial  $\eta^2$  was used as effect size, whereby according to Cohen (1988), values of 0.01, 0.06, and 0.14 have been interpreted as small, medium, and large effects.

After controlling for the pretreatment risk scores of the Stable-2007 (T1) as well as the current age of the patient, unstandardized residuals were regressed stepwise on TLM, the PCL-R Factor I score, and the duration of the HTO. Unstandardized residuals were taken from a linear regression with Stable-2007 values at the time of the index offense (T1, independent variable) and at reporting date (T3, dependent variable) because these numbers can be interpreted as the individual variation of each participant from the sample average trend of changing risk level as measured by the Stable-2007. The advantage of using residuals in comparison with simple difference values is that the measurement error is not added up, that is, the partialized effect can be interpreted (Petermann, 1978). Therefore, the residuals can be considered as an index of individual treatment progress in relation to the average change of the sample controlling for risk-relevant covariates. All variables, including the binary dummy variable TLM ( $-0.5 = \text{no}/+0.5 = \text{yes}$ ), were mean centered to increase accuracy of parameter estimation and the power of the statistical analyses (Kraemer & Blasey, 2004). For all tests, alpha level was set at  $p < .050$ . Statistical analyses were performed using SPSS Statistics for Windows, Version 24.0 (Armonk, NY: IBM, 2016).

## Results

### *Sociodemographic, Clinical, and Criminological Differences*

The most frequent diagnoses across both groups were paraphilic disorders followed by personality disorders and mental disability (see Table 1). Individuals from the +TLM group were more frequently diagnosed with a paraphilic disorder compared with individuals from the -TLM group,  $\chi^2_{(1, 60)} = 18.675$ ,  $\phi = .56$ ,  $p < .001$ . Neither did the frequency of the other mental disorders differ between the two groups nor did we find any differences concerning the index offense,  $\chi^2_{(2, 60)} = 3.245$ , Cramer's  $V = .23$ ,  $p = .222$ , or the criminal history (see Table 2). Nevertheless, there was a highly significant difference in the duration of HTO, with the +TLM group already staying several years longer in the forensic psychiatric hospital than individuals from the -TLM group.

Neither the PCL-R nor the Static-99 total score differed between the two groups at T1 (see Table 2). On average, both groups showed a medium level of psychopathy and could be considered as high risk based on the Static-99 mean score. Furthermore, at T1 and T3, both groups were on average in the highest Stable-2007 risk category. However, at T1, patients from the +TLM had significantly higher scores in the *General* and *Sexual Self-regulation* subscales, whereas this difference was no longer observable at T3.

**Table 1.** Diagnoses According to ICD-10 and Kind of Index Offense of the Treatment Group With TLM (+TLM,  $n = 38$ ) and Without TLM (-TLM,  $n = 22$ ).

Variable	+TLM		-TLM	
	<i>n</i>	%	<i>n</i>	%
Personality disorders	25	65.8	17	77.3
Schizoid	4	10.5	—	—
Antisocial	3	7.9	7	31.8
Narcissistic	6	15.8	—	—
Emotionally unstable/borderline	3	7.9	5	22.7
Anxiously avoiding	1	2.6	2	9.1
Combined (mainly antisocial and narcissistic)	8	21.1	3	13.6
Paraphilic disorders	35	92.1	9	40.9
Pedophilia	16	42.1	5	22.7
Sadism	12	31.6	2	9.1
Fetishism	3	7.9	—	—
Fetishistic transvestism	1	2.6	—	—
Exhibitionism	—	—	1	4.5
Other sexual disorders (i.e., cannibalism, and hypersexuality)	8	21.1	3	13.6
Mental disability	6	15.8	2	9.1
Transgender	1	2.6	1	4.5
Schizophrenia	2	5.3	2	9.1
Addiction <sup>a</sup>	7	18.4	7	31.8
Sexually motivated homicide	8	21.1	2	9.1
Rape/sexual assault against adults	17	44.7	15	68.1
Sexual abuse of children	13	34.2	5	22.7

Note. As some patients had several diagnoses, the numbers do not add up to 100%. ICD = International Classification of Diseases; TLM = testosterone-lowering medications.

<sup>a</sup>Always as comorbid disorder.

### Change Measurements Using Stable-2007

*Changes over the different survey times.* The results of the ANOVAs indicated a significant decrease in the Stable-2007 sum score over time in both groups (see Table 3). In the + TLM, significant changes could be observed in both time periods, in the time between index offense and start of TLM treatment (time without TLM treatment; T1-T2:  $p < .001$ ) as well as between the start of TLM treatment and the reference date (psychotherapeutic and TLM treatment; T2-T3:  $p < .001$ ), whereby the change after the start of TLM treatment was more pronounced ( $\eta_p^2 = .48$  vs.  $.68$ ). Thereby, only after the start of TLM treatment significant reductions in the subscales, *Significant Social Influences* (T1-T2:  $\eta_p^2 = .02$ ,  $p = .422$ ; T2-T3:  $\eta_p^2 = .13$ ,  $p = .023$ ), *General Self-regulation* (T1-T2:  $\eta_p^2 = .10$ ,  $p = .057$ ; T2-T3:  $\eta_p^2 = .45$ ,  $p < .001$ ), and *Sexual Self-regulation* (T1-T2:  $\eta_p^2 = .07$ ,  $p = .096$ ; T2-T3:  $\eta_p^2 = .60$ ,  $p < .001$ ), were

**Table 2.** Differences Regarding Criminal History, PCL-R, and Risk(-Needs) Assessment Between the Treatment Group With TLM (+TLM,  $n = 38$ ) and Without TLM (-TLM,  $n = 22$ ).

