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Prevalence and Risk Factors of Urinary and Fecal Incontinence in German Powerlifters

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Editorial

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Abstract

Introduction and Hypothesis: Incontinence is well documented in high-impact sport, but the population of maximal-strength athletes, particularly powerlifters, remains under- researched, and no nationwide data exist for Germany. We hypothesized that urinary and fecal incontinence would be prevalent among German powerlifters and would be associated with identifiable lifestyle- and sport-related risk factors.

Methods: In this cross-sectional online survey (STROBE/CHERRIES-compliant), a self- developed questionnaire incorporating the ICIQ-UI Short Form and the Revised Faecal Incontinence Scale/Cleveland Clinic Incontinence Score was distributed nationally by email, social media, and posters to members of clubs registered with the German Powerlifting Federation (BVDK). Lifetime and 3-month prevalence were calculated descriptively; associations with candidate risk factors were assessed by binary logistic regression (odds ratios [OR], 95% confidence intervals [CI]).

Results: Of 420 eligible respondents (194 men, 226 women), 43.6% reported lifetime urinary incontinence (26.9% within the past 3 months) and 35.7% reported lifetime fecal incontinence (32.9% within the past 3 months). Older age category, pregnancy (OR 7.66), and regular alcohol, tobacco, caffeine, and medication use were significantly associated with urinary incontinence, as were narrow-grip bench press and lower squat/deadlift weight classes. Female sex, older age, pelvic or spinal surgery (OR 6.9–12.5), and squat stance were significantly associated with fecal incontinence. Equipment use showed no significant association with either outcome.

Conclusions: Urinary and fecal incontinence are highly prevalent among German powerlifters and are associated with age, pregnancy, lifestyle factors, surgical history, and specific technical and training variables. These findings support systematic incontinence screening and targeted preventive strategies for strength athletes.

Keywords: Fecal Incontinence; Pelvic Floor; Powerlifting; Prevalence; Risk Factors; Urinary Incontinence

Brief summary

A nationwide German survey of 420 powerlifters found 43.6% lifetime urinary and 35.7% fecal incontinence, associated with age, pregnancy, lifestyle, surgery, and lifting technique.

Introduction

Incontinence describes the loss of the ability to control the voluntary and controlled excretion of urine and/or stool or gas [1]. Problems with incontinence are widespread and well documented in competitive sport. A systematic review

with meta-analysis found stress urinary incontinence to be the most frequently reported subtype, with a weighted average prevalence of 36.1% across sports [2]. Women participating in high-impact disciplines that markedly raise intra-abdominal pressure, such as volleyball, trampolining, and running, are particularly affected [3,4]. Powerlifters, whose competitive goal is the highest possible combined one-repetition maximum across squat, bench press, and deadlift, represent a population that has received comparatively little attention [5]. The high demands placed on maximal strength during training and competition can provoke urinary and, less commonly, fecal incontinence with gas leakage during the three competition lifts, a phenomenon colloquially termed "leaking" [6].

Despite the substantial physical demands of the sport, the evidence base remains limited and, in places, inconsistent [4,6-10]. Existing studies are also imbalanced: most focus on urinary incontinence and on female athletes, while fecal incontinence and male athletes are comparatively neglected [4,6-10]. One survey of Norwegian powerlifters and weightlifters reported anal incontinence in 61.8% of men and 80% of women, but this sample also included Olympic weightlifters, limiting comparability [6]. No nationwide investigation has previously been conducted in Germany. Beyond the direct impact on quality of life, activity, and participation [11], incontinence carries a substantial psychological burden because the topic remains widely stigmatized [12]. This study aimed to determine the prevalence of urinary and fecal incontinence among powerlifters affiliated with clubs of the German Powerlifting Federation (Bundesverband Deutscher Kraftdreikämpfer e.V.) and to identify associated lifestyle-related and sport-specific risk factors. We hypothesized that both forms of incontinence would be prevalent in this population and would be significantly associated with identifiable risk factors, including age, pregnancy, lifestyle factors, surgical history, and training- and technique-related variables.

