

# The Effects of Strategic Self-Talk on Flow during Competition in Young High-Level Taekwondo Athletes

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## Abstract

**Purpose:** The purpose of the present study was to investigate the effects of a strategic self-talk intervention on flow in young high-level Taekwondo athletes. **Methods:** Originally, twenty-eight young high-level Taekwondo athletes were recruited from two sport clubs that were assigned as experimental ( $n = 15$ ) and control ( $n = 13$ ) groups. An eight-week intervention was implemented between two competitions where flow was assessed. During the eight weeks, athletes practiced three times per week with the same 10-minute drill routine following their typical warm-up, with the experimental group practicing using strategic self-talk. Seventeen athletes participated in both competitions before and after the intervention. **Results:** Pairwise comparisons showed significant increases for the experimental group in the dimensions of challenge-skills balance, clear goals, unambiguous feedback, sense of control, and overall flow at post-intervention, whereas no differences were found for the control group. **Discussion:** The findings provide preliminary, yet useful, insight into the effectiveness of a strategic self-talk intervention in facilitating aspects of flow among young high-level Taekwondo athletes in competition and contribute to the existing literature on the mechanisms explaining the facilitating effects of strategic self-talk in sports.

## Keywords

Field Intervention, Optimal Experience, Self-Talk Mechanisms, Sports Performance

## 1. Introduction

Flow is the most studied optimal experience in sport (Swann et al., 2017) and is

associated with high levels of performance (e.g., [Norsworthy et al., 2018](#)). To develop efficient psychological preparation strategies for athletes entering important competitions, it is important to gain a good understanding of subjective states of excellent performance, such as flow ([Swann et al., 2017](#)). Research designs aimed at collecting “experience-near” data on flow will enhance our understanding of how various factors influence the occurrence of flow, the necessary and sufficient conditions for flow, and the mechanisms and processes through which flow occurs ([Swann, 2016](#)). There has been noticeable progress in the research of flow in sport over the last decades ([Goddard et al., 2023](#); [Swann et al., 2012](#)); however, there are still challenges that researchers need to address to help individuals flourish in sport and facilitate flow experiences.

Following the seminal work of [Csikszentmihalyi \(1990\)](#), the flow experience has been conceptualized as containing nine psychological dimensions: challenge-skill balance, clear goals, unambiguous feedback, merging of action and awareness, concentration on the task at hand, sense of control, loss of self-consciousness, transformation of time, and autotelic experience ([Jackson & Csikszentmihalyi, 1999](#); [Nakamura & Csikszentmihalyi, 2002](#)). Even though the flow model has yielded evidence in a variety of contexts, including sports ([Nakamura & Csikszentmihalyi, 2002](#)), and many of its components are considered spontaneous (e.g., [Jackson & Eklund, 2004](#)), inconsistencies in the existing literature raise the question of whether attaining a state of flow requires effortless (e.g., [Peifer et al., 2014](#); [Ullén et al., 2010](#)) or effortful attention ([de Sampaio Barros et al., 2018](#); [Harris et al., 2017](#); [Pujol et al., 2024](#)).

Contrary to the traditional view that the state of flow involves reduced conscious attention and effort, there is also evidence that flow may require effortful attentional control, even if it is not experienced with much effort ([Harris et al., 2017](#); [Pujol et al., 2024](#)). In other words, regardless of the feeling of effortlessness, it seems that effortful focusing strategies can be a potential trigger of flow in competitive settings. Accordingly, [Stavrou et al. \(2007\)](#) suggested that psychological preparation programs could involve the development of skills relevant to the facilitation of the flow experience. A mental strategy that has been linked to the experience of flow is self-talk ([Miller Taylor et al., 2018](#)). Self-talk refers to the link between thoughts and actions ([Latinjak et al., 2019](#)), and its study has led to the development of strategies that aim to regulate athletes’ cognitive patterns ([Hatzigeorgiadis et al., 2020](#)). In sport, the use of strategic self-talk has proven effective in enhancing performance ([Hatzigeorgiadis et al., 2011](#)) and is considered a key self-regulation strategy.

