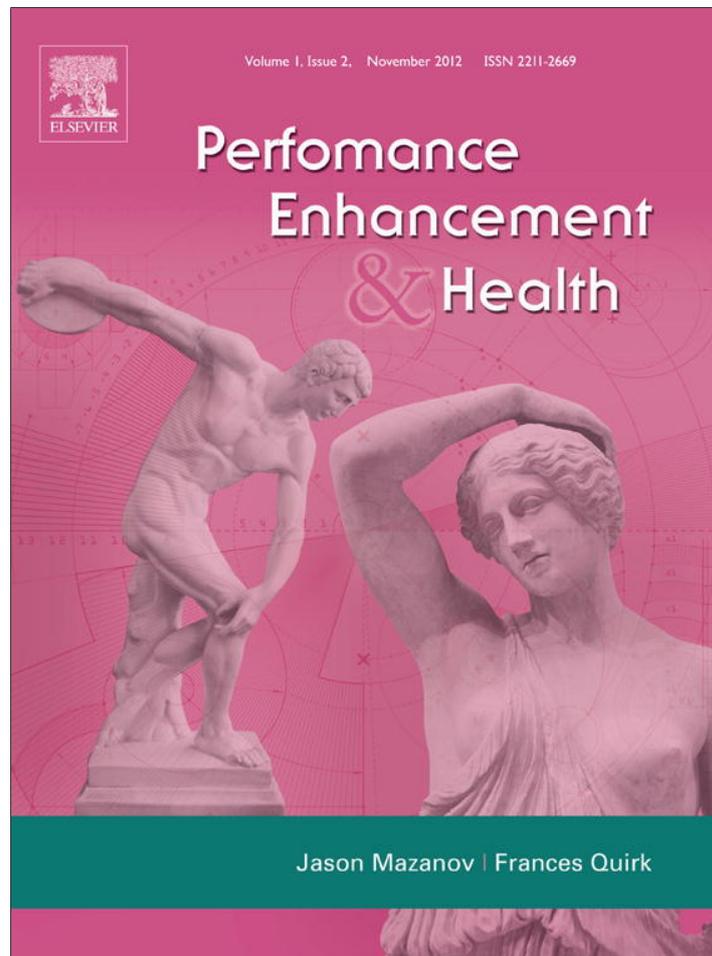


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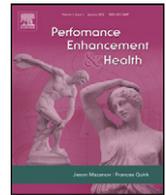
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## Psychogenic urine retention during doping controls: Consequences for elite athletes

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## ABSTRACT

Psychogenic urine retention during doping controls (PURD) refers to an athlete's inability to urinate during a doping control. This paper reports PURD to occur quite frequently in elite athletes, investigates the relationship to the clinical disorder of paruresis (PAR), and investigates its relation to recovery, performance, and self-perception of professionalism and athletic excellence. Furthermore, a scale developed especially for the close description and measurement of PURD is presented. A questionnaire was used for measuring paruresis. The results are based on two online and one paper and pencil study involving 222 German-speaking athletes from various sports. The results indicate that 60% of these athletes have experienced psychogenic urine retention during doping controls, with only 39% of them showing symptoms of paruresis. PURD impacts athlete recovery and self-perception of professionalism and athletic excellence. Suggestions for psychological interventions and recommendations for improving the doping control system are given.

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## 1. Introduction

Sixty-six percent of North-American athletes claim that doping controls are “no big deal” for them (Coombs & Coombs, 1991). This number is quite surprising if one considers that an athlete and a doping control agent stand very closely together in a small space while the athlete has to fill a small beaker with at least 90 ml of urine (WADA, 2009). During this procedure the doping control agent closely observes the athlete's genitals in order to ensure that the athlete is actually delivering his or her own urine and does not add any other substances to the beaker. The procedure might also entail the doping control agent placing his or her head directly in front of the athlete's genitals (Riedel, 2008).

Recently more and more incidents have become public in which athletes describe their inability to urinate during a doping control, even though they show neither physical nor psychological disabilities. “I just can't pee after games. I drink water, energy drinks, until I am full—nothing happens. I usually need two to three hours until it is over” reports Oliver Kahn (German national football goalie, 2007). A sports physician reports that “The others on the team just smile when those two with the problem have to go—they know it will

take one to three hours, no matter what.” (M. M. Schlegel, personal communication, December 13, 2010).

These reports might sound humorous but for some athletes the doping control actually resembles a traumatic event. A 17-year old athlete reported that she had attended the German championship together with a group of athletes from her sports club in a city about 600 kilometers away from home. Her competition had been one of the last that day and afterwards she had been asked to attend a doping control. However, it soon became clear that she was unable to urinate in the presence of the doping control officers. Over the course of three hours she drank more than 6 liters of water and energy drinks. This intake of fluid caused her increasingly excruciating pain. All the while her teammates were on the bus waiting for her to finish the doping control so they could all return home together. None of the doping control officers knew how to handle the situation because letting her go without the urine sample would be considered as a positive test result. The girl was in tears, pleading for a blood test in order to put an end to the ordeal. Finally, the control was called off. The girl was able to urinate as soon as she was unsupervised. Afterwards she felt humiliated and embarrassed especially in front of all of her teammates. After that incident she did not perform well in any further competition during that season and feared controls during each competition. She finished the season far below her actual athletic potential. When she started the next competitive season more than six months after the incident had occurred, she still experienced the same fears and worries. Another athlete reported that she was afraid to win competitions because she did not want to go through the ordeal of a doping control ever

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again (Strahler & Elbe, 2007). Still another athlete, an Olympic gold medalist, quit his career because of psychogenic urine retention during doping controls (A. M. Elbe, personal communication, June 29, 2011).

With an article published in a German sport psychology journal, Strahler and Elbe (2007) presented initial evidence on the topic and indicated that PURD was something very common in doping controls. In their study with doping control agents, 36 out of the 37 German doping control agents reported to encounter the problem regularly and on average in 42% of their monthly doping controls. In 32% of the problematic cases, agents attributed these problems to psychological issues.