Materials and Methods

Study design

This cross-sectional online survey followed the STROBE statement and the CHERRIES checklist for internet-based surveys [13,14]. The primary outcome was the prevalence of urinary and fecal incontinence; the secondary outcome was the identification of associated risk factors, expressed as odds ratios (OR) with 95% confidence intervals (CI).

Participants

Eligible participants were adults aged ≥18 years, registered with a powerlifting club officially affiliated with the German Powerlifting Federation, with sufficient German-language proficiency to complete the questionnaire. Athletes younger than 18 years, athletes from other sports, and members of clubs not registered with the federation were excluded. Based on federation records (226 clubs, 16,882 members; 14,769 members aged ≥18), a minimum sample of 375 participants was calculated using the finite population correction for a 5% margin of error and 95% confidence level [15] (Table 1).

Characteristic	Men (n=194)	Women (n=226)	Total (n=420)
Age category: Junior (19–23y)	—	—	84 (20.0%)
Age category: Open (24–39y)	—	—	181 (43.1%)
Age category: Masters I–IV (≥40y)	—	—	155 (36.9%)
Training experience, years (mean ± SD)	—	—	5.8 ± 4.6
Competition experience, years (mean ± SD)	—	—	3.9 ± 3.9
Personal best total, kg (mean ± SD)	—	—	469.6 ± 187.2
Equipment category: RAW	—	—	377 (89.8%)
Equipment category: Equipped	—	—	43 (10.2%)
Prior pregnancy	n/a	23 (10.2%)	23
Prior pelvic/abdominal/spinal surgery	—	—	37 (8.8%)
Regular caffeine use	—	—	288 (68.6%)
Regular tobacco use	—	—	153 (36.4%)
Regular alcohol use	—	—	131 (31.2%)
Regular medication use	—	—	127 (30.2%)

Table 1: Sample Characteristics of Participating German Powerlifters (N=420).

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Questionnaire Development and Data Collection

A structured literature search (1–16 March 2025) of Medline/PubMed, PEDro, and Mendeley using PEO-structured search terms informed the development of a 30-item, self-administered questionnaire covering five domains: general/demographic factors, powerlifting-specific factors, lifestyle, fecal incontinence, and urinary incontinence. Fecal incontinence was assessed using the Revised Faecal Incontinence Scale (RFIS) combined with the ClevelandClinic Incontinence Score (CCIS) [16]; urinary incontinence was assessed using the German version of the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) [17]. Both instruments have demonstrated good reliability and validity in prior research [16-19]. The questionnaire was digitized using a GDPR-compliant survey platform (empirio) and pilot-tested with 46 athletes from five regional clubs (17–22 March 2025), leading to minor refinements (clarification of onset definitions, larger touch targets, addition of a progress bar). Recruitment (23 March–30 April 2025) proceeded via email through club representatives, the federation's social media channel (Instagram), and posters/tear-off flyers at clubs and competitions in North Rhine-Westphalia (Figure 1). Multiple submissions were prevented via IP-based single-response restriction without IP storage.