Indirect evidence for the postulated links between self-talk and flow has been provided through studies exploring psychological parameters that facilitate flow. [Jackman et al. \(2016\)](#), using a qualitative approach, investigated athletes’ perceptions of the relationship between mental toughness and dispositional flow. Among the several dimensions describing psychological attributes related to dispositional flow in athletes with higher and lower mental toughness, the dimension of con-

centration emerged; themes such as “clearing the mind”, “focusing on the task”, and “narrow concentration” were identified. Swann et al. (2016), in a study with elite golfers, reported that participants experienced different subjective states during their peak performance, which were described as “letting it happen” (a calm state, close to flow conceptualization) and “making it happen” (an intense state, like optimal arousal and effortful concentration). They identified the “letting it happen” as a state with increasing levels of confidence, and the “making it happen” as a state with increasing concentration and effort. Subsequently, Swann et al. (2017) stressed the need for athletes to develop, in each context, skills facilitating the flow experience through psychological skill training.

The above findings highlight the importance of mental strategies that enhance attention/concentration and regulate effort/motivation as a preparatory stage leading to flow experiences, thus providing indirect support for the potential of self-talk to facilitate flow. Research on self-talk has provided robust meta-analytic evidence for the effectiveness of strategic self-talk interventions on sport performance (Hatzigeorgiadis et al., 2011); such effects have also been identified in Taekwondo athletes (Zetou et al., 2014). Moreover, studies have consistently demonstrated the positive effects of strategic self-talk on performance parameters, such as concentration/attention and confidence/effort, in various settings and populations (Galanis & Hatzigeorgiadis, 2020). Based on research findings and relevant theories, two key clusters of mechanisms have been identified explaining the effectiveness of strategic self-talk interventions: attentional and motivational. Accordingly, evidence has supported that strategic self-talk can assist performance under attention-threatening conditions such as external distraction (Galanis et al., 2018), ego depletion (Galanis, Hatzigeorgiadis, Charachousi et al., 2022), and physical exertion (Galanis, Hatzigeorgiadis, Charachousi et al., 2022). It can also serve a motivational function and regulate effort in endurance tasks under challenging environmental conditions (Hatzigeorgiadis et al., 2018; Wallace et al., 2017). Such findings imply that self-talk is a skill that can help develop attributes linked to flow. Interestingly, Zetou et al. (2014), in their study with Taekwondo athletes, reported that, based on participants’ perceptions that strategic self-talk mostly helped them improve their cognitive and emotional control, their self-confidence, and their attention to the task.

In addition to this indirect evidence implying links between self-talk and components of flow, direct evidence for this relationship is warranted. Indeed, Miller Taylor et al. (2018) examined in a correlational study the relationship between self-talk and flow in cross-country runners, assessed following a competitive event. Their results showed that organic motivational and instructional self-talk were positively associated with the dimensions of flow. These findings were the first to test associations between self-talk and flow; yet, to make meaningful inferences that self-talk can actually facilitate the flow experience, experimental evidence is required. Accordingly, the purpose of the present study was to explore the effects of a strategic self-talk intervention, targeting attentional and motiva-

tional performance aspects, on flow in Taekwondo athletes, through a field experimental approach. It was hypothesized that strategic self-talk would have a positive impact on flow parameters and, considering the identified mechanisms of strategic self-talk, in particular on challenge-skill balance, concentration on the task at hand, sense of control, and merging of action and awareness.