Two years later the same authors presented a 47-item PURD questionnaire (PHD-FB) assessing characteristic facets of psychogenic urine retention during doping controls in athletes (Strahler & Elbe, 2009). In the context of their study they were able to show that 56% of responding athletes had experienced PURD, and in 81% of the cases this had meant a time delay of at least 15 minutes. More importantly, they reported that psychogenic urine retention during doping controls is a phenomenon that may be distinguishable from the clinical disorder paruresis (PAR).

Paruresis, also known as shy bladder syndrome, is the clinical diagnosis of a general state of psychogenic urine retention, namely the inability to urinate when other people are around (Williams & Degenhardt, 1954). Triggers for paruretic behavior are (a) the presence of other people, (b) a perceived threat of privacy and (c) the experience of intense emotions like e.g. anxiety or anger (Soifer, Himle & Walsh, 2010). People who suffer from paruresis often adapt their lifestyle to the disorder. They plan most of their activities at a short distance from home in order not to have to urinate in public places. Paruresis is a form of social phobia (Soifer et al., 2010). Its prevalence in the general population has been estimated to lie between 2.8% (Hammelstein, Pietrowsky, Merbach & Braehler, 2005b) and 32% (Kaufman, 2005).

In a sample of 83 elite athletes, Strahler and Elbe (2009) measured partial correlations between the State-Trait Anxiety Inventory-Trait (STAIT-T; Laux, Glanzmann, Schaffner & Spielberger, 1981), the Paruresis-Scale (PARS; Hammelstein & Pietrowsky, 2005a) and the PHD-FB. They found the expected correlation between anxiety and PAR, but not between anxiety and PURD. They also stated that many of the athletes reporting PURD did not seem to show symptoms of PAR nor did they report to have the urination problems in public places. Psychogenic urine retention during doping controls (PURD) therefore seems to be distinguishable from the clinical disorder of paruresis (PAR).

“It is something different, to get undressed in front of the physician, to go to the sauna or to shower at the sports club. I do that voluntarily and can leave if I feel uncomfortable (Riedel, 2008, p.215). Lars Riedel, an Olympic gold and silver medalist, as well as a five time World Champion discus thrower has a lot to say about the doping control system and the athletes having to endure this strict procedure. He repeatedly describes different doping controls in his biography, some of his own and some of his former colleagues, which all have one aspect in common: The perception of being a controlled athlete who is being treated in a degrading manner (Riedel, 2008). From these experiences during the doping control it can be hypothesized that they not only impact the control itself but also have psychological effects after the control. This invasion of privacy is assumed to have effects on micturition, subsequent recovery, performance and on how professional athletes experience their self-perception of professionalism.

The most immediate aspect these negative experiences can impact is the athlete's recovery level. As mentioned above, one athlete reported that doping controls can last up to three hours impacting the recovery that is to follow, for example, after a strenuous competition. Underrecovery “is the failure to fulfill current

recovery demands” (Kellmann, 2002, p.3) and is caused by “stressors”. The above case examples clearly illustrate that doping controls can be characterized as extremely stressful situations for some athletes. Optimal performance, on the other hand, is the result of a balance between negative stress associated with training, competition and related obligations and a fully completed recovery phase. The daily routine of top athletes, who are all part of the doping control system, is based on detailed and structured time schedules that strive for this balance at the highest possible level (Hoffmann, Epstein, Yarom, Zigel & Einbinder, 1999). Every interruption can lead to an imbalance between the negative, strenuous stress and the recovery phase (Boucsein, 1991).

It can be assumed that a doping control can have very diverse effects on the athlete's recovery-stress states. Drug tests in general have been not only negatively evaluated. Coombs and Coombs (1991) show that college athletes reported their experiences with drug tests as being interesting (37%), educational (36%), increasing awareness of the negative effects on the body (34%), serving a good excuse towards friends offering drugs at parties (53%) and as boosting athletic (27%) as well as academic (22%) performance. In the same sample there were, however, also reports of anxiety (34%), adversely affected morale (39%), worry about false detection (47%), embarrassment about the situation (47%), humiliation (37%) and upset (27%). These results show how differently individuals experience drug testing.

For one athlete a doping control can be experienced as something very exciting and as a welcome distraction from the daily routine potentially even leading to an enhanced recovery. For another athlete a prolonged doping control, as in the example of the 17 year old who sat there for over three hours and drank up to six liters, leads to extremely elevated stress levels. This athlete's recovery, performance and her self-perception of professionalism subsequently were negatively impacted by the doping control. Recovery can also be impaired by things as banal as eating carbohydrate rich food two hours later than planned during a densely packed week of multiple competitions (M.M. Schlegel, personal communication, December 13, 2010).

The imbalance between stress and recovery that can result from PURD might not only manifest itself in underrecovery, a relatively short term phenomenon of physical or psychological tiredness (Budgett, 1998); it can take on the form of longer lasting psychological implications. Stress and recovery determine the well-being of an athlete and his or her reaction to subsequent stressors (Kallus, 1992). A stressful doping control can override the strength of an athlete to cope with the situation and leave his or her mind with an aversive blueprint of the situation (Boschen, 2008). During the next doping control, memories of this situation can be triggered by recurring situational cues and elicit unfavorable, physiological and psychological reactions, such as anxiety, anger, an elevated activation of the central and autonomous nervous system, hormonal responses, changes of immune function and behavioral changes (Kellmann, 2002). It is then very unlikely that such a doping control will be successful for the affected athlete causing the adverse memory to become reinforced.