Variable	+TLM		-TLM		$M_{Diff}^a$	Comparison		
	M	SD	M	SD		F	df	$\eta_p^2$
Number of convictions <sup>b</sup>	4.7	4.0	5.1	5.9	- 0.9	2.77	1, 58	.00
Violent convictions <sup>b</sup>	1.0	1.5	1.1	1.2	+ 0.2	0.13	1, 58	.00
Sexual convictions <sup>b</sup>	1.6	1.3	1.3	1.4	+ 0.1	0.86	1, 58	.02
Age at first conviction	18.9	5.6	19.7	6.3	- 0.7	0.21	1, 58	.00
Age at first sexual offense	21.9	7.9	23.4	8.3	- 1.6	0.53	1, 58	.01
Age at index offense	28.8	9.3	32.6	11.4	- 3.8	2.03	1, 58	.03
Imprisonment exp. <sup>b,c</sup>	5.4	7.0	5.2	5.4	+ 1.2	0.02	1, 58	.00
Duration of HTO <sup>c</sup>	17.8	6.9	10.4	6.4	+ 7.4	16.77	1, 58	.22***
PCL-R	17.7	7.5	17.3	6.8	+ 0.4	0.04	1, 58	.00
PCL-R I	7.7	3.8	6.9	3.9	+ 0.8	0.59	1, 58	.01
PCL-R II	8.8	4.9	9.1	3.7	- 0.3	0.07	1, 58	.00
Static-99	5.8	1.8	5.8	1.3	0.0	0.00	1, 58	.00
STABLE 2007 (T1)	17.4	3.1	16.6	2.3	+ 0.9	1.30	1, 58	.02
STABLE 2007 (T3)	13.6	3.3	13.9	4.2	- 0.3	0.10	1, 58	.00
SSI (T1)	1.4	0.7	1.4	0.7	0.0	0.00	1, 58	.00
SSI (T3)	1.3	0.7	1.3	0.8	0.0	0.01	1, 58	.00
ID (T1)	6.3	1.5	6.2	1.4	+ 0.2	0.17	1, 58	.00
ID (T3)	5.4	1.6	5.5	1.7	- 0.1	0.09	1, 58	.00
GSR (T1)	4.1	1.3	4.8	1.1	- 0.7	4.91	1, 58	.08*
GSR (T3)	3.3	1.4	3.6	1.5	- 0.3	0.61	1, 58	.01
SSR (T1)	4.0	1.3	2.6	1.1	+ 1.4	19.07	1, 58	.25***
SSR (T3)	2.7	0.9	2.3	1.1	+ 0.5	3.02	1, 58	.05
CWS (T1)	1.7	0.5	1.7	0.6	0.0	0.00	1, 58	.00
CWS (T3)	0.9	0.6	1.2	0.8	- 0.4	0.06	1, 58	.06

Note. PCL-R = Psychopathy Checklist-Revised; TLM = testosterone-lowering medications; +TLM = psychotherapy +TLM treatment group; -TLM = psychotherapy -TLM treatment group;  $M_{Diff}$  = mean difference;  $df$  = degrees of freedom; imprisonment exp = imprisonment experience; duration of HTO = duration of the hospital treatment order at reporting date (June 30, 2016); HTO = hospital treatment order; PCL-R I = PCL-R (Factor I); PCL-R II = PCL-R (Factor II); T1 = index offense; T3 = reporting date (June 30, 2016); SSI = significant social influence; ID = intimacy deficits; GSR = general self-regulation; SSR = sexual self-regulation; CWS = cooperation with supervision.

<sup>a</sup> $M_{Diff} = M_{+TLM} - M_{-TLM}$ . <sup>b</sup>Without index offense. <sup>c</sup>In years.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

observable. The subscales, *Intimacy Deficits* (T1-T2:  $\eta_p^2 = .27, p < .001$ , T2-T3:  $\eta_p^2 = .33, p < .001$ ) and *Cooperation with Supervision* (T1-T2:  $\eta_p^2 = .45, p < .001$ ; T2-T3:  $\eta_p^2 = .24, p = .002$ ), showed significant improvements before and after the start of TLM treatment.

**Table 3.** Changes Over the Different Survey Times Measured by Stable-2007 (Treatment Group With TLM + TLM,  $n = 38$ , and Without TLM -TLM,  $n = 22$ ).

Variable	T1 Index offense		T2 Start TLM		T3 Reporting date		Comparison (three or two survey times)	
	M (SD)	95% CI	M (SD)	95% CI	M (SD)	95% CI	F	df
Stable-2007	+TLM	17.4 (3.1) [16.4, 18.5]	16.2 (3.5) [15.1, 17.4]	13.6 (3.3) [12.5, 14.6]	89.60	1.5	.71***	
	-TLM	16.6 (2.3) [15.6, 17.6]		13.9 (4.2) [12.0, 15.7]	12.00	1.0	.36***	
SSI	+TLM	1.4 (0.7) [1.1, 1.6]	1.4 (0.7) [1.2, 1.6]	1.3 (0.7) [1.0, 1.5]	1.76	1.5	.05	
	-TLM	1.4 (0.7) [1.1, 1.7]		1.3 (0.8) [0.9, 1.6]	1.00	1.0	.05	
ID	+TLM	6.3 (1.5) [5.9, 6.8]	5.9 (1.6) [5.4, 6.4]	5.4 (1.6) [4.8, 5.9]	20.84	1.4	.36***	
	-TLM	6.2 (1.4) [5.6, 6.8]		5.5 (1.7) [4.8, 6.2]	6.18	1.0	.23*	
GSR	+TLM	4.1 (1.3) [3.6, 4.5]	3.9 (1.4) [3.5, 4.4]	3.3 (1.4) [2.8, 3.8]	28.20	1.6	.43***	
	-TLM	4.8 (1.1) [4.3, 5.3]		3.6 (1.5) [2.9, 4.3]	10.90	1.0	.34***	
SSR	+TLM	4.0 (1.3) [3.5, 4.4]	3.8 (1.2) [3.4, 4.2]	2.7 (0.9) [2.4, 3.0]	47.02	1.3	.56***	
	-TLM	2.6 (1.1) [2.1, 3.0]		2.3 (1.1) [1.8, 2.8]	4.11	1.0	.16	
CWS	+TLM	1.7 (0.5) [1.5, 1.8]	1.2 (0.6) [1.0, 1.4]	0.9 (0.6) [0.7, 1.1]	36.21	1.9	.50***	
	-TLM	1.7 (0.6) [1.4, 1.9]		1.2 (0.8) [0.9, 1.6]	8.33	1.0	.28**	

Note. Bonferroni corrections were applied. TLM = testosterone-lowering medications; 95% CI = 95% confidence interval; df = degrees of freedom; SSI = significant social influence; ID = intimacy deficits; GSR = general self-regulation; SSR = sexual self-regulation; CWS = cooperation with supervision. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$  (two-tailed).

The -TLM group, on the contrary, showed significant improvements between index offense (T1) and reference date (T3) in the subscales, *Intimacy Deficits*, *General Self-regulation*, and *Cooperation with Supervision*, but not in the subscales, *Significant Social Influences* and *Sexual Self-regulation*.