## 2. Methods

### 2.1. Participants

Power analysis (G\*Power 3.1, [Faul et al., 2007](#)) was calculated to identify the number of participants required to achieve a minimum power of .80, based on an estimated effect size of 0.62. This effect size was estimated considering the effect size identified by [Hatzigeorgiadis et al. \(2014\)](#), who used a similar, in-between competitions, design and a similar strategic self-talk intervention. The analysis showed that a minimum of 12 participants per group was required. Considering potential attrition from participation in the two competitions, 28 young high-level Taekwondo athletes (11 males and 17 females) from two clubs were recruited for the study. The athletes' mean age was 15.64 ( $SD = 2.41$ ) years, mean competitive experience was 5.10 ( $SD = 1.95$ ) years, and mean training was 10.55 ( $SD = 4.04$ ) hours per week. All of the athletes competed at the national or international level. The two clubs were randomly assigned to experimental ( $n = 15$ ) and control ( $n = 13$ ) groups.

### 2.2. Measures

#### 2.2.1. Flow Experience

Flow experience was assessed with the Greek version of the Flow State Scale-2 ([Stavrou & Zervas, 2004](#)), a self-report instrument designed to assess post-event flow experience in sport ([Jackson & Eklund, 2002](#)). It comprises 36 items assessing nine dimensions of flow (4 items per subscale): challenge-skills balance (e.g., "The challenge and my skills were at an equally high level"), merging of action and awareness (e.g., "Things just seemed to be happening automatically"), clear goals (e.g., "I knew clearly what I wanted to do"), unambiguous feedback (e.g., "I was aware of how well I was performing"), concentration on the task at hand (e.g., "My attention was focused entirely on what I was doing"), sense of control (e.g., "I felt like I could control what I was doing"), loss of self-consciousness (e.g., "I was not concerned with what others may have been thinking of me"), transformation of time (e.g., "I lost my normal awareness of time"), and autotelic experience (e.g., "I found the experience extremely rewarding"). Athletes completed the questionnaire within 30 minutes after the match. Responses were given on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability for the different subscales in the first assessment ranged from 0.64 to 0.93, and for the second assessment from 0.77 to 0.96.

#### 2.2.2. Manipulation Check

A typical self-talk manipulation check was used to assess the use of strategic self-

talk from the experimental group (Hatzigeorgiadis et al., 2009). For the training sessions, the use of strategic self-talk was assessed through an item asking athletes, following each training session, to report how frequently they used the strategic self-talk cues on a 10-point scale ranging from 1 (not at all) to 10 (all the time). For the post-intervention competition measures, athletes from the experimental group were asked (a) whether they used their strategic self-talk plan during the competition, and, if so, to report to what degree they used the cue words from 1 (not at all) to 10 (all the time).

### 2.3. Procedures

The institution's ethics committee initially approved the study (Ref: 1377). The coaches from two Taekwondo clubs were then contacted and informed about the purpose of the study, and permission was obtained. All athletes were thoroughly informed about the purpose and procedures of the study, and informed consent was obtained from athletes over 18 years old and from the parents of athletes under 18 years old. They were also notified that their participation was voluntary and that they could withdraw at any time.

An eight-week intervention was implemented between two competitions, which were described by the coaches of the two groups as important for the athletes and the teams. During the eight weeks, the two groups performed the same 10-minute drill routine following a typical warm-up and before the start of the main training program. This routine included three drills: the two most commonly used kicks in the competition, the roundhouse (Dollyeo Chagi) and the side (Yeop Chagi) kick, and, in addition, a repetitive roundhouse kick. The routine was performed three times a week in the presence of a member of the research team to ensure that participants in both groups received equivalent training and performed the routine successfully. The perceived importance of the competitions was assessed on the day of each competition with two items ("How important/crucial is this competition?") rated by participants on a 10-point scale. Flow was assessed in both competitions within 30 minutes after each athlete completed their first match.

#### Strategic Self-Talk Intervention

At the onset of the intervention, athletes in both groups were informed of the study requirements, including the importance of attending training sessions on schedule. The athletes in the experimental group were introduced to the strategic self-talk that would be used throughout the intervention. They practiced strategic self-talk three times per week under supervision during the 10-minute drill routine. At the beginning of each session, the athletes were gathered and informed about the purpose and content of the self-talk plan for each set of drills. Specifically, they were receiving information about what cue words to use, when and how often to use them, and what the meaning of the cues was. The strategic self-talk plans were developed through the cooperation of the research team, the coach, and the athletes. Following the completion of the drill routine, the athletes were

asked to rate the frequency with which they used the provided self-talk cues. Additionally, they were advised to use strategic self-talk not only during intervention sessions but also during the rest of practice at all training sessions.