In their paruresis research Soifer et al. (2010) refer to how sensitive the human urination system is toward external shocks. They even go so far as associating the onset of paruresis with an “unpleasant event”, like being harassed by a third person, being rushed by a third person or being unable to urinate during a drug or medical test. Zgourides (1987) points out that the combination of an initial failure to urinate and the subsequent worrying about repeated failure results in an increased activity of the sympathetic nervous system. This further leads to an increased anxiety level that blocks the ability of an individual to urinate. Following this, it can be assumed that PURD leads to an elevated stress level resulting in impaired recovery, whereas impaired recovery could then again

lead to a state of elevated stress (Kellmann & Kallus, 1999). This can also be described as a vicious circle.

In order to achieve a psycho-physiological homeostasis in the elite athlete's body and mind (Hooper & Mackinnon, 1999) his or her training schedule incorporates recovery phases to match the training and competition phase in duration, intensity and type of strain. Concerning type of strain, it is important to keep in mind that stress can have positive effects, for example, if previous activities were under demanding (Yerkes & Dodson, 1908). By alternating physiological stress with psychological stress, athletes are able to optimize their recovery, due to one system resting while the other is active. For example, to achieve homeostasis after a very monotonous physical exercise, an exciting psychological activity might be the right choice for the recovery phase (Kellmann, 2002). Going on a rollercoaster ride after hours of tactical training might be more beneficial to recovery than going to the sauna. However, recovery is very individual and varies from person to person (Kellmann, 2002).

Athletes are capable of compensating for a certain number of daily life stressors, but there are limits to their stress capacity. Symptoms that can be experienced when the stress level becomes too high are among others emotional instability, decreased self-esteem as well as a decreased immune function (Kuipers & Keizer, 1988). It seems logical that if these symptoms persist that they can have negative implications on recovery, performance and self-perceptions of professionalism.

One of the aims of this paper is to investigate exactly this question by analyzing the relationship between PURD and recovery, PURD and performance and PURD and the athlete's subjective experience of his or her professionalism. First, however, more light needs to be shed on the relationship between PURD and the clinical disorder paruresis in order to clarify which of the two, or if maybe even both phenomena relate to recovery, performance and self-perception of professionalism. For these investigations a newly developed and hereby presented Psychogenic Urine Retention during Doping Controls Scale (PURDS) together with the Paruresis Scale (PARS; Hammelstein & Pietrowsky, 2005a) will be utilized.

## 2. Method

### 2.1. Participants

The total sample consists of  $N = 222$  elite athletes (mean age of the whole sample was  $25.3 \pm 6.9$  years), of which 100 ( $23.6 \pm 0.6$ ) are females and 122 are males ( $26.4 \pm 0.7$ ). The majority of the athletes (80.6%) were living in Germany and 18.0% in Switzerland (missing data for 3 athletes). One hundred-sixty six athletes were national team members. Fifty-six were not currently a member of a national team (A, B or C squad), did not give information on their squad status or were retired. Mean years of sport career were  $13.3 \pm 5.8$  (range: 2–32 years) and the mean number of completed doping controls was  $12.16 \pm 16.4$  (range: 1–110 doping controls). The athletes competed in the following sports: team sport ( $n = 56$ ), track and field ( $n = 36$ ), water sports e.g. canoe, rowing etc. ( $n = 35$ ), swimming ( $n = 22$ ), winter sports ( $n = 19$ ), combat sports ( $n = 13$ ), cycling ( $n = 11$ ), triathlon/orienteering ( $n = 9$ ), shooting ( $n = 9$ ), and other sports ( $n = 12$ ).

The total sample contains replies from two different studies. One-hundred-and-thirty-two athletes ( $n = 75$  males;  $n = 57$  females) completed an online survey from August to December 2008 during the first study. Athletes were recruited mostly via the press and through direct contact to their coaches and sport associations.

The recruitment of participants in the second study ( $n = 91$ ), which took place from February to July 2011 ( $n = 47$  males;  $n = 44$

females) differed from the first study in the way that it was a combined online and paper and pencil survey. In addition to the online recruitment of participants, which was conducted identically to the first study, paper versions of the questionnaire were distributed by German doping control agents.

The study was conducted according to the ethical guidelines of the University of Potsdam. All participants provided informed consent and were ensured of the confidentiality of their responses. During study 1 and study 2, 1,490 athletes clicked on the online survey of which 193 (12.95%) completed the questionnaire satisfactorily. Thirty-one athletes completed the paper and pencil version.

### 2.2. Measures

The online survey consisted of two standardized questionnaires as well as additional questions requesting general socio-demographic information and information about doping controls. The online survey was programmed with the software Unipark. The contents of the online and paper and pencil version of the questionnaire were identical.

#### 2.2.1. Socio-demographic information and questions about doping controls

In addition to general biographical information (e.g. age, gender, level and years of sport involvement), the following questions were asked with regard to doping controls: problems in general ("Have you experienced urination problems during doping controls?"), frequency of problems ("How often have you experienced urination problems during doping controls?"), length of delays ("If there were any delays caused by your urination problems, how long did they last?"), possible reasons for urination problems ("In your opinion, are these problems rather physically caused [e.g. due to feeling of dryness] or rather mentally caused [e.g. due to visual observation?]), impairment of recovery ("Do these problems have an influence on your recovery after sport?"), performance ("Do these problems influence your performance?") and self-perceptions of professionalism and athletic excellence ("Do you think that these problems influence your profession of being an athlete?").

#### 2.2.2. Psychogenic Urine Retention during Doping Controls Scale (PURDS)

The PURDS is an improved short version of the 47-item questionnaire on Psychogenic Urine Retention during Doping Controls (PHD-FB) developed by Strahler and Elbe (2009). It is comprised of 15 psychometrically selective items (included in Table 1) taken from the preliminary long version. PURDS items are to be rated on a 4 point-Likert scale ranging from "1 = not at all true for me" to "4 = absolutely true for me". The higher the total score, the more severe the symptoms of PURD are.