**Comparison between +TLM and -TLM regarding the amount of change during treatment.** To measure the influence of group membership (TLM: yes/no) on changes in Stable-2007, ANCOVAs were calculated using the *z*-standardized difference values to control the initial risk in the Stable-2007 or its subscales. As TLM was compared with psychotherapy only, the initial risk for the +TLM was the start of TLM treatment (T2), whereas for the -TLM the start of psychotherapy or the time of the index offense (T1) was used. For the Stable-2007 sum score, no differences regarding the amount of change during treatment between T2 (+TLM, start of TLM treatment), respectively, T1 (-TLM, index offense), and T3 (reference date) could be observed between the two groups. Using the *z*-standardized difference values, there was no significant effect of being part of +TLM ( $M = -2.68$ ,  $SD = 1.86$ ) or -TLM ( $M = -2.73$ ,  $SD = 3.69$ ) on the change in Stable-2007 sum score between T2/T1 and T3,  $F(1, 57) = .989$ ,  $p = .324$ ,  $\eta_p^2 = .017$ , after controlling for the initial risk of the Stable-2007 (Stable-2007 at T2/T1),  $F(1, 57) = 3.974$ ,  $p = .051$ ,  $\eta_p^2 = .065$ . As significant group differences could be observed in the subscales, *General Self-regulation* and *Sexual Self-regulation* (see Table 2), the same procedure was applied to these two subscales. The covariate, subscale *General Self-regulation* at T2/T1, was significantly related to the participants' change in *General Self-regulation* scores,  $F(1, 57) = 7.162$ ,  $p = .010$ ,  $\eta_p^2 = .112$ . After controlling for the initial risk in the subscale, *General Self-regulation*, there was no significant effect of being part of +TLM ( $M = -0.63$ ,  $SD = 0.71$ ) or -TLM ( $M = -1.23$ ,  $SD = 1.74$ ) on the change in *General Self-regulation* between T2/T1 and T3,  $F(1, 57) = 0.082$ ,  $p = .775$ ,  $\eta_p^2 = .001$ . The covariate, subscale *Sexual Self-regulation* at T2/T1, was significantly related to the participants' change in *Sexual Self-regulation* Scores,  $F(1, 57) = 23.132$ ,  $p < .001$ ,  $\eta_p^2 = .289$ . After controlling for the initial risk in this subscale, there was no significant effect of being part of +TLM ( $M = -1.11$ ,  $SD = 0.92$ ) or -TLM ( $M = -0.27$ ,  $SD = 0.63$ ) on the change in *Sexual Self-regulation* between T2/T1 and T3,  $F(1, 57) = 0.263$ ,  $p = .610$ ,  $\eta_p^2 = .005$ .

**Individual treatment progress in relation to the average change of the sample.** To identify the individual variation regarding the average trend of risk reduction during the hospital stay, unstandardized residuals from the regression of Stable-2007 at T1 (index offense) on T3 (reference date) were employed. This allows the measurement of individual changes in relation to the average trend of all individuals over the treatment process. Accordingly, a person with a negative residual is above the average sample trend, indicating an above-average reduction of recidivism risk and, vice versa, a person with a positive residual. Table 4 summarizes the correlations between the unstandardized residuals, or the individual variation from average trend of risk development, and the treatment variables (TLM, duration of HTO, and PCL-R Factors I and II), as well as the controlling variables (initial risk at T1 measured by Stable-2007

**Table 4.** Zero-Order Correlations Between Unstandardized Residuals, Testosterone-Lowering Medication (Dummy Variable), PCL-R (Incl. Subscales), and Age at Reporting Date ( $n = 60$ ).

Measure	RES	TLM <sup>a</sup>	HTO <sup>b</sup>	PCL-R	PCL-R I	PCL-R II	S7-TI	Age
RES	—	.03	-.29*	.18	.28*	.08	.00	-.16
TLM <sup>a</sup>		—	.22***	.00	.01	.00	.02	.04
HTO <sup>b</sup>			—	.28*	.25	.21	.25	.45***
PCL-R				—	.82***	.84***	.54***	.20
PCL-R I					—	.40**	.37**	.32*
PCL-R II						—	.52***	-.02
S7-TI							—	.01
Age								—

Note. PCL-R = Psychopathy Checklist–Revised; RES = unstandardized residuals; TLM = testosterone-lowering medication; HTO = duration of hospital treatment order; PCL-R I = Factor I; PCL-R II = Factor II; S7-TI = Stable-2007 at the time of index offense (TI, initial risk); age = age at reporting date.

<sup>a</sup>As TLM is a dummy variable, partial  $\eta^2$  was calculated as effect size. <sup>b</sup>In years.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$  (two-tailed).

and the current age of the patient). It was found that the individual change measured by Stable-2007 was significantly negatively related to the duration of the HTO and significantly positively related to PCL-R Factor I. Apart from a positive correlation with the duration of HTO, no significant relationships could be found with TLM ( $-0.5 = \text{no}/+0.5 = \text{yes}$ ).

In a next step, the significantly correlated variables (HTO, PCL-R Factor I, and TLM) were included in the regression model controlling for the initial risk and current age (see Table 5). Overall, 21.5% of the variance of the individual changes over the treatment process measured by the Stable-2007 score between T1 and T3 were explained by the duration of HTO and PCL-R Factor I,  $F(2, 57) = 7.805, p < .001$ . Thus, an above-average improvement compared with the average trend was explained by a longer duration of the HTO and a lower value in Factor I of the PCL-R.

### Sexual Fantasies and Patients' Openness

To examine whether the TLM-treated patients (+TLM) were actually able to communicate their (deviant) sexual interests more openly with their psychiatrists/psychotherapists than the members of the -TLM, the type of sexual fantasies provided by the patients in the interview was compared with the external assessments of the treating psychiatrists/psychotherapists. It became apparent that in four cases deviant sexual fantasies have not been recognized by the psychiatrists/psychotherapists. In the -TLM, however, such a difference cannot be observed (see Table 6). At the same time, the psychiatrists/psychotherapists considered the statements of two thirds of the +TLM (66.7%, 20/30) and of one third of the -TLM (37.5%, 6/16) as to be credible. With an effect size of  $\phi = .28$ , there was no significant difference,  $\chi^2_{(1, 46)} = 3.612, p = .070$ .



**Table 5.** Stepwise Multiple Regression With Correlated Variables, Controlled for the Initial Risk and Age at Reporting Date on the Individual Variation of Average Trend of Risk Development Measured by Stable-2007 ( $n = 60$ ).

	Variable	$R^2$ (adjusted $R^2$ )	$b$ (95% CI)	SE $b$	$\beta$	$p$
Step 1		.082 (.066)				
	HTO <sup>a</sup>		-.11 [-.20, -.01]	0.05	-.29	.027
Step 2		.215 (.187)				
	HTO <sup>a</sup>		-.14 [-.23, -.05]	0.05	-.38	.003
	PCL R I		.28 [.10, .46]	0.09	.38	.003

Note.  $R^2 = .08$ ,  $p = .027$ ;  $\Delta R^2 = .13$ ,  $p = .003$ . Excluded variables: TLM = testosterone-lowering medication; S7-T1 = Stable-2007 at the time of index offense (T1, initial risk); CI = confidence interval; age = age at reporting date. HTO = duration of hospital treatment order; PCL-R I = Psychopathy Checklist-Revised Factor I.

<sup>a</sup>In years.