During the first week, the athletes practiced strategic motivational self-talk (e.g., let's go), and during the second week, they practiced strategic instructional self-talk (e.g., block). During this time, drills connected with specific tactical aspects of Taekwondo were developed and discussed with the team's coach. Specific instructional and motivational cues were assigned to these drills, forming daily plans for weeks three and four. Throughout the intervention, all drills were executed in pairs. After the first four weeks, once the athletes were familiar with the use of strategic self-talk, they were encouraged to prepare their individualized strategic self-talk plans according to their needs and preferences.

## 2.4. Data Analysis

A series of preliminary analyses (chi-square and *t*-tests) was planned to examine differences between groups in gender distribution, age, competitive experience, training days and hours, and importance of competition. A two-way mixed model MANOVA, with one independent factor (group: control, experimental) and one dependent factor (time: pre-, post-intervention), was planned to test for differences between groups across time in the dimensions of flow.

## 3. Results

### 3.1. Screening and Control Analyses

A total of 17 athletes participated in both competitions, seven from the experimental group and ten from the control group. Of the remaining athletes, two were injured during the intervention period and nine did not compete in either of the selected competitions for data collection. Chi-square examining differences in gender across groups showed no significant differences  $\chi^2(1) = 4.41, p = 0.10$ . *T*-tests to examine differences in age, competitive experience, and the number of days and hours of weekly training showed that there were no significant differences in any of the tested variables; for age,  $t(25) = 0.60, p = 0.56$ , for competitive experience,  $t(15) = 1.36, p = 0.20$ , for days of training per week,  $t(15) = 0.13, p = 0.90$ , and for hours of training per week,  $t(15) = 0.24, p = 0.82$ .

In addition, *t*-tests to examine differences in the importance of competition between the two groups revealed a non-significant effect for the pre-intervention competition,  $t(15) = 1.01, p = 0.34$ , and a significant effect for the post-intervention competition,  $t(15) = 2.57, p < 0.05$ , with the control group scoring higher than the experimental group. Subsequently, importance scores for post-intervention competition were used as a covariate in the hypothesis testing analyses.

Finally, athletes in the experimental group reported using their strategic self-talk plans systematically during the match ( $M = 8.20, SD = 0.84$ ). With regard to the content of their personal self-talk plans, the athletes used a variety of cues, including both tactical triggers (e.g., head back, push, block) and motivational

cues (e.g., ready, let's go, power).

