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PhD Dissertation

THE CONTENT OF ATHLETES' SELF-TALK

By

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Abstract

Self-talk is a cognitive construct that has received increasing research attention in sport, particularly in recent years. A contemporary, theory-based conceptualization of self-talk in sport has recognized two distinct self-talk entities. The first entity, *organic* self-talk, refers to self-talk as inherent self-statements athletes address to themselves during their sport participation. The second self-talk entity *strategic self-talk* reflects self-talk as a deliberately mental strategy, determined before sport participation, whereby specific cues words or phrases are employed with the aim of enhancing performance or achieving other related performance outcomes. Athletes' organic self-talk is further distinguished between spontaneous self-talk, a more uncontrolled type of self-talk, and goal-directed self-talk, a more controlled type of self-talk. However, these contemporary organic self-talk distinctions between spontaneous and goal-directed self-talk have not yet been operationalized, to allow assessment suitable for quantitative research. Therefore, based on this contemporary, theory-based conceptualization of self-talk in sport, a first aim this PhD was to develop and test the psychometrics properties of a theory-based instrument, the Organic Self-Talk Questionnaire for Sport (OSTQS), assessing the content and the structure of athletes' organic, spontaneous and goal-directed self-talk) on a state level during sport participation. Utilizing this new scale, a second aim of this PhD was to investigate the factors that shape athletes' organic, spontaneous and goal-directed self-talk on a state level during sport participation.

Overall, this PhD consists of three different articles. The first article is a literature review that aimed to classify and reinterpret previous research findings on the antecedents of athletes' organic self-talk, in terms of the contemporary distinctions between spontaneous and goal-directed self-talk. The article also provides directions for future research and based on the existing research evidence presents interventions that could be implemented at

antecedents of athletes' organic self-talk, to change athletes' organic self-talk in effective directions

The second article outlines the development of OSTQS, a new, theory-grounded, self-report measure, designed to assess the content and the structure of athletes' organic self-talk spontaneous and goal-directed self-talk on a state level during sport participation. Two studies were conducted. In the first qualitative study, a prospective 60-item measure was developed based upon (a) the operational definitions of athletes' spontaneous and goal-directed self-talk in sport and (b) raw data collected from athletes in this study through open-ended questionnaires and semi-structured interviews. In the second quantitative study, the psychometric properties of the developed questionnaire were tested through examination of factorial, convergent, and discriminant validity, and reliability. Confirmatory factor analyses (CFA revealed an adequate fit of a 17-item four-factor correlated model for spontaneous self-talk and a 28-item seven-factor correlated model for goal-directed self-talk, and (b) the superiority of these models over to their respective single-factor and hierarchical models, supporting therefore respectively the factorial and convergent validity of the OSTQS. Discriminant validity and reliability analyses provided further evidence regarding the psychometric integrity of the new measure. Overall, these results suggest that the OSTQS is a valid and reliable scale that could aid us further enhancing our understanding regarding athletes' organic self-talk, its antecedents, and its consequences.

Finally, the third article includes a quantitative study aimed to examine the nomological validity of OSTQS, and whether a) the big five personality traits as personal antecedents, and b) athletes' Basic Psychological Needs (BPNs) satisfaction and frustration within their sport environment, as social-environmental antecedents would predict athletes' organic, spontaneous and goal-directed self-talk. The results supported the nomological validity of OSTQS and indicated the incremental contribution of BPNs satisfaction and

frustration to the prediction of athletes' organic, spontaneous and goal-directed self-talk, over and above athletes' big five personality traits and BPNs satisfaction respectively.

Overall, the present research provides a theory-based, valid and reliable, state scale assessing athletes' organic, spontaneous and goal-directed self-talk and underlines the meaningfulness of social-environmental factors on the formulation of athletes' organic, spontaneous and goal-directed self-talk at the state level, over and above personality traits which are considered relatively stable, and thus are more difficult to be changed via interventions.

Περίληψη

Η αυτο-ομιλία είναι μια γνωστική έννοια που έχει λάβει αυξημένη ερευνητική προσοχή στον αθλητισμό, ιδιαίτερα τα τελευταία χρόνια. Ένας, σύγχρονος βασισμένος στη θεωρία εννοιολογικός προσδιορισμός της αυτο-ομιλίας στον αθλητισμό έχει αναγνωρίσει δύο διακριτές οντότητες αυτο-ομιλίας. Η πρώτη οντότητα, η οργανική αυτο-ομιλία, αναφέρεται στην αυτο-ομιλία ως εγγενείς αυτο-δηλώσεις που οι αθλητές απευθύνουν στον εαυτό τους κατά τη διάρκεια της αθλητικής τους συμμετοχής. Η δεύτερη οντότητα, η στρατηγική αυτο-ομιλία αντανακλά την αυτο-ομιλία ως σκόπιμη νοητική στρατηγική, που καθορίζεται πριν από τη συμμετοχή στον αθλητισμό, κατά την οποία χρησιμοποιούνται συγκεκριμένες λέξεις-κλειδιά ή φράσεις-με απώτερο στόχο την ενίσχυση της απόδοσης ή την επίτευξη άλλων σχετικών με την απόδοση αποτελεσμάτων. Η οργανική αυτο-ομιλία των αθλητών διακρίνεται περαιτέρω μεταξύ της αυθόρμητης αυτο-ομιλίας, ενός πιο ανεξέλεγκτου τύπου αυτο-ομιλίας, και της στοχευμένης αυτο-ομιλίας, ενός πιο ελεγχόμενου τύπου αυτο-ομιλίας. Ωστόσο, αυτές οι σύγχρονες διακρίσεις της οργανικής αυτο-ομιλίας μεταξύ αυθόρμητης και στοχευμένης δεν έχουν ακόμη οριστεί λειτουργικά, ώστε να επιτρέπουν αξιολόγηση κατάλληλη για ποσοτική έρευνα. Ως εκ τούτου, με βάση το σύγχρονο αυτό, θεωρητικά-βασισμένο εννοιολογικό προσδιορισμό της αυτο-ομιλίας στον αθλητισμό, ένας πρώτος στόχος αυτής της διδακτορικής διατριβής ήταν η δημιουργία και η διερεύνηση των ψυχομετρικών ιδιοτήτων ενός θεωρητικά βασισμένου οργάνου, της Κλίμακας Οργανικής Αυτο-ομιλίας στον Αθλητισμό (ΚΟΑΑ), η οποία αξιολογεί το περιεχόμενο και τη δομή της οργανικής, αυθόρμητης και στοχευμένης αυτο-ομιλίας των αθλητών, σε επίπεδο κατάστασης κατά τη διάρκεια της αθλητικής συμμετοχής. Χρησιμοποιώντας τη νέα αυτή κλίμακα, ένας δεύτερος στόχος της παρούσας διδακτορικής διατριβής ήταν να διερευνήσει τους παράγοντες που διαμορφώνουν την οργανική, αυθόρμητη και στοχευμένη αυτο-ομιλία των αθλητών σε επίπεδο κατάστασης κατά τη διάρκεια της αθλητικής τους συμμετοχής.