In our sample the PURD scale's internal consistency is  $\alpha = .90$ . The resulting score distributions range from 15 to 55, with a mean of 29.31 ( $SD = 8.65$ ). Although the Shapiro-Wilk-test for normality is significant,  $W = .97$ ,  $p < .01$ , the distribution's visual inspection and calculations for skewness ( $z = 1.82$ ) and kurtosis ( $z = 1.50$ ) allow for the assumption of normality. Single-item analyses reveal that none of the corrected item-total correlations ( $r_{it}$ ) are lower than .23. A moderately high item inter-correlation coefficient ( $r_{ii} = .37$ ) and the elevated score for item-precision ( $P_\alpha = .02$ ) point to the possibility of multi-dimensionality. With a KMO-coefficient of  $.89$  and a significant Bartlett-test,  $\chi^2(df = 105) = 1181.72$ ,  $p < .01$ , the data matches criteria for factor analysis. All 15 items were therefore subjected to a principal component analysis (PCA). The a-priori criterion for factor extraction was set to Eigenvalues  $\lambda < 1$  (see Table 1 for single item descriptives and PCA results). Calculations result in an explained amount of variance of 61.85%, with 26.02% ( $\lambda = 3.90$ ) on the first, 23.35% ( $\lambda = 3.50$ ) on a second and

**Table 1**  
Summary of exploratory factor analysis for the PURD short scale (N = 160).

Item	Item descriptives			PCA results				
	Mean (SD)	Skewness	Kurtosis	Communality	Rotated factor loadings			
					F1	F2	F3	
(1) My thoughts are fixed on the doping control as soon as I know that I will be tested.	2.11 (1.02)	1.66	-2.64	.62	.28	<b>.71</b>	.18	
(2) When I cannot urinate during a doping control, I am worried about what the control agent thinks of me.	1.55 (0.82)	6.66	2.32	.59	.36	<b>.68</b>	.02	
(3) Even prior to a doping control I am already afraid that I will not be able to urinate.	1.44 (0.77)	7.49	3.73	.49	.34	<b>.61</b>	.08	
(4) My practice runs badly when a control agent is waiting for me.	1.61 (0.86)	5.39	0.59	.62	.17	<b>.76</b>	.08	
(5) Sometimes I am afraid that the doping control agents lose their patience with me because I cannot urinate.	1.59 (0.81)	-4.44	-0.57	.51	.31	<b>.64</b>	-.04	
(6) Doping controls are embarrassing for me because of the visual control and that is why I cannot urinate.	1.9 (0.96)	3.53	1.29	.67	<b>.72</b>	.36	.16	
(7) If I see a sign with the words "doping control" at the competition, I get an uneasy feeling.	1.43 (0.77)	9.11	6.91	.55	.19	<b>.70</b>	.12	
(8) I wish there would be an alternative to the standard procedure of the doping control.	2.61 (0.96)	-0.69	1.9	.52	<b>.71</b>	.14	-.02	
(9) Because I am "dried out" after sports I cannot adequately urinate in a subsequent doping control.	2.48 (0.99)	-0.86	1.45	.56	.05	.02	<b>.75</b>	
(10) It poses a problem for me to urinate during doping controls.	2.20 (0.99)	1.28	2.38	.70	<b>.73</b>	.38	.14	
(11) I cannot urinate during doping controls because I often have just been to the toilet shortly before.	2.40 (1.07)	-0.02	2.67	.60	.04	.02	<b>.78</b>	
(12) Even if I drink a whole lot beforehand, I have problems urinating in the presence of a control agent during a doping control.	2.09 (1.04)	2.08	-2.66	.80	<b>.82</b>	.36	.08	
(13) I cannot urinate, because the control situation is cold and impersonal.	1.80 (0.89)	3.53	-1.29	.65	<b>.74</b>	.28	.16	
(14) During doping controls my urge to urinate disappears as long as the control agent is in the stall.	1.98 (1.01)	2.53	-2.14	.74	<b>.76</b>	.34	.23	
(15) I am often still so tense from sport and that is why I cannot urinate during doping controls.	1.84 (0.90)	2.81	-2.09	.67	.30	.25	<b>.72</b>	

Note. This table shows the items translated to English. The method of translation and back-translation (Brislin, 1970) was used. Bold numbers in factor loadings indicate proposed factor assignment.

12.47% ( $\lambda = 1.87$ ) on a third factor. The item-factor loadings might be interpreted as indicating a 3-dimensional internal structure with Factor 1 resembling items of *experiencing problems and voicing criticism* (6 items), factor 2 *negative cognitions and emotions* (6 items) and factor 3 *physiologically attributed causes of urination problems* (3 items). Analyses of subscale reliabilities indicate good psychometric properties for factor 1 (mean inter-item correlation  $r_{ij} = .46$ , smallest item-total correlation  $r_{it} = .57$ , Cronbach's- $\alpha = .84$ ) and factor 2 ( $r_{ij} = .60$ ; smallest  $r_{it} = .56$ , Cronbach's- $\alpha = .90$ ). Indices for factor 3 are lower ( $r_{ij} = .39$ , smallest  $r_{it} = .44$ , Cronbach's- $\alpha = .65$ ) but may still be interpreted as being sufficient.

Further studies using the PURDS may consider the possibility of describing the phenomenon of psychogenic urine retention on these three sub-dimensions. As this dimensionality has not yet been corroborated by confirmatory factor analyses, we prefer to report on the overall-score level.

### 2.2.3. Paruresis-Scale (PARS)

The German Paruresis-Scale (PARS, Hammelstein & Pietrowsky, 2005a) consists of two screening items and 13 single scale specific items which investigate psychogenic urine retention problems in public situations on a 5 point-Likert Scale ranging from "0 = almost never" to "4 = almost always". The authors report the scale's reliability with Cronbach's  $\alpha = .94$  (in our sample  $\alpha$  was .77). Participants were asked to complete this scale only if they replied positively to

at least one of the two screening items. The higher the score on the questionnaire, the more severe the symptoms are.