**Table 6.** Quality of Sexual Fantasies From Patients' as Well as Treating Psychiatrists/ Psychotherapists' Perspective.

	Attending psychiatrists/psychotherapists							
	+TLM				-TLM			
	ND	D	Mis	Total	ND	D	Mis	Total
Patients								
ND	4	5	0	9	2	2	2	6
	11%	13%	0%	24%	9%	9%	9%	27%
D	4	10	1	15	0	3	1	4
	11%	26%	3%	40%	0%	14%	5%	18%
Mis	2	7	5	14	3	4	5	12
	5%	18%	13%	37%	14%	18%	23%	55%
Total	10	22	6	38	5	9	8	22
	26%	58%	16%	100%	23%	41%	36%	100%

Note. TLM = testosterone-lowering medication; ND = not deviant; D = deviant; Mis = missing.

## Discussion

While the quality of studies examining the effectiveness of TLM treatment on different outcomes in individuals convicted of a sexual offense is still quite insufficient, the number of persons who receive such medications seems to rise continuously in some countries (Czerny et al., 2002; Turner et al., 2013, 2017). As the last RCT has been conducted more than 25 years ago (Bradford & Pawlak, 1993) and due to the fact that it has to be regarded as highly unlikely that RCTs will be available in the near future due to ethical concerns (Briken et al., 2017), it seems to be important to focus on the effects of such medications on the treatment process, particularly on empirically

proven risk factors. Thus, the primary aim of this study was to examine possible associations of TLM with a reduction in dynamic criminogenic needs of patients.

### *Clinical and Criminological Differences*

In compliance with current treatment guidelines (Thibaut et al., 2010), patients diagnosed with a paraphilic disorder were more frequently treated with TLM than those without such a diagnosis. Most often, patients with a pedophilic or sadistic disorder were treated with TLM, the two paraphilic disorders found most frequently in individuals who have committed a sexual offense (Eher et al., 2019). It seems as if the proposed six-step algorithm was not utilized in all cases, though. No patient was treated with an SSRI to reduce sex drive, neither in the +TLM nor in the -TLM and only one person was treated with CPA. All others were treated with GnRH-agonists (97.4%), although GnRH-agonists should only be used in patients with the most intense paraphilic urges and the highest risk for sexual recidivism. On average, the participants in the present study were in the highest risk category of the Static-99 and Stable-2007, and thus GnRH-agonist treatment could have been justified for most cases. However, three patients without a paraphilic disorder were treated with a GnRH-agonist as well. At least in Germany, GnRH-agonists are only officially approved for the treatment of patients with severe paraphilic disorders. The obvious assumption beyond this guideline is that in these individuals the mental disorder (i.e., the severe paraphilic disorder) is directly and causally related to an increased risk of further sexual offenses. On the contrary, treating an individual with TLM presents—just like any other pharmacological treatment—a medical procedure and should only be used to treat an underlying disorder, which seems to be not the case in individuals without a paraphilic disorder (Turner et al., 2017). This is even more important in light of the severe side effects of TLM treatment (Basdekis-Jozsa et al., 2013; Briken et al., 2003). It may be, however, that in these cases, hypersexuality was the target symptom without being associated with a specific paraphilic disorder. This would be a common deviation from the guidelines.

As mentioned above, besides the presence of a paraphilic disorder, another reason for treatment with TLM could be seen in a high probability of sexual recidivism (Bradford, 2001; Briken et al., 2003; Maletzky & Field, 2003; Thibaut et al., 2010). Neither the criminal history nor the recidivism risk measured with the Static-99 and Stable-2007 differed between the two groups at the time of the index offense. It could have been expected that those treated with TLM have a higher risk than those not treated with TLM. The analysis of the Stable-2007 subscale scores showed that individuals from the +TLM had more deficits in general and sexual self-regulation, suggesting that individuals with regulatory dysfunctions might be viewed as most suitable for TLM treatment. Previous research asking medical health care providers about the factors that helped them to decide whether or not an individual who committed a sexual offense should be treated with TLM found that a history of treatment failure, sexual violations while under supervision, the use of violence during the sexual offense, and central nervous system (CNS) dysfunctions were viewed as the factors

most important for this decision (Turner et al., 2014). In these individuals, sexually deviant urges and/or fantasies might be so intense that specific risk-reducing and self-control enhancing psychotherapy might not be possible, at least not without an additional sex drive-reducing medication.

### *Change Measurements Using Stable-2007*

*Comparison between +TLM and -TLM regarding the amount of change during treatment.* Both, individuals from the +TLM group as well as those from the -TLM group, showed a significant reduction in their risk for sexual recidivism measured with the Stable-2007 over time. Previous research found a positive association between the dosage and treatment time on the one side and the amount of risk reduction on the other side (Hanson et al., 2009); however, in the present study, both groups were still in the highest risk category, even after at least 10 years of treatment. Applying a rather skeptical view about the current therapeutic interventions provided for high-risk offenders at forensic psychiatric institutions in Germany, this finding could imply that although all patients were treated in a forensic psychiatric hospital for a considerable amount of time, they did not receive enough treatment or the treatment was not effective enough for a more pronounced risk reduction (Hanson et al., 2009). It could also be possible that due to the relatively high risk level of the present sample it would take an even longer amount of time until more pronounced risk reductions can be achieved. It may be noted, however, that some of the variables are not sensitive to changes (e.g., number and type of victims). Furthermore, it cannot be ruled out that the risk reduction found in the present study was simply a consequence of the increased age of the patients as it can be assumed that an older age decreases the individual risk for recidivism, at least for sexual offenses, against adult victims (Hanson, 2002). However, against this latter suggestion, a more pronounced risk reduction was found in the +TLM after the start of TLM treatment, indicating the usefulness of TLM at least for some individuals who have committed a sexual offense.

The more pronounced risk change after the start of TLM in the +TLM can mainly be attributed to the significant reductions in the *General* and *Sexual Self-regulation* subscales. In both subscales, no significant changes could be observed before TLM treatment. Individuals from the -TLM group, on the contrary, showed a significant decrease in the *General Self-regulation* subscale even without TLM treatment. In contrast, a reduction in the *Sexual Self-regulation* subscale could not be observed in this group, whereby it must be noted that individuals in the -TLM group already had significantly lower values in this subscale at the beginning. These findings provide further hints that TLM treatment could be supportive, particularly in individuals with deficits in regulatory functions, maybe especially if sexual preoccupation and/or deviance are pronounced. It is conceivable that TLM, in cooperation with the reduction of serum testosterone and the associated loss of sex drive, could help individuals to implement treatment strategies more effectively. Accordingly, measurable changes in *Intimacy Deficits*, such as a lack of concern for others, capacity for relationship

stability, emotional identification with children, or hostility toward women were found in both groups under psychotherapeutic treatment.