Συνολικά, η παρούσα διδακτορική διατριβή αποτελείται από τρία διαφορετικά άρθρα. Το πρώτο άρθρο είναι μια βιβλιογραφική ανασκόπηση που είχε ως στόχο να ταξινομήσει και να επανερμηνεύσει τα προηγούμενα ερευνητικά ευρήματα αναφορικά με τους παράγοντες διαμόρφωσης της οργανικής αυτο-ομιλίας των αθλητών, με βάση τις σύγχρονες διακρίσεις μεταξύ της αυθόρμητης και στοχευμένης αυτο-ομιλίας. Το άρθρο παρέχει επίσης κατευθύνσεις για μελλοντική έρευνα, και με βάση τα υπάρχοντα ερευνητικά δεδομένα παρουσιάζει παρεμβάσεις που θα μπορούσαν να εφαρμοστούν στους παράγοντες διαμόρφωσης της οργανικής αυτο-ομιλίας των αθλητών, με σκοπό να μεταβάλλουμε την οργανική αυτο-ομιλία των αθλητών προς αποτελεσματικές κατευθύνσεις.

Το δεύτερο άρθρο περιγράφει την ανάπτυξη της ΚΟΑΑ, μιας νέας, θεωρητικά βασισμένης κλίμακας αυτό-αναφοράς, η οποία σχεδιάστηκε για να αξιολογεί το περιεχόμενο και τη δομή της οργανικής, αυθόρμητης και στοχευμένης αυτο-ομιλίας των αθλητών σε επίπεδο κατάστασης κατά τη διάρκεια της αθλητικής συμμετοχής. Πραγματοποιήθηκαν δύο μελέτες. Στην πρώτη ποιοτική μελέτη, αναπτύχθηκε μια κλίμακα 60 θεμάτων με βάση (α) τους λειτουργικούς ορισμούς της αυθόρμητης και της στοχευμένης αυτο-ομιλίας των αθλητών στον αθλητισμό και (β) τα δεδομένα που συλλέχθηκαν από τους αθλητές στην παρούσα μελέτη μέσω ερωτηματολογίων ανοικτού τύπου και ημιδομημένων συνεντεύξεων. Στη δεύτερη ποσοτική μελέτη, οι ψυχομετρικές ιδιότητες του ερωτηματολογίου που αναπτύχθηκε ελέγχθηκαν μέσω εξέτασης της παραγοντικής, συγκλίνουσας και διακριτής εγκυρότητας, και αξιοπιστίας. Οι επιβεβαιωτικές παραγοντικές αναλύσεις (CFA) κατέδειξαν επαρκή προσαρμογή ενός μοντέλου τεσσάρων συσχετιζόμενων παραγόντων με 17 θέματα για την αυθόρμητη αυτο-ομιλία, και ενός μοντέλου επτά συσχετιζόμενων παραγόντων με 28 θέματα για τη στοχευμένη αυτο-ομιλία; και β) την υπεροχή των μοντέλων αυτών έναντι των αντίστοιχων μονοπαραγοντικών και ιεραρχικών μοντέλων, υποστηρίζοντας έτσι αντίστοιχα την παραγοντική και συγκλίνουσα εγκυρότητα της ΚΟΑΑ . Οι αναλύσεις διακριτικής

εγκυρότητας και αξιοπιστίας παρείχαν περαιτέρω στοιχεία σχετικά με την ψυχομετρική ακεραιότητα της νέας κλίμακας. Συνολικά, τα αποτελέσματα αυτά υποδηλώνουν ότι το η ΚΟΑΑ είναι μια έγκυρη και αξιόπιστη κλίμακα που θα μπορούσε να μας βοηθήσει να ενισχύσουμε περαιτέρω την κατανόησή μας όσον αφορά την οργανική αυτο-ομιλία των αθλητών, τους παράγοντες διαμόρφωσης της, και τις συνέπειες της.

Τέλος, το τρίτο άρθρο περιλαμβάνει μια ποσοτική μελέτη η οποία είχε ως στόχο να εξετάσει τη νομολογική εγκυρότητα της ΚΟΑΑ, και στο κατά πόσον α) τα πέντε μεγάλα χαρακτηριστικά της προσωπικότητας των αθλητών ως προσωπικοί παράγοντες και β) η ικανοποίηση και η απογοήτευση των Βασικών Ψυχολογικών Αναγκών (ΒΨΑ) των αθλητών μέσα στο αθλητικό τους περιβάλλον, ως κοινωνικοί-περιβαλλοντικοί παράγοντες, θα προέβλεπαν την οργανική, αυθόρμητη και στοχευμένη αυτο-ομιλία τους. Τα αποτελέσματα υποστήριξαν την νομολογική εγκυρότητα του OSTQS, και κατέδειξαν την επιπρόσθετη συνεισφορά της ικανοποίησης και της απογοήτευσης των ΒΨΑ των αθλητών στην πρόβλεψη της οργανικής, αυθόρμητης και στοχευμένης αυτο-ομιλίας τους, πέρα και πάνω από τα πέντε μεγάλα χαρακτηριστικά προσωπικότητας, και την ικανοποίηση των ΒΨΑ αντίστοιχα.

Συνολικά, η παρούσα έρευνα παρέχει μία θεωρητικά βασισμένη, έγκυρη και αξιόπιστη, κλίμακα αξιολόγησης της οργανικής, αυθόρμητης και στοχευμένης αυτο-ομιλίας των αθλητών σε επίπεδο κατάστασης, και υπογραμμίζει τη σημασία των κοινωνικών-περιβαλλοντικών παραγόντων στη διαμόρφωση της οργανικής, αυθόρμητης και στοχευμένης αυτο-ομιλίας τους, πέρα και πάνω από τα χαρακτηριστικά της προσωπικότητας, τα οποία θεωρούνται σχετικά σταθερά, και επομένως είναι πιο δύσκολο να μεταβληθούν μέσω παρεμβάσεων.

General Introduction

Thoughts in the form of inner speech deluge our mind. Although, most of the time we do not realize this internal dialogue, and much more its content, according to cognitive behavioral theories (Ellis, 1994; Meichenbaum, 1977). This internal dialogue influences our emotions, our behavior, while sometimes it may distract us from performing our best. Similarly, even before cognitive behavioral theorists, Stoic philosophers claimed that thoughts play a critical role in the formulation of our emotions and behavior. (Reardon, 1993). The quote by Stoics philosopher Epictetus “*What upsets people is not things themselves, but their judgments about these things.*” expresses in a very clear way the influence of our thoughts on our emotional states.