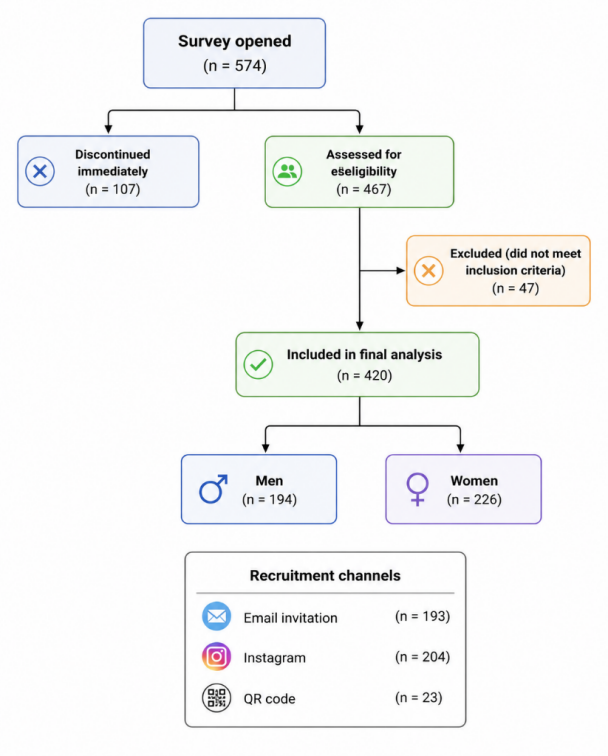


Figure 1: Flow Diagram of Participant Recruitment and Inclusion. Of 574 Respondents who Opened the Survey, 107 Discontinued Immediately and 47 did not meet the Inclusion Criteria, Leaving 420 Valid Datasets (194 Men, 226 Women) for Analysis. Recruitment Channel is Indicated for Each Participant (Email, N=193; Instagram, N=204; QR Code, N=23).

Data Analysis

Data were analyzed using DATAtab and SPSS 29.0. Missing data were handled by listwise deletion, imputation, or dummy coding depending on the extent of missingness; outliers were assessed using boxplots and z-scores. Descriptive statistics characterized the sample. Lifetime and 3-month period prevalence were calculated for urinary and fecal incontinence. Risk factors were analyzed by binary logistic regression, reporting the regression coefficient (B), standard error, z-value, p-value, OR, and 95% CI. Findings from three prior powerlifting/weightlifting cohorts served as the primary comparators given their similar design and population [7-9].

Ethics

The study protocol was reviewed by the Ethics Committee of the author's affiliated university and classified as posing no ethical concerns. Participants provided informed consent,

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and data protection information compliant with the EU General Data Protection Regulation was provided before survey access. Participation was voluntary and anonymous; no identifying data were collected or stored.

Results

Of 14,769 eligible athletes, the survey was opened by 574 individuals; 107 discontinued immediately, and 47 did not meet the inclusion criteria, leaving 420 valid, complete datasets (194 men, 226 women) for analysis — exceeding the pre-specified minimum sample size of 375 (Figure 1). Participants entered via email (n=193), Instagram (n=204), or QR code (n=23). Mean powerlifting training experience was 5.8 ± 4.6 years and competition experience 3.9 ± 3.9 years. Personal best totals ranged from 210 to 875 kg (mean 469.6 ± 187.2 kg); 89.8% competed exclusively "RAW" (without supportive equipment). Twenty- three women reported a prior pregnancy, most commonly delivered by cesarean section (54.2%). Prior pelvic, abdominal, or spinal surgery was reported by 8.8% (n=37) of participants.

Urinary Incontinence

Lifetime prevalence of urinary incontinence was 43.6% (n=183), with a 3-month period prevalence of 26.9% (n=113); prevalence was similar between men (40.7%) and women (46.0%) (Table 2). All 23 women with a prior pregnancy reported urinary incontinence. On the ICIQ-UI SF, most affected participants reported small-volume leakage (n=151/182) occurring approximately weekly or less (n=147), most often during physical/sport activity (n=172), particularly during training (n=178) and competition (n=115). Age category was a significant predictor, with risk rising sharply from the Masters II class onward (OR 2.32–41.9 versus reference; all p=0.01), while junior and open classes showed reduced risk. In women, weight classes ≤52 kg (OR 14.3), ≤72 kg (OR 3.0), and ≤84 kg (OR 3.2) were significantly associated with increased risk; in men, the ≤59 kg (OR 3.4) and ≤74 kg (OR 5.7) classes were significant. Regular use of alcohol (OR 2.17), tobacco (OR 2.56), caffeine (OR 2.07), and medication (OR 2.31) were all significantly associated with increased risk (all p<0.05) (Table 3). Pregnancy was the strongest single predictor (OR 7.66, 95% CI 1.68–34; p=0.01); number of births and delivery mode were not significant.

