

Return to Play after symptoms of inability to takeoff in pole vaulters: A case series study

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Abstract

Purpose: This study aimed to clarify the occurrence situations and recovery strategies for the "inability-to-takeoff syndrome" in pole vaulting. Through a case analysis of athletes who successfully returned to competition, we aimed to provide foundational data for understanding and addressing this specific psychomotor disorder. **Methods:** A qualitative study was performed using semi-structured interviews with four Japanese pole vaulters (three male, one female; mean age 24.3 years) who had experienced and recovered from inability-to-takeoff syndrome within the past year. Participants were recruited via online platforms, and data on their symptoms, situational triggers, and recovery processes were collected through one-hour videoconference interviews. Thematic analysis was applied to the interview data, while descriptive statistics summarized participant characteristics. **Results:** The findings revealed two primary onset patterns for the syndrome: sudden, unexplained occurrences and onsets triggered by catastrophic incidents, such as falls or dangerous vaults. The timing of anxiety and the specific number of approach steps (from 6 steps to a full approach) at which symptoms appeared varied among individuals. Key recovery strategies identified included a gradual increase in the number of approach steps from a shortened approach, practicing approach runs outside the vaulting area to reduce pressure, practicing under favorable conditions (e.g., tailwind), and changing coaching environments. All participants reported receiving psychological support from coaches, teammates, or mental health professionals, which they found beneficial for recovery. **Conclusion:** The inability-to-takeoff syndrome in pole vaulting appears to be a complex psychological issue, potentially linked to traumatic experiences and performance anxiety. The recovery strategies employed by the athletes shared characteristics with principles of exposure therapy, particularly a gradual, systematic re-introduction to the feared activity (i.e., full-approach vaulting). This suggests that a gradual exposure approach may be an effective method for facilitating recovery. Furthermore, minimizing high-risk vaulting situations during practice is considered crucial for preventing the onset of this syndrome. Future research should aim to further explore the psychological mechanisms underpinning this syndrome and develop structured prevention and intervention protocols.

Key words: Yips, Athletics, Track and field, Psychological issue, Case study

Introduction

In pole vault, a jumping event in track and field, elite athletes achieve bar clearances of approximately 6 meters for men and 5 meters for women. The inherent danger of vaulting at such heights can lead to catastrophic injuries, including permanent disability and fatalities (Boden et al., 2012; Boden et al., 2001). Pole vaulters experience falls to ground from significant heights or similar accidents, and witnessing such events can also result in trauma. This experience may lead to a condition where the athlete becomes unable to perform the takeoff. In coaching circles, this condition is often referred to as "inability-to-takeoff syndrome" in pole vault. However, this term has historically lacked a standardized definition, potentially leading to inconsistent prevalence reporting in prior research (Enoki et al., 2024). Among these factors, the psychological aspect is highly variable and is essential for consistently maximizing performance. Athletes frequently face anxiety and nervousness during competition, and excessive tension or anxiety can lead to performance deterioration (Woodman & Hardy, 2003). One example of a psychomotor disorder is the "yips," which is believed to share similar symptoms with inability-to-takeoff syndrome.

To provide a theoretical context for the "inability-to-takeoff syndrome," it is useful to review the literature on the yips, a more extensively studied psychomotor disorder with similar characteristics. The yips are recognized as a psycho-neuromuscular movement disorder that particularly affects sports requiring fine motor precision for success. This phenomenon, where previously automatic motor skills can no longer be executed as intended, is frequently reported in activities such as golf putting, baseball throwing, and darts. The onset of yips

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is strongly associated with psychological factors such as performance anxiety, excessive self-consciousness, and past failures, with symptoms often being exacerbated under stressful conditions. Smith et al. proposed a continuum for yips, distinguishing between Type I, characterized by focal dystonia, and Type II, associated with psychological symptoms like choking (Smith et al., 2003).

The "inability-to-takeoff syndrome" investigated in this study is a specific psychomotor impairment in the takeoff phase of pole vaulting, sharing several similarities with the yips. First, both conditions involve an inability to perform a specific motor skill as intended. Second, psychological factors such as performance pressure and fear of failure are considered significant triggers or exacerbating factors in both conditions. However, several distinctions can be made. First, the nature of the target motor skill differs. While yips are commonly observed in tasks requiring fine motor control, the "inability-to-takeoff syndrome" pertains to the dynamic gross motor skill of takeoff in pole vaulting. Second, the nature of fear associated with failure may differ. In pole vaulting, a failed takeoff carries an immediate risk of physical injury, suggesting that a specific fear of heights or a crash may play a more significant role than the fear of social evaluation often seen in yips. Third, previous research indicates this syndrome might be more directly triggered by traumatic experiences, such as personal falls or witnessing accidents involving others, compared to the typical onset patterns of yips (Enoki et al., 2024).