As it is apparent from above, the study of human thoughts has attracted the interest from the beginning of scientific inquiry (Theodorakis et al., 2012), while what we say to ourselves has been the focus of study in a broad range of disciplines including philosophy, neuroscience, developmental, educational, social, and sport psychology (Hardy & Zourbanos 2015). Although in the psychology literature various terms have been used to describe the same or similar constructs related to thoughts including automatic thoughts, internal dialogue, inner conversation, subvocal speech, self-verbalizations, self-instructions, and self-statements; in the sport psychology literature the term self-talk has been prevailed (Theodorakis et al., 2012).

In sport psychology, the systematic study of self-talk started between the eighties and nineties of the 20th century (Latinjak, Hatzigeorgiadis, et al., 2019) and since then has been expanded rapidly. One of the major developments within the study of self-talk in sport psychology is the identification of two distinct self-talk entities, namely organic self-talk (previously also referred to as “automatic or spontaneous self-talk”) and strategic self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). Strategic self-talk refers to the use of predetermined self-talk as a psychological strategy aiming primarily at enhancing sports performance or

other related outcomes, while organic self-talk refers to athletes' innate self-talk in relation to their sport participation (Latinjak, Hatzigeorgiadis, et al., 2019). Athletes' organic self-talk is further distinguished between spontaneous self-talk, a more uncontrolled type of self-talk, and goal-directed self-talk, a more controlled type of self-talk. Grounded on Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary, theory-based conceptual framework of self-talk in sport, that distinguishes between the two major types of athletes' organic self-talk, the focus of this PhD is on the assessment of athletes' spontaneous and goal-directed self-talk and the factors that shape them. The purpose of this chapter is to review the broader self-talk literature in sport by focusing on the multiple conceptualizations and classifications of self-talk in sport, particularly those of automatic/organic self-talk and how these have been advanced during the past decade. Next, the assessment of automatic/organic self-talk in sport is presented and measurement limitations are identified. Finally, the rational and the specific purposes of the present research are outlined.

Conceptualizations of Self-Talk in Sport

As with other underdeveloped areas within sport psychology, research on self-talk faced several challenges, due to among other reasons the vague definitions, and a lack of theory behind self-talk research (Latinjak, Hatzigeorgiadis, et al., 2019). Consequently, various definitions have been forwarded in the sport self-talk literature, which ranged from general and simple to more elaborated and sophisticated (Theodorakis et al., 2012). Hardy (2006), in an attempt to “speak clearly,” in his elaborate review regarding the conceptualization of self-talk discriminated between the more general “global” definitions of self-talk, and the more precise, dialogue-oriented or “self-statements” definitions of self-talk.

In one of the earliest, “global” definitions of self-talk, Bunker et al. (1993) viewed self-talk as “anytime you think about something, you are in a sense talking to yourself” (p. 226). However, as Hardy et al. (2006) noted, this definition is rather vague and places an

emphasis on thoughts in general, which makes the specific measurement of self-talk difficult, as such eclectic thought-oriented definitions include amongst other things, day dreams, mental imagery, and self-statements. Although these cognitions occur together, using those general thought-oriented definitions we may confound self-statements with other phenomena, for instance mental imagery (Hardy, 2006). Another example of a global definitions of self-talk, combining of both cognitive and behavioral aspects was proposed by Theodorakis et al. (2001, p. 310) who stated that “self-talk can be manifested in verbal or non-verbal ways, in the form of a word, a thought, a smile, a frown, etc. (Chroni, 1997)”. According to Hardy (2006) the limitation of the above definition is that it has confounded the nature of self-talk with some of its consequences and/or associations (i.e. the non-verbal manifestations). Consequently, he argued that definitions with emphasis on self-statements alone are more appropriate to describe the self-talk in sport and would help more self-talk researchers to better understand the construct.

In a self-statement oriented definition of self-talk, Theodorakis et al. (2000) defined self-talk as “what people say to themselves either out loud or as a small voice inside their head” (p. 254). However the above definition was characterized as a little simplistic, because it did not include some of the uses of self-talk. Finally, in another self-statement oriented, more comprehensive definition, Hackfort and Schwelkmeizger (1993), including also the uses of self-talk, defined self-talk as “dialogue [through which] the individual interprets feelings and perceptions, regulates and changes evaluations and convictions, and gives him/herself instructions and reinforcement” (p. 355).

After noted the deficiencies of the previously employed definitions, Hardy (2006) presented a working definition of self-talk that includes several components: “(a) verbalizations or statements addressed to the self; (b) multidimensional in nature; (c) having interpretive elements associated with the content of statements employed; (d) is somewhat

dynamic; and (e) serving at least two functions; instructional and motivational, for the athlete.” (p. 84). In concluding his review, Hardy noted that as our knowledge for social constructed variables develops over time this definition of self-talk would likely benefit from future modification. Indeed, Zourbanos et al. (2010) taking into account the research findings (Zourbanos et al., 2006, 2007, 2010) regarding the social influences on athletes’ self-talk, added to Hardy’s (2006) definition of self-talk another element “that athletes’ self-talk is malleable to perceptions and interpretations of stimuli received from the social environment” (p . 782).

As research on self-talk in sport has been increasing, more elaborate descriptions and definitions of self-talk have been proposed. More specifically, recently, taking into account the development of research literature on self-talk Hatzigeorgiadis et al. (2014) defined self-talk as “what people say to themselves either silently or aloud, inherently or strategically, to stimulate, direct, react and evaluate events and actions” (p. 372). Similarly, Hardy and Zourbanos (2016, p. 450) described self-talk as “statements, phrases or cue words that are addressed to the self which might be said automatically or very strategically, either out loud or silently, phrased positively or negatively, having an instructional or motivational purpose, an element of interpretation, and incorporating some of the same grammatical features associated with every day speech.

Also, Van Raalte et al. (2016) in an attempt to expand upon and clarify the definition of self-talk in sport psychology, approached the definition of self-talk from another perspective, in light of discursive (Haye & Larrain, 2013; Larrain & Haye, 2012) and dual-process theories (Kahneman, 2011), and defined self-talk “as the syntactically recognizable articulation of an internal position that is expressed either internally or out loud where the message-sender is also the intended receiver” (p.141).