Outcome	Men	Women	Total
Urinary incontinence, lifetime	79/194 (40.7%)	104/226 (46.0%)	183/420 (43.6%
Urinary incontinence, 3-month	54/194 (27.8%)	54/226 (23.9%)	113/420 (26.9%
Fecal incontinence, lifetime	80/194 (41.2%)	70/226 (31.0%)	150/420 (35.7%
Fecal incontinence, 3-month	74/194 (38.1%)	64/226 (28.3%)	138/420 (32.9%

Table 2: Lifetime and 3-Month Prevalence of Urinary and Fecal Incontinence, by Sex.

Risk factor	OR	95% CI	p
Master's II class (vs. reference)	2.32	1.24–4.36	0.01
Master's III class	13.3	2.94–60.24	0.01
Master's IV class	41.94	9.91–177.43	0.01
Women's weight class ≤52 kg	14.29	1.41–144.38	0.02

Table 3: Significant Risk Factors for Urinary Incontinence, Binary Logistic Regression

None of the assessed surgical procedures reached significance, though all except "other surgery" showed a trend toward increased risk. Equipment use showed no significant association in either the RAW or Equipped category. Narrow-grip bench press was associated with significantly increased risk (OR 1.77, p=0.04), while use of an exaggerated arch ("extreme bridge") was protective (OR 0.41, p=0.01). Higher competitive tier was linearly associated with increased risk (OR 1.18 per level, p=0.01), although individual tiers were not independently significant. Training years, competition years, and session duration showed no significant associations.

Fecal Incontinence

Lifetime prevalence of fecal incontinence was 35.7% (n=150), with a 3-month period prevalence of 32.9% (n=138); prevalence was higher in men (41.2%) than women (31.0%) (Table 2). On the CCIS, gas leakage was most common (45.2%), followed by liquid stool (13.3%) and solid stool (4.3%); most participants had good (n=217) or perfect (n=193) continence scores. Female sex was a significant risk factor (OR 1.56, p=0.03), as was older age, with risk rising markedly from Masters II onward (OR 2.98–30.4; all p=0.01) (Table 4).

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Risk factor	OR	95% CI	p
Female sex	1.56	1.05–2.34	0.03
Masters II class (vs. reference)	2.98	1.53–5.80	0.01
Masters III class	8.56	2.60–28.25	0.01
Masters IV class	30.36	10.27–89.72	0.01
Regular medication use	2.28	1.04–5.02	0.04
Hysterectomy	12.23	1.63–91.87	0.01
Prostatectomy	12.45	1.66–93.50	0.01
Episiotomy	11.97	1.59–90.09	0.01
Spinal surgery	10.17	1.34–77.22	0.02
Other surgery	6.89	1.60–29.65	0.01
Squat: sumo stance	1.65	1.04–2.61	0.03
Squat: conventional stance	1.65	1.04–2.61	0.03
Training frequency 3–4x/week (protective)	0.29	0.16–0.53	0.01
District-level competition	2.01	1.19–3.39	0.01
State-level competition (protective)	0.5	0.29–0.84	0.01

Table 4: Significant Risk Factors for Fecal Incontinence, Binary Logistic Regression.

Weight class showed no significant association. Among lifestyle factors, only regular medication use reached significance (OR 2.28, p=0.04); tobacco, alcohol, and caffeine showed non-significant trends toward increased risk. Pregnancy, parity, and delivery mode showed no significant association. Pelvic or spinal surgery was strongly associated with increased risk: hysterectomy (OR 12.2), prostatectomy (OR 12.5), episiotomy (OR 12.0), and spinal surgery (OR 10.2, all p≤0.02), and other surgery (OR 6.9, p=0.01).

Squat stance, both sumo and conventional, was significantly associated with increased risk (OR 1.65, p=0.03). Weekly training frequency of three to four sessions was protective (OR 0.29, p=0.01), while district-level competition was associated with increased risk (OR 2.01, p=0.01) and state- level competition with decreased risk (OR 0.50, p=0.01). Equipment use showed no significant association.