No changes were found in the subscale *Significant Social Influences*. This is not surprising, as the overall sample consisted of (hospitalized) long-term inmates who had no or only little opportunity to establish contacts outside the institution. As at least in the present sample the acceptance of TLM was closely related to the perspective of home leave steps (Briken et al., 2009; Bussmann & Finger, 2009), the slightly significant improvement in the +TLM after the start of TLM treatment could be attributed to measures granted in this context. The subscale *Cooperation with Supervision* improved significantly over the course of treatment in both groups. Interestingly, only this subscale showed the higher effect size before the start of TLM treatment. As this subscale consists of only one item, this effect could be possibly traced back to saturation. However, it can be assumed that only in a few cases there was an inner belief regarding the necessity of such an invasive treatment. Rather, the desire for home leave steps could have been the crucial factor in this sample (Briken et al., 2009; Bussmann & Finger, 2009). This perceived coercion could have had a lasting effect on treatment compliance. Already in 1995, Hall reported in his meta-analysis higher dropout rates among individuals convicted of a sexual offense who had been treated with TLM compared with those who were treated with other interventions. Hence, it seems even more important to ensure the voluntary participation in the treatment beforehand.

*Individual treatment progress in relation to the average change of the sample.* Other than expected, the post hoc identified individual variation of each participant from the total sample average trend of risk development measured by the Stable-2007 could not be explained by TLM treatment. Instead, 21.5% of the variance was explained by the duration of the HTO and the PCL-R Factor I score. The longer the patients were in psychotherapeutic and psychiatric treatment, the more the Stable-2007 scores changed toward a positive criminal prognosis in relation to the average trend. Furthermore, the higher the PCL-R Factor I score, the smaller this deviation or, in other words, the worse the prognosis was compared with the average change. In accordance with current research results, the latter result could be seen as an indicator that the PCL-R Factor I could potentially counteract treatment progress (Sewall & Olver, 2019), whereas Factor II scores have obviously not the same effects. This could be explained by the assumption that lifestyle (Facet 3) and impulsiveness (Facet 4: antisocial) change with age, whereas the affective-interpersonal facets (1 and 2) are more sustainable personality traits. In accordance with this result, practitioners named a high PCL-R total score (>25), due to the high risk of recidivism associated with it, as a variable that opposes discontinuing TLM (Briken et al., 2018). At the same time, practitioners should keep in mind that TLM treatment in individuals with a PCL-R score above 25 could be less promising, and that, especially in this subgroup, compliance often appears questionable. In this respect, the issue arises as to whether and if so under what conditions and with what targets TLM should be started in the first place.

### *Sexual Fantasies and Patients' Openness*

In line with the current state of research, the majority of TLM-treated patients of the present study showed a decrease in sexual urges but not in deviant sexual fantasies (Jordan et al., 2014; Schober et al., 2005). Interestingly, the comparison between the patients' self-reports and the therapists' assessments concerning the sexual fantasies of the patients did not lead to the conclusion that the individuals of the +TLM talked more openly about their fantasies (e.g., Bussmann & Finger, 2009). Rather, in a few cases, the psychiatrists/psychotherapists seem to have substantially underestimated the relevance of deviant sexual fantasies in their patients. This seems even more remarkable as only in patients from the +TLM the presence of deviant sexual fantasies was underestimated. Perhaps the assumed additional safety due to the medication leads to this biased perception (Koller, 2008), or the assumption that a patient who is compliant with TLM will also more likely show positive outcomes in psychotherapy (Bussmann & Finger, 2009). Given the fact that the psychiatrists/psychotherapists tended to rate the statements of the medicated patients more frequently as credible, the question arises whether such treatments sometimes contribute to a sense of security rather than to an actual success (i.e., risk reduction) of the treatment. It can be remarked that self-reports are less credible than assumed and, therefore, objective measures should be used as a supplement (Schober et al., 2005).

### *Limitations*

Although the present study provides promising results in an area of research where the existing knowledge is still scarce, there are several limitations that have to be taken into account. Even though this is a full survey of all individuals convicted of a sexual offense and who were treated under an HTO in Berlin, the results of the present study are limited because it is still a relatively small sample from only one city in one country. Further investigations from other federal states and countries would be necessary to examine the generalizability of the present results. Furthermore, based on the study design, the samples could not be randomly assigned to either the +TLM or the -TLM group. However, at least in Germany, high-quality study designs, for example, RCTs, do not seem to be realizable in the near future due to ethical concerns for this kind of treatment in patients of forensic psychiatric hospitals (Briken et al., 2017). Because of the retrospective examination of the criminal and treatment files, investigator biases cannot be ruled out. Interrater reliability could not be calculated for the PCL-R, but the person completing the checklist was extensively trained and experienced in the application. It would therefore be desirable in long-term studies to record objective measurement parameters, such as home leave steps, release from HTO or prison, and the official recording of any renewed (sexual) offenses. Some relevant variables, like the consent behavior or the effects of a treatment with GnRH-agonists on the therapeutic alliance, motivation, and compliance were not investigated in the present study. This should be done in future research, especially because it was suggested that patients being treated with TLM

show a lower treatment compliance in general. Despite these limitations, the present study provides further empirical evidence about the potentials and problems of TLM for individuals who have committed sexual offenses.

## Conclusion

In summary, TLM appears to affect the self-regulation capacities of individuals who have committed a sexual offense, by reducing sexual fantasies and urges. This was perceived not only by the patients themselves, but also by the therapists, with the latter tending to underestimate deviant sexual fantasies in medicated patients. Overall, at least in the present sample—apart from general and sexual self-regulation—TLM treatment does not appear to be superior to psychotherapeutic treatment in terms of reducing other empirically proven risk factors. Although TLM should not be seen as a lifelong treatment, it is important to note that after discontinuing treatment with TLM, sexual fantasies and urges may increase again (Koo et al., 2014; Voß et al., 2016). This might be of particular importance for people with a PCL-R score above 25 as the smallest changes have been achieved in this group. Hence, the intrinsic motivation to be able to better regulate sexual impulses would speak for the beginning of TLM treatment. If the patient can expect benefits, such as home leave steps, treatment motivation should be carefully examined. Especially for this high-risk group, experts recommend not to stop taking the medication (Briken et al., 2018), but patients' compliance may decrease significantly after reaching their goals (Hall, 1995) or due to side effects and other discomforts (ATSA, 2012). Nevertheless, TLM should be applied in at least a specific subgroup of high-risk patients with a paraphilic disorder and who do not profit from conventional psychotherapeutic methods alone.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The Institute of Forensic Psychiatry, Charité—Universitätsmedizin Berlin, Germany, funded the test person funds.