Lately, Latinjak, Hatzigeorgiadis, et al. (2019) in their recent review regarding the conceptualization of self-talk in sport, and after considering the rapid developments of the self-talk literature in sport in the last decade, noticed that Hardy's working definition needs updating so as to accommodate the recent literature and serve as a conceptual framework for the future study of self-talk in sports. More specifically, the authors identified two main developments in the self-talk research literature that create the need to reconsider the previous conceptualizations of self-talk in sport. The first development was the identification of two distinct self-talk entities (organic self-talk and strategic self-talk, whereas the second development was the distinction between spontaneous and goal-directed self-talk, as these emerge within organic self-talk. These two developments are presented below. Finally the authors, conceptualized self-talk as: verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it either (a) reflects dynamic interplays between organic, spontaneous and goal-directed cognitive processes or (b) conveys messages to activate responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes (Latinjak, Hatzigeorgiadis, et al., 2019; p. 11).

Organic Self-talk versus Strategic Self-talk

Regarding the first development in the self-talk literature, Latinjak, Hatzigeorgiadis, et al. (2019), identified two distinct self-talk entities which were initially reflected in two different research perspectives (Theodorakis et al., 2012) in the study of self-talk in sport. The first entity, introduced by the authors as *organic* self-talk, previously also called as *automatic* (Zourbanos et al., 2009) or *spontaneous* self-talk (Van Raalte et al., 2014), refers to self-talk as inherent self-statements that athletes address to themselves, mostly during sport performance. In this case, self-talk, either represents psychological processes or emanates from metacognitive knowledge and skills (Latinjak, Hatzigeorgiadis, et al., 2019).

Specifically, according to Latinjak, Hardy, et al. (2020) organic self-talk is the result of inherent psychological and cognitive processes and not part of a psychological intervention, even though it may be indirectly influenced by interventions like cognitive-behavioral therapy or mindfulness-acceptance approaches. Regarding the term, Latinjak, Hatzigeorgiadis, et al. (2019) stated that they preferred the term *organic self-talk* compared to *automatic or spontaneous self-talk*, as the first can be defined as characteristic of living organisms and because both *automatic* and *spontaneous* may lead to misunderstandings as they are also used in general psychology to refer to uncontrolled cognitive processes. However, athletes use in relation to their sport participation both uncontrolled (i.e., thoughts which appear automatically or spontaneously) and controlled (i.e., self-statements deliberately used by the athlete to self-regulate) self-statements. Thus, according to Latinjak, Hatzigeorgiadis, et al. (2019) suggestion, in this thesis the term *organic* will be adopted to refer to what previous called *automatic* or *spontaneous* self-talk. In previous research, athletes' organic self-talk has been mainly examined in field-studies, descriptive or correlational, which aimed to describe its content, to explore its antecedents, and to examine its relationship with sport performance and other related outcomes (Theodorakis et al., 2012).

The second self-talk entity was termed *strategic self-talk* (Latinjak , Hatzigeorgiadis, et al., 2019; Theodorakis et al., 2012) and was described as the use of predetermined cue words and phrases, mostly developed through interventions, that athletes verbalize with the aim of enhancing performance or achieving other related performance outcomes. In this case, self-talk stems from adherence to strategic plans and is based on memory (Latinjak, Hatzigeorgiadis, et al., 2019). To date, in sport psychology, the research on strategic self-talk has dominated the self-talk literature. Although there are some descriptive studies investigating the use of strategic self-talk, the self-talk literature in sport has been dominated

by studies examining, through interventions, the effectiveness of strategic self-talk on sport performance or other performance- related outcomes (Theodorakis et al., 2012).

Organic Self-Talk

Researchers, in their attempt to understand the content and the structure of organic self-talk had used data-driven and theory-driven approaches (Latinjak, Hatzigeorgiadis, et al., 2019), which led to data-driven and theory-driven classifications of organics self-talk respectively. These classifications are outlined below.

Data-Driven Classifications

In the sport literature, the traditional distinctions of self-talk that emerged from inductive qualitative analyses focusing on (a) the content of self-talk, and more specifically its valence, that is, positive, neutral and negative self-statements; and (b) the function of self-talk, that is motivational and instructional self-talk (Hardy, Gammage, et al., 2001). With regard to the valence, positive self-talk (e.g., I can achieve it) in sport refers to encouragement or talk that one could be successful; negative self-talk is self-critical or represents an inability to succeed (I performed too awfully); whereas neutral self-talk (“There are people watching”) is self-talk that reflects statements that are neither positive nor negative in valence.

Other content-based self-talk distinctions that emerged from inductive qualitative analyses concerns with the grammatical structure of self.-talk, where the most recurrent themes recognizing I statements (“I can do it”) and you-statements (“You can do it”; Hardy, Gammage, et al., 2001; Latinjak et al., 2014). Actually, second person self-statements have received particular research attention in the social psychology literature, where it has also been studied under the label of *fragmented self-talk* (Zell et al., 2012), however they have been less studied by sport psychologists. Finally, another content-based self-talk distinction in sport psychology concerns the overtness of self-statements, with self-talk researchers

distinguishing between overt and covert self-talk. Covert self-talk is articulated internally, as a voice inside the athletes' mind, and thus cannot be heard by another individual. In contrast overt self-talk is articulated audibly so that others may hear what is said (Hardy, 2006).

With regard to the functions of organic self-talk, that is, the aims self-talk is intended to serve, two main categories have been identified: a) instructional, referring to statements that aid performance by triggering desired actions through proper focus of attention, correct technique, and strategy execution (Hardy et al., 1996), and b) motivational self-talk, referring to self-statements that facilitate performance by enhancing confidence, inspiring greater effort, and creating positive mood (Theodorakis et al., 2000). Hardy, Gammage, et al. (2001) further classified the above functions similar to the classification of functions of athletes' imagery. Specifically, they distinguished instructional self-talk functions into skills-related and strategy-related (e.g., to develop my skills and to work out game plan, respectively) and motivational self-talk functions into, mastery, arousal, and drive (e.g., to remain focused, to calm nerves, and to keep myself motivated, respectively).

It is worth mentioning that, as the distinction between motivational and instructional self-talk had been made before the organic/strategic self-talk distinction, they have been applied to both organic self-talk and strategic self-talk. However, there is a subtle difference between them (Latinjak, Hatzigeorgiadis, et al., 2019): Within organic self-talk, self-talk inherently possesses specific motivational and instructional functions, and reports of motivational and instructional organic self-talk reflect the perceived functions of athletes' self-talk. In contrast, in strategic self-talk, motivational and instructional cue words are designed and applied to serve specific motivational and instructional functions by verbalizing them mechanically before, during, and/or after task execution. Finally, it should be mentioned that the terms instructional and motivational have been used less in association with organic

self-talk than in association with strategic self-talk for the identification of different self-talk interventions (Latinjak, Hatzigeorgiadis, et al., 2019).