Various approaches have been explored for recovery from yips and similar motor dysfunctions. For yips, psychological interventions such as solution-focused guided imagery and emotional freedom techniques have been reported as effective treatments. Cognitive Behavioral Therapy (CBT) is a common method to treat anxiety problems, and exposure therapy, a CBT technique, has been applied to athletes experiencing performance anxiety (McCarthy et al., 2023). Psychological skills training, which includes techniques like self-talk, goal setting, imagery, and arousal regulation is recognized for its effectiveness in improving overall wellbeing. Third-wave interventions, such as mindfulness and acceptance-based approaches, also show promise for athlete wellbeing. Furthermore, an external focus of attention has been reported to improve performance in yips-affected golfers (Clarke et al., 2015). For injured athletes, psychological support programs often incorporate various psychological skills to facilitate recovery. Moreover, CBT in sport can be conceptualized as cognitive behavioral training, where athletes practice changing dysfunctional behaviors (e.g., avoiding anxiety-provoking situations) into functional ones. Sports activities can sometimes lead to traumatic experiences, whether through injury, accidents, or intense psychological pressure. Cognitive behavioral stress management, which employs techniques like relaxation training, imagery, and cognitive restructuring, has been shown to reduce the frequency of injury and illness among competitive collegiate athletes. Previous findings also indicated it could reduce postsurgical pain and anxiety and accelerate physical recovery (Perna et al., 2003; Ross & Berger, 1996). Psychological skills interventions, including cognitive-behavioral approaches, have also been reviewed for their role in facilitating psychological and physiological recovery. CBT is also recognized as an effective psychotherapeutic approach for athletes to manage anxiety and stress, modify non-functional thought patterns related to performance, and acquire coping skills. These findings underscore the critical role of psychological interventions in recovering from performance blocks like the yips and sports-related trauma. However, research specifically addressing recovery strategies for the "inability-to-takeoff syndrome," remains scarce. A qualitative exploration of the subjective experiences of recovered athletes is therefore needed to identify concrete strategies and inform the development of effective support systems.

This study aimed to clarify the occurrence situations and recovery strategies for this "inability-to-takeoff syndrome".

Materials & methods

Participants and data collection

A semi-structured interview (Dixon et al., 2024; Powell et al., 2021) was conducted with pole vaulters active in Japan (Table 1).

Table 1. Participant characteristics

Participant	male / female	Age (year)	Duration of competition (year)	Personal record (m)	Number of vaulting sessions (per week)	Duration of absence (month)
A	male	22	10	5.2	2	10
B	male	28	16	5.4	2	1
C	male	27	15	4.5	1	42
D	female	18	8	4.1	3	1

Participants were recruited via web and social media platforms, and eligibility was confirmed through an online questionnaire. The inability-to-takeoff syndrome was defined as a "symptom in which athletes are repeatedly unable to bend the pole and execute the takeoff due to psychological factors," and the inclusion criterion was "athletes who had returned to play from the inability-to-takeoff syndrome within the past year."

Return to play was defined as the return to full track and field training and competitions. To minimize recall bias, this study included participants who had recovered within the past year. Written explanations regarding the use of research findings were provided, and participants who provided consent underwent a semi-structured interview. The interviews, each lasting approximately one hour, were conducted via videoconference by an experienced pole vaulter. The interview questions are listed in Table 2.

Table 2. Questions used in semi-structured interviews

Do you have a pole vault coach?
When did you experience the symptoms of inability to takeoff in pole vault?
Did people around you know about your symptom of being unable to takeoff in pole vault?
Did your symptoms of inability to takeoff in pole vault occur suddenly or gradually?
Was there a specific trigger that caused you to experience/develop these symptoms?
How many times per week do you practice pole vaulting sessions?
Do your symptoms of inability to takeoff occur every time you practice vaulting?
At what point during your approach run do you feel anxious?
At what number of approach steps do your symptoms of inability to takeoff occur?
Do your symptoms of inability to takeoff in pole vault occur during practice, competition, or both?
Did you discuss your symptoms of inability to takeoff in pole vault with your coach?
When did you return to play from the symptoms of inability to takeoff in pole vault?
What strategies did you use to recover from the symptoms of inability to takeoff in pole vault?
Why did you choose to implement that particular strategy to recover from the symptoms of inability to takeoff in pole vault?
Have you received support from others about the symptoms of inability to takeoff in pole vault?