## 3. Results

The following analyses vary in sample size, since participants did not always answer all questions.

### 3.1. PURD and PAR (cell counts)

Table 2 summarizes the observed frequency (cell counts) of our PURD and PAR binary screenings (PURD-positive vs. PURD-negative and PAR-positive vs. PAR-negative). Participants were categorized as PURD-positive if their answer to the dichotomous variable "Have you ever had problems to urinate during a doping control?" was "Yes". In our sample 132 athletes (60%) did so. On this screening level, having experienced PURD is not related to age,  $r(222) = -.03$ ,  $p = .64$ , nor are there gender differences,  $\chi^2(df = 1) = 0.37$ ,  $p = .54$ . PURD-positive and PURD-negative athletes differ with respect to their mean scores on the PURD scale,  $t(140) = 5.71$ ,  $p < .01$ .

The PURD-positive athletes report that urination problems occur independently from the place (at home, at training facilities or at competitions) in which doping controls are conducted,  $\chi^2(df = 3) = 52.62$ ,  $p < .01$ . Eighty-two of all PURD-positive athletes (62%) report that they have experienced urination problems in

**Table 2**  
Frequency of PURD and PAR (n = 167).

PURD screening	PAR screening	PURD score (severity)	PAR score (severity)
PURD positive: n = 109 (65%)	PAR positive: n = 42 (25%)	34.10 (7.83)	7.32 (5.54)
	PAR negative: n = 67 (40%)	30.12 (8.97)	4.18 (3.52)
PURD negative: n = 58 (35%)	PAR positive: n = 6 (4%)	28.54 (7.16)	9.17 (7.57)
	PAR negative: n = 52 (31%)	22.94 (6.60)	3.73 (3.48)

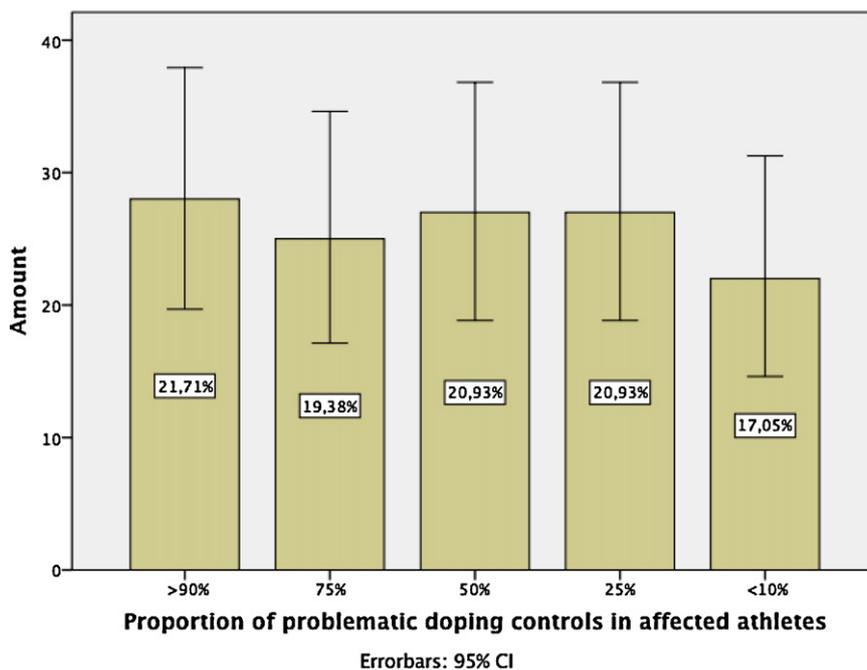


Figure 1. Equal distribution of occurrence.

more than 50% of all their doping controls (Figure 1). Sixty-one PURD-positive athletes (48%) report that the urination problems prolong the duration of their doping controls by 15 to 60 minutes. Another 62 PURD-positives (50%) indicate time delays between one to three hours. Time delays of more than three hours are indicated by 2% of PURD-positive athletes. Seventy-three PURD-positive athletes (56%) ascribe their problems to mental causes; 44% indicate subjective physiological reasons (as for example feeling “dehydrated”).

Athletes who gave a positive reply to both PAR screening items (“Do you occasionally have problems urinating in the presence of others?” and “Is it easier for you to urinate in familiar environments?”) were categorized as PAR-positive. In our sample there were 48 of those athletes (29%) that are potentially suffering from paruresis. As expected PAR-positive and PAR-negative subjects differ with respects to their scores on the PARS,  $t(73) = 3.68$ ,  $p < .01$ .

Table 2 also contains information on cross-combinations of PURD-PAR positive-negative screenings. One fourth of the whole sample (25%) were screened positive for paruresis as well as for PURD. Athletes with PAR are at a 5.28 (odds ratio) increased risk of experiencing PURD,  $\chi^2(df=1) = 14.41$ ,  $p < .01$ . Concordantly, PAR-positive athletes score significantly higher on the PURDS than PAR-negative athletes,  $t(140) = 3.80$ ,  $p < .01$ . It needs to be added that six athletes categorized as PAR-positive did not show PURD.

Pearson's product moment correlation between the PARS and PURDS was  $r = .39$  ( $p < .01$ ). In the group of PURD-positive subjects, PAR-positive athletes did not score higher on the PURDS than PAR-negatives,  $t(62) = 0.74$ ,  $p = .46$ . However, their PAR scores were higher,  $t(62) = 2.32$ ,  $p = .02$ .