Although the content and the functions constitute separate dimensions of self-talk, data-driven classifications have sometimes blurred the boundaries between content and functions. For instance, in early self-talk research positive self-talk was described as self-talk that helps the athlete keep his or her focus of attention in the present, not on past errors or the distant future (Weinberg, 1988). Similarly, negative self-talk was defined as self-talk that gets in the way because it is inappropriate, irrational, counterproductive, or anxiety-producing (Theodorakis et al., 2000). However, several researchers (Hardy, Gammage, et al., 2001; Theodorakis et al., 2012) afterwards have argued that such an approach is misleading, as it is possible that positive statements can have negative effects and negative statements can have positive effects, based on individual and situational characteristics. Therefore, they suggested that a distinction between positive and negative self-talk should be based solely on the content of the statements and not the effect (Hardy, Gammage, et al., 2001; Theodorakis et al., 2012), whereas with regard to the effect self-talk can have on outcome variables, the terms *facilitative effects* and *debilitative effects* should be preferred (Theodorakis et al., 2012). Similar to the positive-negative self-talk distinction, Theodorakis et al. (2012) also suggested to classify self-talk as instructional or motivational based on the content rather than the function it may serve, as there is evidence that self-talk cues can serve several functions irrespective of their content.

In more recent years, the development of several self-talk scales in sports, such as the Functions of Self-Talk Questionnaire (Theodorakis et al., 2008) and the Automatic Self-Talk Questionnaire for Sport (ASTQS; Zourbanos et al., 2009), as well as in general psychology (e.g., Self-Talk Scale; Brinthaupt et al., 2009) have further advanced our knowledge regarding organic self-talk. For instance Zourbanos et al. (2009) developed the ASTQS, a

comprehensive measure of athlete's self-talk content, describing four types of positive self-talk (psych-up, confidence, anxiety control, and instruction); three types of negative self-talk (worry, disengagement, and somatic fatigue), and irrelevant self-talk supporting the multidimensionality of self-talk. In this scale the types of positive self-talk were identified based on the content but also on their functions, whereas the identification of types of negative self-talk was based on the content only. As Latinjak, Hatzigeorgiadis, et al. (2019) suggested, one way to overcome the confusion between the content and functions of self-talk that came from data-driven classification of organic self-talk is by considering the theory-driven classification of organic self-talk.

Theory-Driven Classifications

Different theoretical frameworks from general psychology have influenced the classifications that researchers used to investigate athletes' organic self-talk. Of particular importance for addressing the overlaps between the content and functions of data-driven classifications of self-talk is the introduction of dual-process theories (Latinjak, Hatzigeorgiadis, et al., 2019).

More specifically, previous research in psychology and the sport sciences have recurrently distinguished between (a) thought processes related to cognitive control, such as conscious, operant, reflexive, or goal-directed thinking, and (b) more automatic and uncontrolled processes, such as unconscious, respondent, or spontaneous thinking (Christoff, 2012; Klinger, 1977). According to Lieberman (2003) controlled thought processes typically require effort, intention, and awareness, tend to interfere with one another, and are usually experienced as self-generated thoughts. Conversely, automatic and uncontrolled processes occur without effort, intention, and awareness, tend to not interfere with one another, and are usually experienced as perceptions or feelings.

With regard to self-talk in sport, Van Raalte et al. (2016) adapted Kahneman's (2011) dual processing theory to explain self-talk in sport. They identified: (a) an intuitive type of self-talk (also called System I self-talk) that is fast, comes to mind spontaneously, and brings current experiences into awareness in a way that represents the immediate, emotionally-charged reaction to a situation; and (b) a rational type of self-talk (called, System II self-talk) which is slower, emotionally neutral, and is influenced by different perspectives and new information.

In a similar vein, Latinjak and colleagues (Latinjak et al., 2014, 2017) recently adapted and modified Christoff's (2012) theoretical framework used in neuropsychology studies, into the organic self-talk paradigm used in sport psychology. This line of neuropsychological research distinguished between goal-directed (controlled) and undirected (uncontrolled) thought processes. More specifically, Christoff et al. (2011) described goal-directed thinking as a mental process deliberately employed towards solving a problem or making progress on a task, and it usually occurs during reasoning, problem solving and decision making. Furthermore, goal-directed thinking includes, firstly, the representation of current and desired states, and secondly, the establishment of a link between current and desired states through a series of actions which attempt to convert the former to the latter. In contrast, undirected thoughts are unintentional and involuntary thoughts, which are further categorized into three types: mind-wandering, stimulus-independent thoughts, and spontaneous thoughts (Christoff et al., 2011). According to Klinger (2009), mind-wandering, also called task-unrelated thoughts (Christoff, 2012) includes any thought that is unrelated to the ongoing task or activity, thus unrelated to the thought eliciting situation (e.g. thinking about a movie while attending a team meeting). Stimulus-independent thoughts are however related to the context of the activity, yet unrelated to ongoing stimuli a person receives (e.g., thinking about past strategic mistakes while in a team meeting). Finally, spontaneous

thoughts are unintended, non-working, non-instrumental thoughts that come to mind unbidden and effortless, which are however linked to the task or activity at hand and relevant contextual stimuli (e.g., thinking about how a suggestion was appraised by the team manager).

In line with Christoff et al. (2011), Latinjak Hatzigeorgiadis, et al. (2019) described athletes' goal-directed self-talk as an expression of controlled mental process deliberately used toward solving a problem or making progress on a task, and it usually occurs during reasoning, problem-solving, and decision-making. Inversely, undirected self-talk refers to involuntary statements that appear unintentionally (Latinjak et al., 2014). Regarding to undirected self-talk subtypes, athletes' spontaneous self-talk refers to unintended, non-instrumental statements that come to mind unbidden and effortlessly, which are, however, linked to the task or activity at hand and relevant contextual stimuli (e.g., ruminating about the last mistake while competing). Finally, stimulus-independent statements are related to the sport context, however unrelated to the ongoing stimuli a person receives (e.g., thinking about the last practice during the competition), whereas the content of mind-wandering is unrelated to the both sport context and the task at hand (e.g. thinking about work during the competition)..

Latinjak et al. (2014, 2017) described several differences between spontaneous and goal-directed self-talk in terms of structure, content, wording, and nature. In terms of structure, spontaneous self-talk varies in terms of two dimensions: valence (from positive to negative; e.g., "I played well/I played awfully") and time perspective (from past-related to future-related; e.g., "I was unlucky/I will succeed"), whereas goal-directed self-talk varies in terms of two dimensions: time orientation (from past-oriented to future-oriented; e.g., "Nothing happened/You can do it") and activation (from low to high; e.g., "Calm down / Give it all"). Although valence and arousal have previously been used in self-talk research in

sport (Hardy, Hall, et al., 2001), the identification of the two time dimensions (i.e., time perspective for spontaneous, and time orientation for goal-directed self-talk) is relatively new in sport psychology literature. Generally, the main difference between the two time dimensions lies in their foundation (Latinjak et al., 2017). Time perspective distinguishes between statements based on their content; whereas time orientation reflects the purpose or the function of the goal-directed statement.