### 3.2. Hypothesis Testing

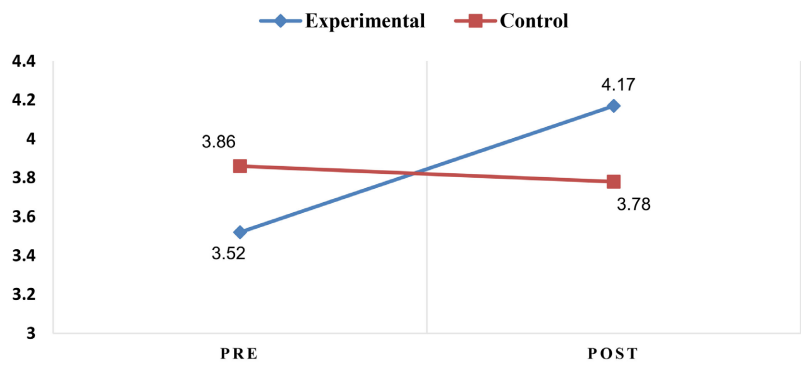
A MANCOVA with group as the independent factor (experimental, control), competition as the dependent factor (pre-, post-intervention competition), and importance for post-intervention competition as the covariate was conducted to examine differences in flow scores. The analysis revealed a non-significant multivariate effect,  $F(6, 9) = 0.62$ ,  $p = 0.75$ , partial  $\eta^2 = 0.48$ . Nevertheless, considering the high effect size of the multivariate analysis, the pairwise comparisons were examined. The analysis showed significant differences for several flow subscales when comparing changes across competitions for the two groups. In particular, changes that reached or approached significance with notable effect size were observed for challenge-skills balance ( $p < 0.05$ , partial  $\eta^2 = 0.21$ ), clear goals ( $p < 0.05$ , partial  $\eta^2 = 0.16$ ), unambiguous feedback ( $p < 0.05$ , partial  $\eta^2 = 0.30$ ), concentration on the task at hand ( $p = 0.08$ , partial  $\eta^2 = 0.06$ ), sense of control ( $p = 0.05$ , partial  $\eta^2 = 0.21$ ), and overall flow ( $p < 0.05$ , partial  $\eta^2 = 0.27$ ). For all of the above subscale scores and the overall flow score, the experimental group improved in the post-intervention competition (estimated means displayed in **Figure 1**), whereas scores for the control group did not change significantly. Considering the size of the effect reported above, and the implications of the sample size on statistical significance, it was deemed appropriate that these differences were noticed. Descriptive statistics for flow are presented in **Table 1**.

**Table 1.** Descriptive statistics for flow (observed means).

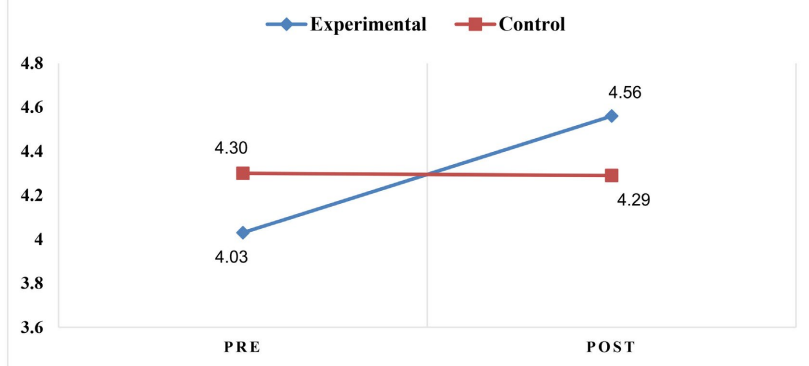
Dimensions	Experimental					Control				
	Pre		Post		<i>d</i>	Pre		Post		<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
CSB	3.71	0.53	4.00	0.79	0.43	3.73	0.70	3.90	0.67	0.24
MAA	3.18	0.62	3.25	0.82	0.09	3.65	0.61	3.45	0.87	0.26
CG	4.18	0.47	4.50	0.46	0.68	4.20	0.54	4.33	0.61	0.22
UF	3.79	0.59	4.29	0.49	0.92	3.93	0.65	3.90	0.77	0.04
CTH	3.69	0.57	3.96	0.83	0.37	3.48	0.89	3.98	1.06	0.51
SC	3.61	0.66	3.93	0.83	0.42	3.63	1.08	3.68	1.11	0.04
LSC	3.54	0.64	4.23	0.97	0.83	4.13	0.50	4.05	0.96	0.10
TT	2.57	0.81	3.07	0.99	0.55	3.33	0.69	3.15	0.90	0.22
AE	3.93	0.53	3.82	1.12	-0.12	3.65	1.09	3.88	1.20	0.20
OF	3.58	0.44	3.89	0.53	0.63	3.74	0.60	3.81	0.61	0.11

Note. CSB = Challenge-Skills Balance, MAA = Merging of Action and Awareness, CG = Clear Goals, UF = Unambiguous Feedback, CTH = Concentration on the Task at Hand, SC = Sense of Control, LSC = Loss of Self-Consciousness, TT = Transformation of Time, AE = Autotelic Experience, OF = Overall Flow.