## ORCID iDs

Julia Sauter  <https://orcid.org/0000-0001-8718-126X>

Martin Rettenberger  <https://orcid.org/0000-0002-0979-4295>

## References

- Ahn, J., Shim, G., Lee, J., Lee, J., Lee, T., & Roh, I. (2013). Preliminary study of effect of leuprolide acetate treatment on sexual fantasy of sex offenders. *Korean Journal of Legal Medicine*, 37, 139–144. <https://doi.org/10.7580/kjlm.2013.37.3.139>

- Anderson, D., & Hanson, R. K. (2010). An actuarial tool to assess risk of sexual and violent recidivism among sexual offenders. In R. K. Otto & K. S. Douglas (Eds.), *Handbook of violence risk assessment* (pp. 251–267). Routledge.
- Andrews, D. A., & Bonta, J. (2011). *LSI-R: The Level of Service Inventory–Revised*. Multi-Health Systems.
- Association for the Treatment of Sexual Abusers. (2012). *Pharmacological interventions with adult male sexual offenders* [Position statement]. [www.atsa.com/pharmacological-interventions-adult-male-sexual-offenders-0](http://www.atsa.com/pharmacological-interventions-adult-male-sexual-offenders-0)
- Basdekis-Jozsa, R., Turner, D., & Briken, P. (2013). Pharmacological treatment of sexual offenders and its legal and ethical aspects. In K. Harrison & B. Rainey (Eds.), *The Wiley-Blackwell handbook of legal and ethical aspects of sex offender treatment and management* (pp. 302–320). John Wiley.
- Bradford, J. M. W. (2001). The neurobiology, neuropharmacology, and pharmacological treatment of the paraphilias and compulsive sexual behavior. *The Canadian Journal of Psychiatry*, *46*, 26–33. <https://doi.org/10.1177/070674370104600104>
- Bradford, J. M. W., & Pawlak, A. (1993). Double-blind placebo crossover study of cyproterone acetate in the treatment of the paraphilias. *Archives of Sexual Behavior*, *22*(5), 383–402. <https://doi.org/10.1007/BF01542555>
- Briken, P., & Berner, W. (2010). Behandlung von Sexualsträtern mit Psychotherapie und LHRH-Agonisten [Treatment of sexual offenders with psychotherapy and LHRH-agonists]. *Forensische Psychiatrie, Psychologie, Kriminologie*, *4*(Suppl. 1), S1–S2. <https://doi.org/10.1007/s11757-010-0071-6>
- Briken, P., Boetticher, A., Krueger, R. B., Kismödi, E., & Reed, G. M. (2019). Current legal situation for patients with paraphilic disorders and implications of the ICD-11 for paraphilic disorders for Germany. *Journal of Sexual Medicine*, *16*, 1615–1622. <https://doi.org/10.1016/j.jsxm.2019.07.011>
- Briken, P., Hill, A., & Berner, W. (2003). Pharmacotherapy of paraphilias with long-acting agonists of luteinizing hormone-releasing hormone: A systematic review. *The Journal of Clinical Psychiatry*, *64*(8), 890–897. <https://doi.org/10.4088/JCP.v64n0806>
- Briken, P., Müller, J. L., Berner, W., Bödecker, R.-H., Vollmann, J., Kasperk, C., & Koller, M. (2017). Vom Scheitern einer Studie in Maßregelvollzugskrankenhäusern. Klinische Prüfung zum additiven Effekt von Triptorelin auf die Wirksamkeit von Psychotherapie [Failure of a study in forensic psychiatric hospitals. Clinical trial to investigate the additive effect of triptorelin on the efficacy of psychotherapy]. *Nervenarzt*, *88*(5), 480–485. <https://doi.org/10.1007/s00115-017-0301-7>
- Briken, P., Turner, D., Thibaut, F., Bradford, J., Cosyns, P., & Tozdan, S. (2018). Validation of the Change or Stop Testosterone-Lowering Medication (COSTLow) Scale using Delphi method among clinical experts. *Journal of Sex & Marital Therapy*, *24*, 1–25. <https://doi.org/10.1080/0092623X.2018.1491910>
- Briken, P., Welzel, K., Habermann, N., Hill, A., & Berner, W. (2009). Antiandrogene Therapie und Lockerungen bei Sexualsträtern im Maßregelvollzug Berlin [Antiandrogenic pharmacotherapy of sexual offenders and home leave steps in the forensic psychiatric hospital Berlin]. *Psychiatrische Praxis*, *36*, 232–237. <https://doi.org/10.1055/s-0028-1090221>
- Bussmann, H., & Finger, P. (2009). Die Durchführung antiandrogener Behandlung von Sexualsträtern im Berliner Maßregelvollzug [Anti-androgenic treatment of sex offenders in the forensic psychiatric hospital of Berlin]. *Forensische Psychiatrie, Psychologie, Kriminologie*, *3*, 129–140. <https://doi.org/10.1007/s11757-010-0061-8>



- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Academic Press.
- Cooper, A. J. (1981). A placebo-controlled trial of the antiandrogen cyproterone acetate in deviant hypersexuality. *Comprehensive Psychiatry*, *22*, 458–465. [https://doi.org/10.1016/0010-440X\(81\)90034-1](https://doi.org/10.1016/0010-440X(81)90034-1)
- Czerny, J.-P., Briken, P., & Berner, W. (2002). Antihormonal treatment of paraphilic patients in German forensic psychiatric clinics. *European Psychiatry*, *17*, 104–106. [https://doi.org/10.1016/S0924-9338\(02\)00635-1](https://doi.org/10.1016/S0924-9338(02)00635-1)
- Eher, R., Gnoth, A., Birklbauer, A., & Pfäfflin, F. (2007). Antiandrogene Medikation zur Senkung der Rückfälligkeit von Sexualstraftätern: Ein kritischer Überblick [The effects of antiandrogenic medication on relapse rates of sex offenders: A review]. *Recht & Psychiatrie*, *25*(3), 103–111.
- Eher, R., Rettenberger, M., Gaunersdorfer, K., Haubner-MacLean, T., Matthes, A., Schilling, F., & Mokros, A. (2013). Über die Treffsicherheit der standardisierten Risikoeinschätzungsverfahren Static-99 und Stable-2007 bei aus einer Sicherungsmaßnahme entlassenen Sexualstraftätern [On the accuracy of the standardized risk assessment procedures Static-99 and Stable-2007 for sexual offenders released from detention]. *Forensische Psychiatrie, Psychologie, Kriminologie*, *7*, 264–272. <https://doi.org/10.1007/s11757-013-01212-9>
- Eher, R., Rettenberger, M., & Turner, D. (2019). The prevalence of mental disorders in incarcerated contact sexual offenders. *Acta Psychiatrica Scandinavica*, *139*, 572–581. <https://doi.org/10.1111/acps.13024>
- Etzler, S., Eher, R., & Rettenberger, M. (2018). Dynamic risk assessment of sexual offenders: Validity and dimensional structure of the Stable-2007. *Assessment* *27*(4), 822–839. <https://doi.org/10.1177/1073191118754705>
- Gallo, A., Abracen, J., Looman, J., Jeglic, E., & Dickey, R. (2018). The use of leuprolide acetate in the management of high-risk sex offenders. *Sexual Abuse*, *31*, 930–951. <https://doi.org/10.1177/1079063218791176>
- Greenhouse, S. W., & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika*, *24*(2), 95–112. <https://doi.org/10.1007/BF02289823>
- Hall, G. C. N. (1995). Sexual offender recidivism revisited: A meta-analysis of recent treatment studies. *Journal of Consulting and Clinical Psychology*, *63*(5), 802–809.
- Hanson, R. K. (2002). Recidivism and age: Follow-up data from 4,673 sexual offenders. *Journal of Interpersonal Violence*, *17*(10), 1046–1062. <https://doi.org/10.1177/08862605-0201710-02>
- Hanson, R. K., Bourgon, G., Helmus, L., & Hodgson, S. (2009). The principles of effective correctional treatment also apply to sexual offenders: A meta-analysis. *Criminal Justice and Behavior*, *36*(9), 865–891. <https://doi.org/10.1177/0093854809338545>
- Hanson, R. K., Harris, A. J. R., Scott, T.-L., & Helmus, L. M. (2007). *Assessing the risk of sexual offenders on community supervision* (User Report No. 2007-05). Public Safety and Emergency Preparedness Canada.
- Hanson, R. K., & Morton-Bourgon, K. E. (2005). The characteristics of persistent sexual offenders: A meta-analysis of recidivism studies. *Journal of Consulting and Clinical Psychology*, *73*(6), 1154–1163. doi:10.1037/0022-006X.73.6.1154
- Hanson, R. K., & Thornton, D. (2000). Improving risk assessments for sex offenders: A comparison of three actuarial scales. *Law and Human Behavior*, *24*, 119–136. <https://doi.org/10.1023/A:1005482921333>

- Hare, R. D. (2003). *Manual for the Psychopathy Checklist-Revised* (2nd ed.). Multi Health Systems.
- Hare, R. D., & Neumann, C. S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4*, 217–246. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091452>
- Harris, A., Phenix, A., Thornton, D., & Hanson, R. K. (2003). *STATIC-99: Coding rules revised–2003*. Solicitor General.
- Hebebrand, K., Hebebrand, J., & Remschmidt, H. (2002). Medikamente in der Behandlung von Paraphilien und hypersexuellen Störungen [Pharmacological agents for treatment of paraphilias and hypersexual disorders]. *Fortschritte der Neurologie Psychiatrie, 70*, 462–475. <https://doi.org/10.1055/s-2002-33759>
- Helmus, L. M., Thornton, D., Hanson, R. K., & Babchishin, K. M. (2012). Improving the predictive accuracy of STATIC-99 and STATIC-2002 with older sex offenders: Revised age weights. *Sexual Abuse: A Journal of Research and Treatment, 24*, 64–101. <https://doi.org/10.1177/1079063211409951>
- Hill, A., Briken, P., Kraus, C., Stroh, K., & Berner, W. (2003). Differential pharmacological treatment of paraphilias and sex offenders. *International Journal of Offender Therapy and Comparative Criminology, 47*(4), 407–421. <https://doi.org/10.1177/0306624X03253847>
- Jordan, K., Fromberger, P., Laubinger, H., Dechent, P., & Müller, J. L. (2014). Changed processing of visual sexual stimuli under GnRH-therapy—A single case study in pedophilia using eye tracking and fMRT. *BMC Psychiatry, 14*(1), Article 142. <https://doi.org/10.1186/1471-244X-14-142>
- Khan, O., Ferriter, M., Huband, N., Powney, M. J., Dennis, J. A., & Duggan, C. (2015). Pharmacological interventions for those who have sexually offended or are at risk of offending [Review]. *Cochrane Database of Systematic Reviews, 3*, Article CD0079789. <https://doi.org/10.1002/14651858.CD007989>
- Koller, M. (2008). Triebdämpfende Medikation zwischen Rückfallprophylaxe und Körperverletzung [Sex drive-reducing medication between relapse prevention and physical assault]. *Recht & Psychiatrie, 26*, 187–199.
- Koo, K. C., Ahn, J. H., Hong, S. J., Lee, J. W., & Chung, B. H. (2014). Effects of chemical castration on sex offenders in relation to the kinetics of serum testosterone recovery: Implications for dosing schedule. *Journal of Sexual Medicine, 11*(5), 1316–1324. <https://doi.org/10.1111/jsm.12492>
- Kraemer, H. C., & Blasey, C. M. (2004). Centring in regression analyses: A strategy to prevent errors in statistical inference. *International Journal of Methods in Psychiatric Research, 13*(3), 141–151. <https://doi.org/10.1002/mpr.170>
- Laschet, U., & Laschet, L. (1967). Antiandrogentherapie der pathologisch gesteigerten und abartigen Sexualität des Mannes [Antiandrogen therapy of pathologically increased and abnormal sexuality of man]. *Klinische Wochenschrift, 45*, 324–325. <https://doi.org/10.1007/BF01747114>
- Lösel, F., & Schmucker, M. (2005). The effectiveness of treatment for sexual offenders: A comprehensive meta-analysis. *Journal of Experimental Criminology, 1*(1), 117–146. <https://doi.org/10.1007/s11292-004-6466-7>
- Maletzky, B. M., & Field, G. (2003). The biological treatment of dangerous sexual offenders. A review and preliminary report of the Oregon pilot depo-Provera program. *Aggression and Violent Behavior, 8*, 391–412. [https://doi.org/10.1016/S1359-1789\(02\)00065-4](https://doi.org/10.1016/S1359-1789(02)00065-4)