Thus, with regard to their content, spontaneous self-talk mostly describes, evaluates and explains past outcomes (e.g., “I played awfully/I was good/lucky”), and makes predictions about future events (e.g., “I will win”). In contrast, goal-directed self-talk aims to control cognitive reactions (e.g., “Everyone makes mistakes”) and dysfunctional activated (e.g., “Do not be angry”) and deactivated affective states (e.g., “Do not be sad”), and to promote functional activated (e.g., “Strong”) and deactivated affective states (e.g., “Relax”), task instructions (e.g., “Concentrate/Pass the ball”) and positive predictions about future (e.g., “You will achieve it”). Overall, the structure and the content of spontaneous and goal-directed self-talk provided by Latinjak et al. (2014) has the potential to accommodate all self-statements, and does not simply reflect some categories of self-talk. Moreover, Latinjak, Torregrossa, et al. (2019) provided subsequently six subcategories of athletes’ future-oriented goal-directed self-talk focusing on positive predictions, as it was found the most frequent goal-directed self-talk function used by basketball players in stereotypical competitive situations in order to self-regulate. These six subcategories of athletes’ future-oriented goal-directed self-talk were: (a) up-regulating self-confidence (e.g., “You are at your best”); (b) down-regulating self-confidence; (e.g., “It’s not finished yet”), (c) promoting mastery goals (e.g., “The goal is to do your best”), (d) promoting performance-approach goals (e.g., “Your goal is to win”), (e) promoting performance-avoidance goals (e.g., “You mustn't lose today”), and (f) promoting intrinsic motivation (e.g., “Go and have fun”).

With regard to differences between spontaneous and goal-directed in terms of wording and nature, in their wording (Latinjak et al., 2014, 2017): spontaneous self-talk is almost always formulated in first person and seldom in second person (e.g., “I can do it”), whereas goal-directed self-talk is frequently formulated in second person, and less in first (e.g., “You can do it”). Finally, in terms of nature, Latinjak, Corbalan-Frigola, et al. (2020) based on research evidence concluded that spontaneous self-talk can be viewed as a window into the athlete’s mind as it informs, among other things, about athletes’ performance beliefs (“I can score”), goal orientations (“I do not want to lose”), irrational beliefs (“I have to win”), thoughts of disengagement (“I want to quit”), and causal attributions of success (“I performed well”), and of failure (“The opponent was better”). Conversely, goal-directed self-talk is a rational process of thought that is deliberately used for self-regulation. As a result, according to Latinjak, Hardy, et al. (2020), spontaneous self-talk cannot exist on its own; it is always accompanied by at least one psychological process that is expressed by spontaneous self-talk. For instance, a spontaneous statement like “I’m too angry” could be an expression of athlete’s emotion of anger and would make no sense if the athlete does not perceive him/herself as angry. In contrast, compared to spontaneous self-talk, goal-directed self-talk can be considered more as a separate psychological entity. For instance, an athlete could use a goal-directed statement, such as “Don’t get angry/Calm down,” to avoid getting angry before actually feeling this emotion. Thus, from this point of view, goal-directed self-talk is distinct from other psychological processes, such as when goal-directed self-talk is used proactively to anticipate potential psychological challenges and prevent them before they even occur. Finally, according to Latinjak and Hatzigeorgiadis (2021) spontaneous self-talk is a kind biopsychological descriptor (like emotions, feelings, thoughts, etc.) that describes how people are at certain moments, whereas goal-directed self-talk is a type of psychological skill (like guided imagery, concentration, etc.) that help people to regulate themselves.

Strategic Self-Talk

Strategic self-talk refers to the use of predetermined cue words and phrases, mostly developed through psychological interventions, that athletes verbalize to themselves just prior to, or while performing a task, with the aim to facilitate learning and enhance performance, through the activation of appropriate responses (Latinjak, Hatzigeorgiadis, et al., 2019). Depending on the specific function that strategic self-talk serves, it has been mainly classified as instructional or motivational (Latinjak, Hatzigeorgiadis, et al., 2019; Theodorakis et al., 2012). As already mentioned above, to date the self-talk sport psychology literature has been dominated by experimental studies examining the effect of strategic self-talk interventions on sport performance, and recently on other performance-related outcomes (Theodorakis et al., 2012). Overall, the effectiveness of strategic self-talk interventions has been well documented in sport-related self-talk literature, including a systematic review (e.g., Tod et al., 2011) and a meta-analysis (e.g., Hatzigeorgiadis et al., 2011). Particularly, Hatzigeorgiadis et al. (2011) in their meta-analysis of 32 studies, reported that strategic self-talk interventions had a positive moderate effect size ($d = .42$) on sport performance, suggesting that strategic self-talk could have a meaningful impact on performance enhancement. In addition, Hatzigeorgiadis et al. (2011) in their meta-analysis examined potential moderators for the effectiveness of strategic self-talk interventions on sport performance, and found that: Self-talk interventions were more effective for tasks involving relatively fine, compared with relatively gross, motor demands; and for novel, compared with well-learned, tasks. Moreover, interventions including self-talk training were more effective compared to those not including self-talk training. Finally, providing further partial support for Theodorakis et al.'s (2000) matching hypothesis, the authors (Hatzigeorgiadis et al., 2011) reported that instructional self-talk was more effective for fine tasks rather than gross tasks, and also more effective for fine tasks than was motivational self-talk. The lack of full support for the “motor demands/self-talk

type” matching hypothesis, led Hatzigeorgiadis, et al. (2014) to suggest that for the development of effective strategic self-talk plans, except for the motor demands, additional matching factors should be considered such as , the learning stage and the performance setting.

Given the considerable research evidence for the effectiveness of strategic self-talk on performance enhancement, recently there is a growing research interest into the mechanisms that may explain the facilitative effect of strategic self-talk on sport performance. In summary, in line with Hardy et al.’s self-talk framework in sport, contemporary reviews of this line of research (Galani, Hatzigeorgiadis, Zourbanos, & Theodorakis, 2016; Hatzigeorgiadis & Galani, 2017) have revealed that cognitive, motivational, behavioral, and affective mechanisms may explain the facilitative effect of strategic self-talk on sport performance.