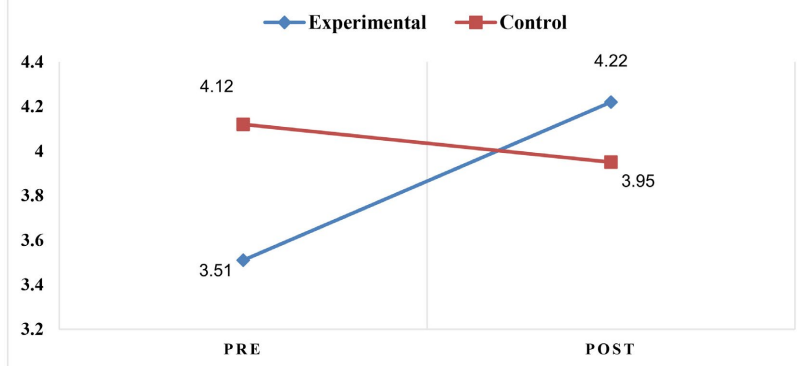
### CHALLENGE-SKILLS BALANCE



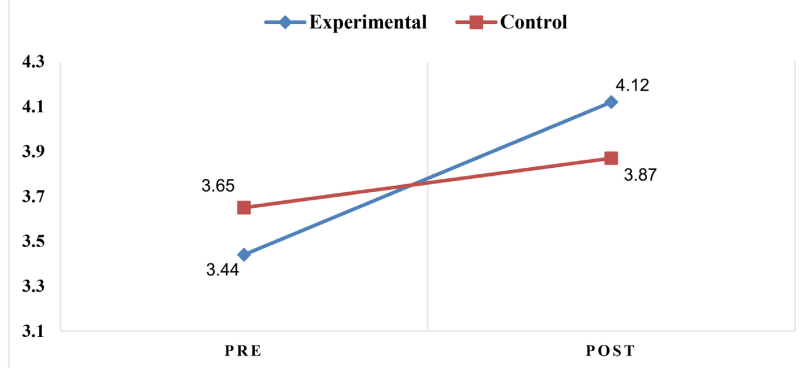
### CLEAR GOALS

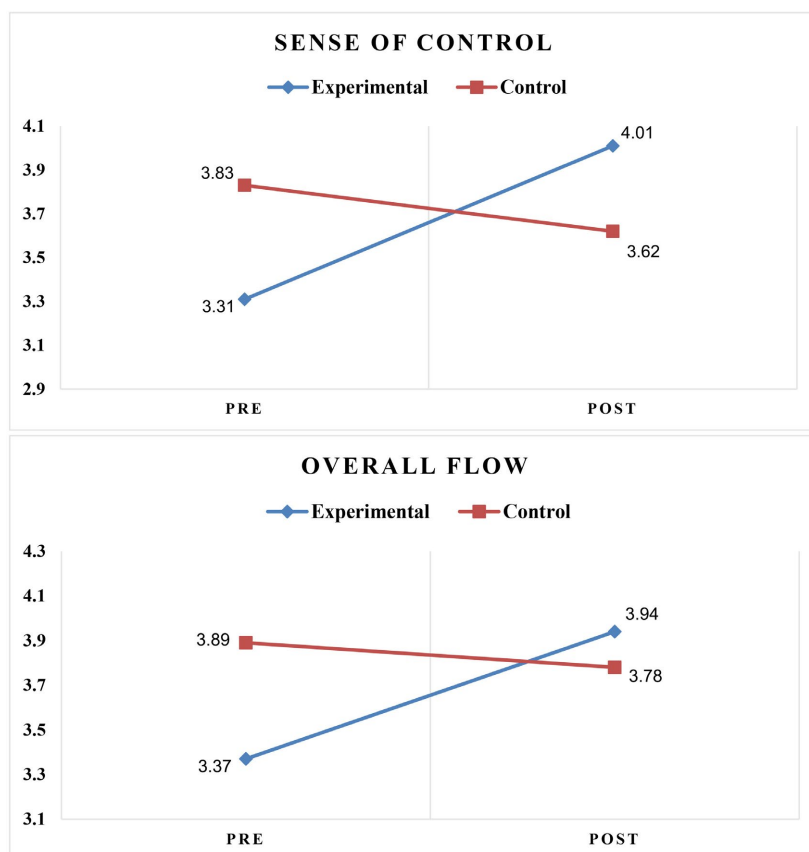


### UNAMBIGUOUS FEEDBACK



### CONCENTRATION ON THE TASK AT HAND





**Figure 1.** Changes in flow: estimated means controlled for competition importance.

#### 4. Discussion

This study examined the effects of an eight-week strategic self-talk intervention on the flow experience of young high-level Taekwondo athletes in competitive settings. The findings provided preliminary indications that some of the dimensions of flow were enhanced as a result of the intervention. The flow dimensions that were affected by the intervention included the challenge-skills balance, sense of control, concentration on the task at hand, clear goals, unambiguous feedback, and overall flow. According to the expectations, participants' reports for challenge-skills balance, sense of control, and concentration on the task at hand, as well as overall flow, increased at post-intervention.

According to Jackson and Csikszentmihalyi (1999), when the challenge-skills balance, described as the golden rule of flow, is achieved, the athlete's mind becomes focused on the task, free from irrelevant thoughts and distractions (Jackson & Eklund, 2004). Strategic self-talk has been found to increase athletes' attentional focus (Galanis, Hatzigeorgiadis, Comoutos et al., 2022) and to counter the detrimental effects of internal (Hatzigeorgiadis et al., 2004) and external distraction (Galanis et al., 2018). Additionally, it has been shown to increase self-confidence in competition (Galanis, Mylonopoulos et al., 2022) and can therefore lead to perceiving challenges in a positive way as one's skills are considered to meet the demands of the situation. In our intervention, instructional self-talk cues referring

to tactical aspects (e.g., push-to-push, used to defend a push from the opponent) and motivational cues (e.g., let's go, to boost readiness and confidence) may have assisted a clear focus without distractions, and contributed to a sense of confidence that the challenge is optimal.