### 3.2. PURD, impaired recovery, performance and self-perception of professionalism

Forty-nine of the PURD-positive athletes (38%) report an impact on their recovery (Figure 2). With respect to the whole sample of athletes (PURD-positive and PURD-negative) this equals a significant deviation from expectancy,  $\chi^2(df=1) = 11.37$ ,  $p < .01$ . The odds for impaired recovery after a doping control are 3.28 times higher for PURD-positives than for PURD-negatives. Those athletes

reporting impaired recovery also score higher on the PURDS,  $t(137) = 4.02$ ,  $p < .01$ , and on PARS,  $t(86) = 2.14$ ,  $p = .04$ , in comparison to the others. However, being PAR-positive in addition to being PURD-positive does not add a higher risk of impaired recovery in comparison to being PAR-negative,  $\chi^2(df=1) = .01$ ,  $p = .98$ .

Sixty-three of PURD-positive athletes (50%) report impaired performance (Figure 2). However, the odds for reporting impaired performance due to the doping control are 3.17 times lower for PURD-positives than for PURD-negatives,  $\chi^2(df=1) = 13.21$ ,  $p < .01$ . In line with this, PURD-positives who do not report performance impairment score higher on PARS than PURD-positives who do report performance impairment,  $t(70) = 2.08$ ,  $p = .04$ . PURDS scores do not differ between athletes who report performance impairment and those who do not,  $t(132) = 1.576$ ,  $p = .117$ . In PURD-positive athletes, being PAR-positive adds a 2.5 times higher risk of suffering performance decrease in comparison to being PAR-negative,  $\chi^2(df=1) = 5.017$ ,  $p = .03$ .

Sixteen of PURD-positive athletes (4%) report that the problem negatively affects their self-perception of professionalism and athletic excellence (Figure 2). Being PURD-positive makes it 3.54 times more likely to report an impact on their self-perceptions in comparison to a PURD-negative athlete,  $\chi^2(df=1) = 4.26$ ,  $p = .04$ . Athletes who report this impact, score significantly higher on the PURDS,  $t(134) = 3.44$ ,  $p < .01$ , and the PARS,  $t(10) = 3.97$ ,  $p < .01$ , than those athletes not reporting it. Being PAR-positive in addition to being PURD-positive adds a 3.4 times higher risk of experiencing a decrease in self-perception of professionalism and athletic excellence in comparison to PURD-positive but PAR-negative athletes,  $\chi^2(df=1) = 3.89$ ,  $p = .05$ .

In conclusion, PURD is negatively related to recovery, to the athletes' self-perceptions of professionalism and athletic excellence. However, in terms of performance decrements, PURD-positive athletes attribute this less often to doping controls than PURD-negative athletes.

## 4. Discussion

In our sample, 60% of the athletes have experienced psychogenic urine retention problems during doping controls at least once. This

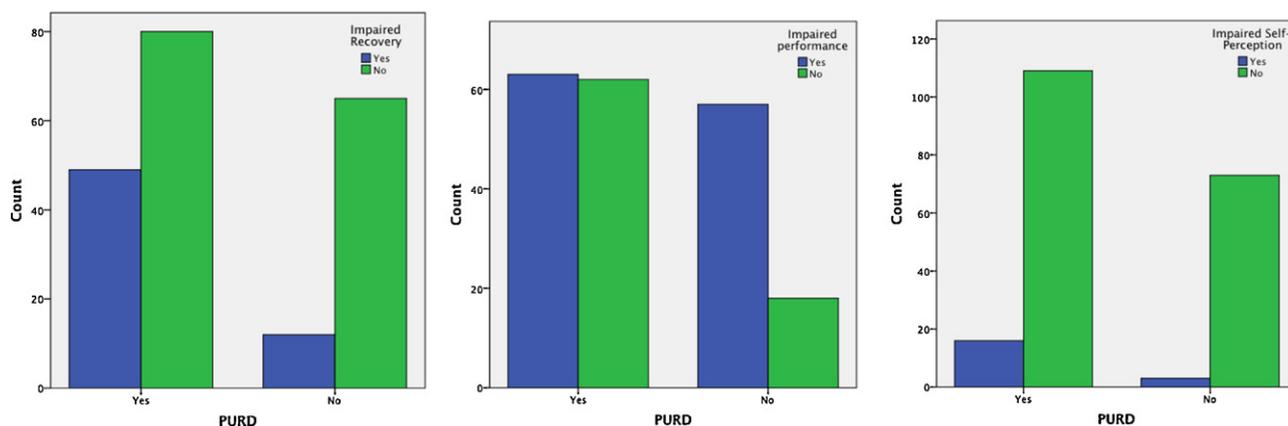


Figure 2. PURD and impaired recovery PURD and impaired performance PURD and impaired self-perception.

number is higher than the 42% reported by Strahler and Elbe (2007), but this can be attributed to the fact that in their study they only interviewed doping control agents. The present results show once more that neither age, nor gender or place of control seem to be associated with the occurrence of PURD, thus being in line with earlier findings (Strahler & Elbe, 2007).

Furthermore, we find that delays caused by PURD last longer than one hour for half of the athletes and that for about two thirds of the PURD-positive athletes these problems affected at least 50% of all of the doping controls they have experienced. The problem of psychogenic urine retention during doping controls can therefore not be classified as a “one-off” incident; instead it occurs frequently, repeatedly and in large numbers in elite sports.

The co-occurrence of PAR in our sample indicates that slightly more than one third of the athletes who have PURD might also be suffering from the clinical disorder of paruresis. However, the results also show that about two thirds of the athletes who have problems during the doping control do not experience this problem in their private life, that only 15% of variance in PURD can be explained by PAR (Strahler & Elbe, 2009, for a similar finding) and that the subsample analysis “PAR-positive & PURD-positive” vs. “PAR-negative & PURD-positive” does not show a significant difference in PURDS scores. We take this as evidence that PURD stands in direct relation to the doping control, that it is a sport-specific problem and that the clinical disorder of paruresis is neither a necessary, nor an overly common prerequisite for it.