Organic Self-Talk Assessment

According to Vygotsky (1986), “the area of inner speech is one of the most difficult to investigate” (p. 226). Consequently, the study of self-talk has faced plentiful methodological difficulties and challenges, and self-talk measurement has been itself a challenging research topic, mainly due to the often hidden and subjective nature of the phenomenon (Brinthaup et al., 2015). In the literature of cognitive assessment, various methodological approaches have been used to identify the individuals’ cognitive processes or structures. These methods ranged from concurrent to retrospective assessments and from unstructured to fully structured procedures (e.g., think-aloud, private speech recordings, free association, random sampling, self-monitoring, videotape reconstruction, thought listing, interviews, and self-statement inventories), with several strengths and weaknesses (Zourbanos et al., 2009). Similarly, in the field of sport psychology, various methods have been applied to identify and assess athletes’ organic self-talk, including think-aloud processes, private speech recordings, descriptive

experience sampling, videotape reconstruction, interviews, self-monitoring, thought listing, self-report psychometric questionnaires and observational tools (Brinthaup & Morin, 2020). However, as in other areas of assessment across many fields, in sport psychology self-report psychometric questionnaires have been the most widely used form of assessing athletes' organic self-talk (Van Raalte et al., 2019).

Initially athletes' organic self-talk was measured via the Test of Performance Strategies-2 (TOPS-2; Thomas et al., 1999). Based on previous qualitative data (Hardy, Gammage, et al., 2001), Hardy et al. (2005) developed the Self-Talk Use Questionnaire (STUQ) in order to assess *Where, When, What, and Why* athletes use self-talk. Based on Hardy, Gammage, et al.'s (2001) conceptualization, Zervas et al. (2007) developed the Self-Talk Questionnaire (S-TQ), an instrument assessing the instructional and motivational functions of self-talk. One year later, Theodorakis et al (2008) developed the Functions of Self-Talk Questionnaire (FSTQ), a psychometrically sound instrument aiming to assess a wider range of self-talk functions. However, none of the above questionnaires actually assess the content and the structure of athletes' organic self-talk. The first validated measure of the content and the structure of athletes' organic self-talk is the Thought Occurrence Questionnaire for Sport (TOQS; Hatzigeorgiadis & Biddle, 2000). Even though the TOQS has shown good psychometrics properties (Hatzigeorgiadis & Biddle, 2000), it focuses only on negative and irrelevant thoughts, while it had no references to positive thoughts athletes experience (Zourbanos et al., 2009). Thus, addressing this gap in literature, Zourbanos and colleagues (2009) developed the Automatic Self-talk Questionnaire for Sports (ASTQS), a comprehensive, multidimensional measure assessing the content and structure of athletes' both positive and negative organic self-talk. With regard to the contemporary self-talk conceptualizations into sport psychology, although ASTQS contains statements, and therefore factors that can be described as undirected or System I self-talk (e.g., worry and

disengagement) and goal-directed or System II self-talk (e.g., instruction and confidence), these distinctions had not been made in the development of ASTQS, as they introduced some years later. Thus, a refinement of ASTQS is needed (Karamitrou et al., 2020), so that the measure takes into account the recent self-talk conceptualizations. In addition, as the majority of self-talk self-reports in sport, ASTQS is a trait measure of athletes' organic self-talk, as its validation was based on a trait approach (Zourbanos et al., 2009). Thus, the development of a state measure of athletes' organic self-talk will fill this gap in the assessment of athletes' organic self-talk and also will help us to partially overcome the disadvantage of mnemonic biases, that all retrospective self-reports have, but mainly these which are based on a trait approach. Particularly, in retrospective trait measures more information may have been forgotten or recalled inaccurately due to the time that has elapsed from the actual behavior to the questionnaire completion, compared to the retrospective state measures which involve immediate recall procedures.

Purpose and Summary

To sum up, the classification of strategic and organic self-talk, and within the latter category between spontaneous and goal-directed self-talk, offers a more theory-based investigation of athletes' self-talk (Latinjak, Hatzigeorgiadis, et al., 2019). Therefore, using Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary conceptual framework of organic self-talk in sport, the main aim of this investigation was to develop and test the psychometrics properties of a theoretically-grounded instrument assessing the content and the structure of athletes' state organic self-talk, the Organic Self-Talk Questionnaire for Sport (OSTQS). We used Latinjak, Hatzigeorgiadis, et al.'s contemporary conceptual framework of organic self-talk in sport for the following reasons: First, it is purely a conceptual framework of organic self-talk in sport, which in line with previous research literature (Theodorakis et al., 2012), distinguishes organic from strategic self-talk. In contrast, Van Raalte et al. (2016) in their

theoretical framework, included strategic self-talk within the System II self-talk category, claiming that organic and strategic self-talk are not distinct orthogonal categories, and thus it is useful to view and examine them as belonging to the same category. Second, Latinjak, Hatzigeorgiadis, et al.'s conceptual framework of organic self-talk has been investigated and supported in several studies in the sport domain (e.g., Latinjak, 2018a, 2018b; Latinjak et al., 2014, 2017, 2018; Latinjak, Corbalan-Frigola, et. al., 2020; Latinjak, Maso, et. al., 2019; Latinjak, Torregrossa, et al., 2019), whereas Van Raalte et al. (2016) theoretical framework has not yet been studied so much, although has received some support (Hong et al., 2020) in the sport context.

The development of an instrument assessing the content and the structure of athletes' organic self-talk based on the contemporary conceptual framework of organic self-talk in sport, will offer us the opportunity to examine quantitatively the contemporary distinctions (i.e., spontaneous and goal-directed self-talk) of organic self-talk in sport and their classifications, and thus better understand the organic self-talk phenomenon in sport, its antecedents, and its consequences related to sport performance. For this reason, a second aim of this investigation was to examine three unexplored, potential antecedents of athletes' organic, spontaneous and goal-directed self-talk on a state level, and particularly: a) big five personality traits as personal antecedents and b) athletes' perceptions of Basic Psychological Needs (BPNs) satisfaction, and c) BPNs frustration within their sport environment, as social-environmental antecedents of athletes' Studying the factors that shape athletes' organic self-talk has been considered an important research direction, because it will help us to intervene and change these factors, thus regulating athletes' organic self-talk according to individual needs (Karamitrou et al., 2020; Theodorakis et al., 2012).

Overall, this PhD consists of one review (Chapter 2) and two empirical (Chapter 3-4) articles. Chapter 2 is a literature review on the research area that examined the antecedents of

athletes' organic self-talk, before the introduction and operationalization of the two contemporary organic self-talk distinctions, between spontaneous and goal-directed self-talk. Particularly, the main aim of this literature review is to contribute to the existing self-talk literature by attempting for the first time to reinterpret previous research findings on the antecedents of athletes' organic self-talk in terms of the contemporary distinctions between spontaneous and goal-directed self-talk. Finally, the chapter ends with directions for future research and recommendations of interventions that could be implemented on organic self-talk antecedents to change athletes' organic self-talk in effective directions.

Chapter 3 outlines the development and initial validation of the OSTQS, a new theory-grounded, self-report measure, designed to assess the content and the structure of athletes' organic self-talk (i.e., uncontrolled/spontaneous and controlled/goal-directed self-talk) in a state level during sport participation. Two studies were conducted. In the first study, a prospective instrument was developed based upon (a) the operational definitions of athletes' spontaneous and goal-directed self-talk in sport, and (b) raw data collected from athletes in this study through open-ended questionnaires and semi-structured interviews. In the second study, the psychometric properties of the developed questionnaire were tested through examination of factorial validity, discriminant validity, and reliability.