Sense of control was the second dimension, which was improved with the strategic self-talk intervention. Whether a sense of control can be assisted by strategic self-talk through efficient and effortful attentional control (Harris et al., 2017) or effortless automatic functioning (Landin & Hebert, 1999), or even both, remains debatable. A possible explanation for the former is that increased attentional focus induced through strategic self-talk (Galanis, Hatzigeorgiadis, Comoutos et al., 2022) may relieve athletes from fear of failure and enable them to focus on the task at hand (Jackson & Eklund, 2004). Respectively, a possible explanation for the latter would be that strategic self-talk, once well-acquainted, triggers automatic execution of the desired actions (Landin & Hebert, 1999), enhancing the athlete's self-confidence (Galanis, Mylonopoulos et al., 2022), and therefore allowing them to feel in control under challenging situations. Further research is warranted to address this question, yet, strategic self-talk was shown to improve the sense of control. In our intervention, motivational cues (e.g., harder, used to take control of the point) may have contributed to an enhanced sense of control over the outcome. Similarly to the sense of control, the change in the dimension of concentration on the task at hand can be explained by the positive effects of strategic self-talk on attentional focus, which has been evidenced both in laboratory (Tzormpatzakis et al., 2022) and field conditions (Galanis, Hatzigeorgiadis, Charachousi et al., 2022). Athletes with high levels of concentration are able to keep their minds in the present with thoughts directed to the demands of the activity they are engaged in (Jackson & Csikszentmihalyi, 1999). In our intervention, such an effect may have been induced through instructional, tactical cues (e.g., head back, used to keep attention on the right stimuli).