Concerning the results of recovery, performance and self-perceptions of professionalism and athletic excellence, we can clearly identify impaired recovery after going through a doping control and experiencing micturition failure. PAR-positive as well as PAR-negative athletes are equally affected. These results indicate that the athlete’s stress-recovery level is negatively influenced and potentially endangering his or her homeostasis. It appears that problematic doping controls are an additional negative stressor on top of training and/or competition stress, which potentially leads to underrecovery. According to Kellmann (2002), underrecovery can be caused by a sudden change in an individual’s perception and self-awareness. During the doping control the athlete’s perception of him or herself potentially changes from being a medalist to the controlled potential convict. It seems plausible that this is stressful and that it can impair recovery. The following quotation also points to this direction: “Having to urinate into a beaker, on command, in front of strangers, under strict surveillance and without any privacy, indicates to me that they have the power and I need to subdue to them” (Riedel, 2008, p.215).

The story, however, is not this clear concerning sport performance. Even though 50% of PURD-positive athletes report a negative influence on performance, even more PURD-negative

athletes (76%) report a negative influence of the doping control on their performance. Experiencing PURD therefore does not seem to impair performance more than a regular doping control in itself.

Few athletes report an impairment of their self-perceptions of professionalism and athletic excellence, but PURD-positive athletes do so more often than PURD-negative ones and being PAR-positive even potentiates this.

#### 4.1. Intervention strategies

Easy explanations for the problem often given by sport federations are that PURD affected athletes must have consumed illegal drugs and that is why they cannot urinate during a doping control or that these athletes are paruretics or just “wussies”. These laymen explanations are not research-based and in no way justified nor helpful in solving the problem.

The questions that follow from our results are how can they be used to help the athletes, and recommendations for the improvement of doping controls can be made. A first recommendation for the doping control system would be to raise awareness for PURD as well as for the clinical disorder of paruresis. As indicated in our results, 39% of the PURD-positive athletes also show signs of paruresis, and for them the doping control has special implications on their recovery stress levels. Knowing about the disorder and educating doping control agents about this disorder can be a first step towards improving the situation. For these athletes we can only recommend that they openly discuss their problems and seek professional help in order to improve their quality of life both during controls but also in their daily lives. However, pharmaceuticals used to alleviate the symptoms like alpha blockers, beta blockers, benzodiazepines, selective serotonin reuptake inhibitors (SSRIs; Soifer et al., 2010), monoamine oxidase inhibitors (Hatterer et al., 1990) and Clonazepam (Labbate, 1997) can violate anti-doping regulations (WADA, 2009) and therefore cannot be recommended to athletes suffering from paruresis. Additionally they have often been reported to be ineffective (Boschen, 2008).

Other interventions used for paruresis are different forms of psychotherapy like psychoanalysis (Wahl & Golden, 1963), hypnosis (Mozdzierz, 1985), flooding (Lamontagne & Marks, 1973), in vivo desensitization (Anderson, 1977), conditioned relaxation (Ray & Morphy, 1975) and paradoxical intention (Ascher, 1979). The disadvantage of these interventions for athletes is that they are quite time-consuming and that it often takes a long time before effects can be seen.

Audio-biofeedback of the pelvic floor musculature, muscle fibers with direct relation to urination, have been reported to help patients with paruresis (Christmas, Noble, Watson & Turner-Warnick, 1991) and might be an option for athletes. One athlete

suggested visiting nudist beaches to help the problem (Schlegel, personal communication, June 15<sup>th</sup>, 2011).

Cognitive-Behavioral Therapy (CBT), where a psychotherapeutic dialogue and in vivo desensitization meet to create the best match of talk and action, seems to be a professional and feasible intervention for athletes. For the cognitive part, recent research of Boschen (2008) shows that first and foremost the unrealistic beliefs about negative evaluation have to be resolved. Paruretics, often due to over-controlling parents, overestimate the probability and severity of negative evaluation. When these patients enter social situations, like a public restroom, they tend to focus their attention on the self and unrealistic beliefs about normal urination behavior. This has the consequence that they are too much aware of their inability to relax the urethral sphincter and too unaware of the fact that people are not attending to them. Any stimulus from outside is interpreted as a negative evaluation. In cognitive therapy, these irrational patterns of thinking are discussed, new cognitions are shaped, like “it is irrational of me to be in a hurry” and strategies are discussed to deal with the problem or even to get rid of it. In the behavioral part, the affected individual, as in-vivo desensitization mentioned above, basically has to practice the situation, with altering difficulty like starting alone and ending up peeing shoulder to shoulder with somebody else.

Elements of CBT might also be helpful for PURD positive but PAR negative athletes. It should be noted here that the cognitive part might be the more important, since paruresis has been reported to be resistant to exposure therapy (Labbate, 1997) due to its early onset. However, CBT will probably be relevant only for those athletes that mentioned psychological reasons for not being able to urinate. For those athletes that mention physiological reasons (44%) like being too dehydrated after training and competition or still being too tense, immediate hydration during the doping control and learning relaxation skills might promise success.

A further intervention could be to enhance athlete recovery after a problematic doping control. A strategy recommended to enhance recovery after unpleasant experiences is debriefing (Hogg & Kellmann, 2002). Furthermore, raising awareness among athletes, coaches and support staff about the negative implications doping controls can have could further improve the situation. Last but not least, preventive measures, like a workshop, prior education for example with help of the brochure “I am being controlled” (NADA, 2010), and communication could be protective factors against underrecovery. Kellmann, Patrick, Botterill and Wilson (2002) state that awareness and communication are key factors in preventing underrecovery due to situational conditions.

#### 4.2. Recommendations for the doping control system

Helping athletes to cope better with the situation of a doping control and raising awareness for the problem is one thing. However, we also think that it is necessary to make recommendations for the system conducting doping controls.