- McGrath, R. J., Cumming, G. F., Burchard, B. L., Zeoli, S., & Ellerby, L. (2010). *Current practices and emerging trends in sexual abuser management: The Safer Society 2009 North America Survey*. Safer Society Press.
- McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods, 1*, 30–46. <https://doi.org/10.1037/1082-989X.1.1.30>
- Mokros, A., Hollerbach, P., Nitschke, J., & Habermeyer, E. (2017). *Deutsche Version der Hare Psychopathy Checklist-Revised (PCL-R) von R. D. Hare: Manual* [German version of the Hare Psychopathy Checklist-Revised (PCL-R) by R. D. Hare: Manual]. Hogrefe.
- Mokros, A., Vohs, K., & Habermeyer, E. (2014). Psychopathy and violent reoffending in German-speaking countries: A meta-analysis. *European Journal of Psychological Assessment, 30*, 117–129. <https://doi.org/10.1027/1015-5759/a000178>
- Moulier, V., Fonteille, V., Pelegrini-Issac, M., Cordier, B., Baron-Laforêt, S., Boriassé, E., . . . Stoléro, S. (2012). A pilot study of the effects of Gonadotropin-Releasing Hormone Agonist therapy on brain activation pattern in a man with pedophilia. *International Journal of Offender Therapy and Comparative Criminology, 56*(1), 50–60. <https://doi.org/10.1177/0306624X10392191>
- Petermann, F. (1978). *Veränderungsmessung* [Change measurement]. Kohlhammer.
- Quinsey, V. L., Lalumière, M. L., Rice, M. E., & Harris, G. T. (1995). Predicting sexual offences. In J. Campbell (Ed.), *Assessing dangerousness: Violence by sex offenders, batterers, and child molesters* (pp. 114–137). SAGE.
- Rettenberger, M., Haubner-MacLean, T., & Eher, R. (2013). The contribution of age to the STATIC-99 risk assessment in a population-based prison sample of sexual offenders. *Criminal Justice and Behavior, 40*, 1413–1433. <https://doi.org/10.1177/0093854813492518>
- Rettenberger, M., Matthes, A., Boer, D. P., & Eher, R. (2010). Prospective actuarial risk assessment: A comparison of five risk assessment instruments in different sexual offender subtypes. *International Journal of Offender Therapy and Comparative Criminology, 54*, 169–186. <https://doi.org/10.1177/0306624X08328755>
- Rettenberger, M., Matthes, A., Schilling, F., & Eher, R. (2011). Die Validität dynamisch-veränderbarer Risikofaktoren bei der Vorhersage einschlägiger Rückfälle pädosexueller Straftäter—Eine Studie über Stable-2000 und Stable-2007 [The validity of dynamic and changeable risk factors for the prediction of sexual recidivism in a sample of pedosexual offenders—A study of Stable-2000 and Stable-2007]. *Forensische Psychiatrie, Psychologie, Kriminologie, 5*, 45–53. <https://doi.org/10.1007/s11757-010-0086-z>
- Rösler, A., & Witzum, E. (1998). Treatment of men with paraphilia with a long-acting analogue of gonadotropin-releasing hormone. *The New England Journal of Medicine, 338*(7), 416–422. <https://doi.org/10.1056/NEJM199802123380702>
- Salekin, R. T., Rogers, R., & Sewell, K. W. (1996). A review and meta-analysis of the Psychopathy Checklist and Psychopathy Checklist-Revised: Predictive validity of dangerousness. *Clinical Psychology: Science and Practice, 3*, 203–215. <https://doi.org/10.1111/j.1468-2850.1996.tb00071.x>
- Sauter, J., Stasch, J., Klemke, K., Emmerling, A., & Voß, T. (2018). Das Absetzen antiandrogener Medikation im ambulanten Setting. Fortsetzungsbericht über die Auslassversuche der Berliner Stichprobe [Discontinuing antiandrogenic treatment in a forensic outpatient setting. A follow-up report of withdrawal trials of a Berlin sample]. *Forensische Psychiatrie, Psychologie, Kriminologie, 12*(4), 352–359. <https://doi.org/10.1007/s11757-018-0498-8>
- Schmucker, M., & Lösel, F. (2015). The effects of sexual offender treatment on recidivism: An international meta-analysis of sound quality evaluations. *Journal of Experimental Criminology, 11*(4), 597–630. <https://doi.org/10.1007/s11292-015-9241-z>

- Schober, J. M., Kuhn, P. J., Kovacs, P. G., Earle, J. H., Byrne, P. M., & Fries, R. A. (2005). Leuprolide acetate suppresses pedophilic urges and arousability. *Archives of Sexual Behavior, 34*(6), 691–705. <https://doi.org/10.1007/s10508-005-7929-2>
- Sewall, L. A., & Olver, M. E. (2019). Psychopathy and treatment outcome: Results from a sexual violence reduction program. *Personality Disorders: Theory, Research, and Treatment, 10*(1), 59–69. <https://doi.org/10.1037/per0000297>
- Thibaut, F., De La Barra, F., Gordon, H., Cosyns, P., & Bradford, J. M. W. (2010). The World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for the biological treatment of paraphilias. *The World Journal of Biological Psychiatry, 11*(4), 604–655. <https://doi.org/10.3109/15622971003671628>
- Turner, D., Basdekis-Jozsa, R., & Briken, P. (2013). Prescription of testosterone-lowering medications for sex offender treatment in German forensic-psychiatric institutions. *Journal of Sexual Medicine, 10*, 570–578. <https://doi.org/10.1111/j.1743-6109.2012.02958.x>
- Turner, D., Basdekis-Jozsa, R., Dekker, A., & Briken, P. (2014). Which factors influence the appropriateness of testosterone-lowering medications for sex offenders? A survey among clinicians from German forensic-psychiatric institutions. *The World Journal of Biological Psychiatry, 15*(6), 472–478. <https://doi.org/10.3109/15622975.2013.839052>
- Turner, D., & Briken, P. (2018). Treatment of paraphilic disorders in sexual offenders or men with a risk of sexual offending with Luteinizing Hormone-Releasing Hormone Agonists: An updated systematic review. *Journal of Sexual Medicine, 15*(1), 77–93. <https://doi.org/10.1016/j.jsxm.2017.11.013>
- Turner, D., Gregório Hertz, P., Sauter, J., Briken, P., & Rettenberger, M. (2018). Pharmacological treatment of sexual offenders in German outpatient treatment centers. *International Clinical Psychopharmacology, 33*(6), 349–352. <https://doi.org/10.1097/YIC.0000000000000222>
- Turner, D., Petermann, J., Harrison, K., Krueger, R., & Briken, P. (2017). Pharmacological treatment of patients with paraphilic disorders and risk of sexual offending: An international perspective. *The World Journal of Biological Psychiatry, 17*, 1–10. <https://doi.org/10.1080/15622975.2017.1395069>
- Voß, T., Klemke, K., Schneider-Njepel, V., & Kröber, H.-L. (2016). Wenn ja, wie lange?—Dauer antiandrogener Behandlung von Sexualstraftätern mit paraphilen Störungen: Klinische Erfahrungen aus Auslassversuchen in der forensischen Nachsorgepraxis [When yes, for how long?—Duration of antiandrogenic treatment of sexual offenders with paraphilic disorders]. *Forensische Psychiatrie, Psychologie, Kriminologie, 10*(1), 21–31. <https://doi.org/10.1007/s11757-015-0346-z>
- Webster, C. D., Douglas, K. S., Eaves, D., & Hart, S. D. (1997). *HCR-20: Assessing risk of violence* (Version 2). Mental Health Law & Policy Institute, Simon Fraser University.