The interviews were video-recorded, and the recordings were subsequently summarized by a different researcher. The study was performed in accordance with the declaration of Helsinki and was approved by the Research Ethics Committee of International Budo University (approval no. 2024022; dated January 24, 2024).

Data collection and data analysis

Participant age, athletic experience, and personal best performance were presented as mean $\pm$ standard deviation (minimum–maximum). To analyze the qualitative data regarding the occurrence situations and recovery strategies for the inability-to-takeoff syndrome, a researcher other than the interviewer reviewed the recorded interview data and extracted responses, which were then qualitatively described and analyzed.

Results

Recruitment of Participants

A total of 23 pole vaulters responded to the participant recruitment survey. Of these, 3 had not experienced the inability-to-takeoff syndrome. Among the remaining 20 individuals, 10 did not consent to an interview. Of the 10 who did consent, 4 were excluded as they had recovered more than one year prior based on their questionnaire responses. Interviews were conducted with the remaining 6 individuals; however, one participant who had recovered from the inability-to-takeoff syndrome over a year prior and another who had not practiced full-approach vaulting during training were excluded. Ultimately, four vaulters were included as participants in this study. Participant information is presented in Table 1. All participants were active pole vaulters and had coaches.

Symptoms and Occurrence Situations of the Inability-to-Takeoff Syndrome Table 3

All participants experienced the inability-to-takeoff syndrome during all vaulting attempts. The approach length at which symptoms appeared differed: Two participants (Participants B and D) experienced symptoms with an approach run of 12 or more steps, one participant (Participant C) at 6 or more steps, and one participant (Participant A) only during a full approach vault. The timing of anxiety onset also varied: participants reported anxiety 6 steps before takeoff (on the second mark), immediately before takeoff, at the moment of entering the box area, and prior to entering the box area. Three participants (Participants A, C, and D) experienced the inability-to-takeoff syndrome during both competitions and practices, while one participant (Participant B) experienced it only during competitions.

Regarding the onset triggers of the syndrome, 2 participants (Participants B and C) reported a sudden onset. For 1 participant (Participant A), the syndrome was triggered upon returning to competition after sustaining a fracture from a fall outside the landing area. Another participant (Participant D) developed the syndrome after experiencing multiple dangerous vaulting attempts using a long and stiff pole.

Strategies of Recovery from the Inability-to-Takeoff Syndrome

Participant A achieved recovery through approach run practice outside the vaulting area, practicing vaults under favorable conditions such as tailwind support, and gaining confidence from successfully vaulting in a dream. Participant B recovered by gradually increasing the number of approach steps, starting from an 8-step

approach. While increasing the steps, the participant used the same pole and grip as before progressing to longer and stiffer poles. Participant C recovered by switching coaches, setting tasks on vaults (e.g., requiring a takeoff within 3 attempts or adding extra practice), and practicing vaults with a non-bending pole. Participant D also recovered by gradually increasing the number of approach steps, starting from an 8-step approach and adding 2 steps at a time, similar to Participant B. These recovery strategies were proposed by coaches for 3 participants (Participants B, C, and D) and were self-devised by 1 participant (Participant A). All 4 participants utilized various support systems during their recovery process, which included the following:

- Sharing their mental condition with teammates and receiving encouragement,
- Simulating competition-like conditions during practice,
- Receiving support from the mental support room within their institution,
- Receiving advice from their coach.

Table 3. Regarding the symptoms and situations of occurrence in the inability-to-takeoff syndrome in the participants

Participant	The number of steps at which the inability-to-takeoff syndrome occurs	The point at which athletes feel anxiety	practice / competition	Situation of occurrence
A	18	last 6 steps	both	Experienced a runway landing upon returning to competition after a fracture from falling off the mat
B	≥ 12	immediately prior to takeoff	competition	Sudden occurrence
C	≥ 6	The moment of standing on the runway Before gripping the pole	both	Sudden occurrence
D	≥ 12	Prior to entering the runway	both	Experienced multiple dangerous vaults with a long and stiff pole

Discussion

This study aimed to clarify the occurrence situations and recovery strategies for the inability-to-takeoff syndrome. Semi-structured interviews were conducted with the participants. The results revealed that the syndrome could be triggered suddenly or as a consequence of experiencing catastrophic incidents. Additionally, recovery strategies included gradually increasing the number of approach steps starting from a shortened approach and practicing approach runs outside the vaulting area.

Among the 4 participants, 2 vaulters experienced the inability-to-takeoff syndrome with 12 or more approach steps, 1 experienced it with 6 or more steps, and 1 experienced it exclusively during full-approach vaults. Previous study (Fitts, 1954) has demonstrated the trade-off relationship between speed and accuracy during motor performance, suggesting that the high approach velocity involved in full-approach vaults may contribute to the difficulty of vaulting. In pole vaulting, the pole is typically bent for takeoff when using 8 or more approach steps, indicating that the act of bending the pole during takeoff may be associated with the onset of the syndrome.