One important factor to consider and to educate all doping control officers about is the fact that for most paruretics the age of onset is between 12 and 15 years of age (Malouff & Lanyon, 1985) which is an age at which young elite athletes may encounter their first doping control. As mentioned before, Soifer et al. (2010) point out that paruretics often report the onset of their problem as being caused by one unpleasant event, in which they were harassed, teased or rushed by another person while trying to urinate either in a public restroom or during a drug or medical test. Zgourides (1987) believes that this initial failure to urinate produces subsequent worrying about failing again and that this underlies the perseveration of symptoms.

Doping control agents therefore need to be sensitized towards this issue and need to be educated about the fact that an unsuccessful doping control can be a trigger for paruresis and/or PURD. The novelty of the situation and the unreadiness of the young athletes could be the trigger for many problems later on. The first doping control in an athlete's career might be more crucial to him or her than subsequent ones. Riedel (2008) states that he and other athletes had the greatest problems during their first doping controls to which it took them a while to get used to. Young athletes in general have a higher variability of physical and psychological states, such as mood disturbances, than older athletes due to their ongoing developmental processes (Kellmann, 2002). Therefore carefully preparing young athletes for their first doping control in order to decrease PURD prevalence in the long run seems crucial. Promoting self-determination might be a key protective factor as well (Beckmann, 2002).

Suggestions the doping control agents made in the Strahler and Elbe (2007) study to improve the control system were for example “blood tests”, “video observation of the stall”, “testers wearing headphones” and “letting athletes go into the stall naked and alone”. Further recommendations are choosing warm and comfortable places for testing (Coombs & Coombs, 1991), giving athletes the possibility to come back later when they feel they can urinate (Labbate, 1997), matching a control agent to the athlete that the athlete is familiar with (Riedel, 2008; Soifer et al., 2010), and choosing larger stalls so that the rule of 3 meters distance to the athletes can actually be adhered to (Labbate, 1997).

One last recommendation is to introduce the use of a urine marker (Gauchel, Huppertz, Feiertag, & Keller, 2003; Huppertz et al., 2004) during doping controls. Urine markers are widely used in drug testing of pilots and convicts, for example. The marker substances are taken orally prior to providing the urine sample. After 30 minutes, athletes are allowed to urinate without supervision. Urine samples are traced to the athlete by determining the presence of marker substances, previously ingested. By means of a combination of polyethylene glycols of different molecular weights a large number of different polyethylene glycol chain mixtures can be obtained. More than 10,000 different combinations of polyethylene glycols as markers are possible. Therefore, individual markers can be obtained that are easily discriminated. This concept is often characterized as a substance “fingerprint.” First results conducted in the Anti-Doping Laboratory of Kreischa show that the urine marker, which does not interfere with the doping analysis, and therefore seems to be an alternative which can be offered to athletes suffering from psychogenic urine retention during doping controls (Keller & Elbe, 2011). A survey of 83 elite athletes showed that 71% would be willing to ingest a marker prior to a doping control (Keller & Elbe, 2011).

#### 4.3. Limitations of the study

Our data collection process might have undergone a response bias. Although we tried to overcome this by distributing questionnaires through doping control agents the larger number of questionnaires ( $n=193$ ) were completed online. The numbers show that 1,490 athletes clicked on the two online surveys but only 12.95% satisfactorily completed the questionnaire. This might be an indication that those athletes affected with the problem of either PURD or PAR are more likely to respond to the survey than those athletes not having experienced the problem leading to an over representation of affected athletes in our sample.

Furthermore, the overall sample could have been larger. However, national squad athletes are an extremely difficult group to access due to their strict training regimes and highly packed

schedules. Additionally, the topic is not one that many athletes want to talk openly about.

## 5. Conclusion

To sum up, our results show that PURD is of concern for many elite athletes. Furthermore, 39% of athletes with PURD might also suffer from the clinical disorder paruresis, a phenomenon that up until now has not been discussed in research on elite athletes. PURD is a problem regardless of age, gender or the place of control that is negatively related to athlete recovery, performance and self-perceptions of professionalism and athletic excellence. We recommend that athletes, coaches, support staff as well as the doping control system are made aware both of PURD and PAR and the implications it can have. The key is to prevent young athletes from having negative experiences during their first doping control and in this way preventing the onset of paruresis or PURD. We furthermore advise raising awareness for the increased recovery demands athletes face after experiencing problematic doping controls. Finally, it is our hope that these results might contribute to improving the doping control system as a whole.

## 6. Future research perspectives

Future research programs could investigate personality dispositions within the athletes themselves that are related to PURD. Trait-anxiety has been shown to be of less importance for sport-specific urine retention problems than it is for the clinical disorder of paruresis (Strahler & Elbe, 2009). Instead, in interviews athletes complain about the situational demands such as the pressure during the doping control and the interaction with the doping control officers. It could be that their instinctive reaction, influenced by personality factors and individual differences, often triggered and sustained subconsciously, causes PURD (Strahler, Elbe & Brand, 2010). Therefore, a focus of future research could be on social psychological factors (e.g. reactance; Brehm, 1966 or proactive coping, Schwarzer, Taubert & Greenglass, 2000), cultural factors (Soifer et al., 2001) or choking under pressure (Baumeister, 1984). Reactance, for example, refers to adverse behavior and cognition, which arises when one's freedom is perceived as being threatened.

Additionally, a qualitative approach to the phenomenon seems warranted. Studies qualitatively investigating how the control is perceived by the athletes and the emotions and thoughts they experience during the control seem useful. Furthermore, a closer investigation of sport type differences seems promising. It could be that the phenomenon is more pronounced in certain types of sports and the cultures surrounding them. Future research, in spite of the possible response bias in our sample, also needs to investigate the reasons for the higher prevalence of PAR in the athletic sample compared to the numbers of Hammelstein et al. (2005). The question whether a negatively experienced doping control was the trigger for paruresis in elite athletes also calls for further investigation. A specific focus on young athletes and the development of PURD in different age groups could also warrant future investigations.

## Conflicts of interest

The authors declare that they have no conflict of interest.

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