Discussion

This nationwide survey of 420 German powerlifters found a lifetime urinary incontinence prevalence of 43.6%, at the upper end of the 9.3–50% range reported in comparable powerlifting and weightlifting cohorts [6-9], and a fecal incontinence prevalence of 35.7%, markedly lower than the 61.8–80% reported by Skaug et al. in a mixed powerlifting/ weightlifting sample [6], possibly reflecting differences in population composition. To our knowledge, this is the first nationwide investigation of both urinary and fecal incontinence in this population conducted in a German-speaking country and one of few to include a substantial male sample alongside women. Consistent with prior literature, older age was strongly associated with both outcomes, with risk increasing markedly from the Masters II category onward [7,9,20].

Female sex was significantly associated with fecal, but not urinary, incontinence, in line with previous reports [6,10,21]. Pregnancy emerged as a strong, independent risk factor for urinary incontinence (OR 7.66), corroborating the well-established role of pregnancy-related anatomical and hormonal change on pelvic floor function [8,10,20,22]; the absence of a significant association with delivery mode or parity may reflect limited subgroup sample sizes. All four lifestyle factors examined were significantly associated with urinary incontinence, plausibly reflecting the direct irritant effects of alcohol, caffeine, and nicotine on the bladder mucosa and micturition, and the diuretic, sedative, or muscle-relaxant properties of certain medications [23-25]; only medication use reached significance for fecal incontinence. Pelvic and spinal surgery showed a consistent, strong association with fecal incontinence (OR 6.9–12.5) but only non-significant trends for urinary incontinence, in agreement with previous work [22,26].

Sport-specific findings were more heterogeneous. Neither training nor competition experience (years) was associated with either outcome, but higher competitive tier was linearly associated with increased urinary incontinence risk, and specific technical variables (narrow-grip bench

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press, squat stance) showed significant associations, consistent with the hypothesis that sustained or repeated increases in intra-abdominal pressure during resistance training may exceed compensatory pelvic floor capacity over time [7,9,27]. Equipment use (RAW versus Equipped) showed no significant association with either outcome, in partial contrast to earlier findings implicating belt use, possibly reflecting the more limited assessment of equipment use and bracing technique in the present questionnaire compared with prior work [8].

Strengths And Limitations

Strengths of this study include its status as the first nationwide investigation of urinary and fecal incontinence in German powerlifters, its inclusion of a substantial male sample alongside women, its combined assessment of both incontinence types using validated instruments (ICIQ-UI SF, RFIS/CCIS), adherence to STROBE and CHERRIES reporting standards, and a sample size exceeding the pre-specified minimum required for reliable prevalence estimation.

Several limitations warrant consideration. Selection bias cannot be excluded: athletes affected by incontinence may have been more motivated to participate, or, conversely, stigma may have discouraged participation, in either direction biasing prevalence estimates [28,29].

Eligibility criteria requiring federation-registered club membership excluded athletes training independently or in unaffiliated clubs, and regional or demographic subgroups may be over- or under-represented given the voluntary, anonymous recruitment strategy. Recall and information bias are likely given the sensitive and stigmatized nature of the topic [28,30]. The questionnaire, although incorporating validated subscales, was not validated as a composite instrument, limiting comparability with other studies. Selective non-response to specific items may have introduced further bias, and unmeasured confounding (e.g., body mass index, pelvic floor muscle function) cannot be excluded. As the study addressed a broad range of risk factors rather than focusing on specific subgroups (e.g., athletes with prior surgery or pregnancy), individual associations should be interpreted with caution and confirmed in more targeted studies.

Conclusion

Urinary and fecal incontinence are highly prevalent among German powerlifters and are associated with age, pregnancy, lifestyle factors, surgical history, and specific technical and training variables, largely corroborating findings from international cohorts while extending them to a previously unstudied national population. These findings support routine, non- stigmatizing incontinence screening in powerlifting settings and underscore the need for sport-specific, validated assessment tools, prospective and biomechanical (e.g., electromyographic) studies of underlying mechanisms, and the development of targeted training modifications and pelvic floor-focused preventive and rehabilitative strategies for
strength athletes.

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Prior Presentation

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Author Contribution Statement

A Volzhenin: Protocol/project development, Data collection or management, Data analysis, Manuscript writing/editing.

Consent

Written informed consent was obtained from all participants prior to survey participation.

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