Furthermore, despite our expectations, the dimension of merging with action and awareness was not affected by strategic self-talk. In a state of merging action and awareness, athletes are absorbed in the activity in a spontaneous and automatic manner (Csikszentmihalyi, 1990), whereas losing self-consciousness allows their minds to be free from worrying about meeting others' expectations and standards they perceive as important (Jackson & Eklund, 2004). A possible explanation may lie in the dual approach to the experience, suggesting that flow can be the outcome of either effortless or effortful attentional processes and effort (Pujol et al., 2024).

In addition to the above, improvements were also observed for two dimensions of flow that were not predicted: clear goals and unambiguous feedback. As parts of the same phenomenon, all dimensions of flow are interconnected in some ways. Therefore, the potential impact of strategic self-talk on these two dimensions could be attributed to its attentional functions. In light of the study's findings, it could be argued that strategic self-talk, with its attentional effects, can enhance

focus on particular goals, thereby adding to the enhancement of the clear goals dimension of flow. Unambiguous feedback refers to receiving information about keeping track of the chosen goals. As strategic self-talk has been found to enhance internal and external attentional focus (Bell & Hardy, 2009) and help maintain it under conditions such as distractions and fatigue (Galanis, Hatzigeorgiadis, Charachousi et al., 2022), it can be postulated that this attentional effect enhances the athletes' chances for effective gathering of unambiguous feedback from different sources.

The improvements observed in the flow dimensions above led to an increased overall flow score. Considering the dynamic model of self-talk mechanisms (Galanis et al., 2016), attributing the impact of strategic self-talk on performance to its attentional and motivational functions, it can be suggested that these same functions operate for the enhancement of the flow experience. Attentional and motivational functioning can serve as mechanisms of strategic self-talk for improving task performance, enabling athletes to shift their focus depending on the skill they are performing, strengthening the quality of their internal and/or external focus, protecting against distractions, and increasing their self-efficacy and self-confidence (Galanis & Hatzigeorgiadis, 2020), all of which can be identified as potential parameters for the flow experience.

A noticeable limitation of the current study was the loss of participants due to injury and reduced participation in the post-measurement competition, which resulted in a limited final sample size. The loss of nearly 40% of the initial sample resulted in underpowered statistical analyses, thus limiting the internal validity of the experiment, and making the interpretation of the findings cautious. At this point, it is important to note that the timing of the intervention was determined by the competitions, which were appointed by the coaches as competitions important for the athletes, who, at the time of recruitment, were expected to participate. Eventually, for nine athletes this plan changed over the course of the intervention; of course, the research team could not intervene or influence decisions about athletes' participation in the competitions. Field experiments in a competition context are rare (Martin et al., 2005) due to their complexity and the factors that limit internal validity. However, such experimental attempts have unique and valuable ecological validity, providing indications regarding the real-world effects of psychological skill training in sport. This is particularly important when studying flow, as it is a phenomenon mostly studied within competitive settings.

Despite the above limitations, the present study offers potential practical implications for coaches and sports psychologists, which could inform the design of psychological skills training programs in Taekwondo. The implemented strategic self-talk intervention provides guidance on how to incorporate individualized strategic self-talk plans into their training routines, which could eventually help them trigger a state of flow in competition. Strategic self-talk cues could help athletes regulate their cognitive and bodily functions, subsequently activating the appropriate responses needed for optimal experience and performance.

## 5. Conclusions

Understanding the psychological factors connected with optimal performance is a key quest in the field of applied sport psychology (Jackson et al., 2001). Overall, our findings provide preliminary, yet useful, indications of the effectiveness of a strategic self-talk intervention in enhancing flow in young high-level Taekwondo athletes; in particular, because flow was assessed in relation to optimally challenging events, which are the most appropriate for studying flow experiences (Swann et al., 2012). Despite the limitations, the study represents a novelty in its topic and contributes to the existing literature with an innovative experimental design to investigate self-talk as a strategy to increase flow in competition. Replicating this study would enhance our confidence and provide further insights into the understanding of the flow experience.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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