The yips are understood to involve both neurological and psychological issues (Smith et al., 2003). From a neurological perspective, pole vaulting involves closed-skill movements characterized by the repetitive execution of the same motion. This repetitive skill execution may be a predisposing factor for conditions like focal dystonia, which has been observed in professions requiring precise and repetitive movements, such as musicians or surgeons. From a psychological perspective, pole vaulting is prone to accidents, such as falling to the ground or pole breakage, which athletes may either experience or witness. These incidents can lead to conditions such as post-traumatic stress disorder (PTSD) or other trauma-related disorders, and contribute to excessive performance pressure. In this study, the inability-to-takeoff syndrome occurred suddenly in two participants and was triggered by catastrophic incidents during vaults in the other two. Given that previous research (Aron et al., 2019) has reported that elite athletes may have a higher prevalence of PTSD and other trauma-related disorders stemming from sport-specific traumatic events, it is conceivable that the participants in this study who experienced catastrophic incidents during vaults faced psychological impacts consistent with trauma-related disorders, although no formal diagnoses were made in this study.

The recovery strategies for the inability-to-takeoff syndrome in pole vaulting included gradually increasing the number of approach steps starting from an 8-step approach while adjusting the length and stiffness of the pole, performing approach run practice outside the vaulting area, conducting vault training under favorable

conditions such as a tailwind, building confidence through successful vaults in a dream, changing coaches, setting tasks during vault attempts, and performing vaults using a non-bending pole. Of these strategies, 3 participants adopted those proposed by their coaches, while 1 participant developed their own strategy. Furthermore, all 4 participants utilized various forms of support during their recovery, such as sharing their emotional struggles with teammates for encouragement, simulating competition-like environments, receiving support from on-campus mental support services, and obtaining advice from coaches. As the results suggest, inability-to-takeoff syndrome in pole vaulting appears to be influenced by psychological factors. Exposure therapy has been reported as an effective treatment for PTSD and trauma-related disorders, as evidenced by a meta-analysis (McLean et al., 2022). Exposure therapy consists of structured techniques designed to help individuals confront feared objects, situations, memories, or images in a safe environment. It can be classified into imaginal exposure and in vivo exposure. Imaginal exposure involves confronting traumatic memories by repeatedly recounting the traumatic experience while reactivating the associated sensory and emotional responses to promote habituation. The support strategies from the support network, and the strategy of building confidence through successful vaults in a dream, share characteristics with techniques used in imaginal exposure. On the other hand, in vivo exposure involves gradually encouraging individuals to confront and habituate to situations or objects they tend to avoid. The recovery strategies for the inability-to-takeoff syndrome implemented by the participants, such as progressively increasing the number of approach steps during vaults, vaulting under favorable conditions, and practicing approach runs outside the vaulting area, appear to reflect the principles of in vivo exposure. Therefore, the implementation of these approaches may have helped the athletes manage the psychological difficulties associated with their experiences and facilitated their return to competition.

Limitations

This study has several limitations. First, there is a potential for selection bias. The participants in this study were limited to athletes who had experienced the inability-to-takeoff syndrome and successfully returned to competition. Consequently, there is a possibility that the severity of the condition in these participants was relatively low. Additionally, the sample size of this study was small, with only four participants. Second, there is a possibility of recall bias. This study employed a retrospective case series design, in which participants provided responses to questionnaires and semi-structured interviews based on recollection, which may have influenced the results. Furthermore, participants who experienced the inability-to-takeoff syndrome multiple times only reported on their most recent occurrence. Third, while the interviewer's experience as a pole vaulter may have facilitated a deeper understanding of the participants' experiences, it could also have potentially compromised objectivity and neutrality. Future studies should explore factors associated with the inability-to-takeoff syndrome and investigate effective prevention strategies.

Conclusions

This study aimed to clarify the occurrence situations and recovery strategies for this inability-to-takeoff syndrome based on interviews with recovered athletes. The findings revealed that the inability-to-takeoff syndrome can occur either suddenly or as a result of experiencing a catastrophic incident during vaults. Additionally, effective recovery strategies included gradually increasing the approach steps from a shortened approach and practicing approach runs outside the vaulting area. Psychological support, such as encouragement from teammates and coaches, as well as professional mental support, was also shown to be beneficial. Future research should investigate the factors associated with the inability-to-takeoff syndrome and develop strategies for its prevention in pole vaulters.

Conflicts of interest

The authors report no conflicts of interest.

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