Finally, chapter 4 presents an empirical quantitative study focusing on the antecedents of athletes' organic, spontaneous and goal-directed self-talk on a state level. In particular, ground in Big Five Model of personality traits and Self-Determination Theory the objectives of this study were:

1. To investigate three unexplored, potential antecedents of athletes' organic, spontaneous and goal-directed self-talk on a state level, and particularly: a) personality traits as personal antecedents and b) athletes' BPNs satisfaction, and c) BPNs frustration within their sport environment, as social-environmental.

2. To provide evidence regarding the nomological validity of OSTQS by a detailed examination of the relationships between athletes' organic, spontaneous and goal-directed self-talk on a state level with their antecedents, that is the variables of the big five personality traits, BPNs satisfaction, and BPNs frustration.

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Organic Self-talk Antecedents: An Interpretative Review and Implications for Practice

Book Chapter

Karamitrou A., Galanis, E., Theodorakis, Y., & Comoutos, N. (2020). Organic self-talk antecedents: An interpretative review and implications for practice. In Latinjak, A., & Hatzigeorgiadis, A. (Eds.), *Self-talk in Sport* (pp. 77-90). Routledge.

Introduction

People experience approximately 4,000 thoughts on a 16-hour day (Clark & Rhyno, 2005) and nearly 96% of adults talk to themselves (Winsler, Feder, Way, & Manfra, 2006), engaging in what is called internal dialogue, inner speech, or self-talk. Although we are often not fully aware of this internal dialogue and its content, according to cognitive behavioural theories (Ellis, 1994; Meichenbaum, 1977), it influences our emotions and our behaviour, and sometimes it can keep us from doing our best. Various terms have been used in general psychology to describe this internal dialogue, such as automatic thoughts, internal dialogue, inner conversation, self-statements, self-verbalisations, and self-instructions (see Chapter 2); in the sport psychology literature the term “self-talk” has prevailed (Theodorakis, Hatzigeorgiadis, & Zourbanos, 2012). The purpose of this chapter is to provide an overview on the antecedents of athletes’ organic self-talk (previously referred to as “automatic self-talk”) followed by directions for future research and applications. In particular, first, we review research examining the factors that shape athletes’ organic self-talk, and then we provide relevant directions for future research based on identified gaps in the literature. Finally, based on the existing evidence, we present interventions that can be used to change factors that influence self-talk. Thus, these interventions would indirectly regulate self-talk.

In this chapter, we assume a contemporary conceptual framework (Latinjak, Hatzigeorgiadis, Comoutos, & Hardy, 2019) that distinguishes between two major dimensions of organic self-talk: spontaneous and goal-directed self-talk. This theoretical perspective could lead to the discovery of new interpretations of previous findings, since much of the research into the antecedents of organic self-talk of athletes has been conducted before researchers began to distinguish between types of organic self-talk. Instead, researchers who studied organic self-talk have previously distinguished between positive and negative self-talk and their respective sub-dimensions, regardless of their spontaneous or

goal-directed nature. This distinction between spontaneous and goal-directed was not only introduced much later in sports psychology; it has not yet been operationalised in order to provide researchers with an assessment tool appropriate for quantitative research inquiries. The purpose of this chapter is primarily to contribute to the existing literature by attempting for the first time to reinterpret earlier research on the antecedents of athletes' organic self-talk with regards to the distinction between spontaneous and goal-directed self-talk.

To do this, we turn to recent findings from the study of organic self-talk to re-examine the differences between positive and negative self-talk categories used in previous research. First, considering the content of negative self-talk in established scales, negative self-talk has been described as performance worries and disengagement (e.g., Hatzigeorgiadis & Biddle, 2002; Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis, & Papaioannou, 2009), somatic fatigue (e.g., Zourbanos et al., 2009), self-blame, and self-attack (e.g., Conroy & Metzler, 2004). Given our knowledge of the content and structure of spontaneous and goal-directed self-talk, it can be assumed that negative self-talk almost always reflects spontaneous self-talk. This assumption was recently confirmed by a study exploring the content of spontaneous self-talk (e.g., Latinjak, Corbalan-Frigola, Alcoy-Fabregas, & Barker, 2019). Second, considering the content of positive self-talk scales, but also from studies examining self-talk as a psychological skill used by athletes during practice and competitions (e.g., Harwood, Cumming, & Fletcher, 2004; Zourbanos, Theodorakis, & Hatzigeorgiadis, 2006), positive self-talk has been described as psyching-up, building confidence, controlling anxiety, and providing instruction (e.g., Zourbanos et al., 2009), or self-affirming and self-protecting (e.g., Conroy & Metzler, 2004). From studies of the nature of goal-directed self-talk, we can infer that most of the positive self-talk described in earlier studies is likely to be goal-directed self-talk. The types of positive self-talk mentioned above match many of the categories introduced in the study of athletes' goal-directed self-talk functions (e.g., Latinjak, Masó, Calmeiro, &

Hatzigeorgiadis, 2019). Nonetheless, these interpretations should be viewed with caution, because the classification into spontaneous and goal-directed self-talk was made by us, posthoc, and not by the researchers who conducted the studies, and also because it is fairly certain that there is a small overlap in the content between spontaneous and goal-directed self-talk.

Self-talk Antecedents

Theodorakis et al. (2012) identified three key research questions regarding understanding of self-talk in sport. The first refers to the description and the content of athletes' self-talk, the second involves the antecedents or the factors that shape athletes' self-talk, while the third involves the consequences or impact of self-talk on various outcome variables, of which sport performance is the most important. Until recently, in sport psychology, research on strategic self-talk and its effects on sport performance has dominated the self-talk literature. Recently, however, after Latinjak, Zourbanos, López-Ros, and Hatzigeorgiadis (2014) introduced the distinction between the two types of organic self-talk, and after suggestions were formulated on the importance of identifying the mechanisms through which self-talk influences performance and self-regulation (Hatzigeorgiadis & Galanis, 2017), research on the functions and mechanisms of self-talk has also attracted significant research attention. Despite increasing research efforts, research on the factors that influence athletes' organic self-talk is still at a developmental stage.

Research on the antecedents of organic self-talk is based on a review by Hardy, Oliver, and Tod (2009) and later works by Zourbanos and colleagues (Zourbanos et al., 2011; Zourbanos, Hatzigeorgiadis, Tsiakaras, Chroni, & Theodorakis, 2010), who proposed and developed a framework for the study of self-talk. Hardy et al. (2009), based on the existing research evidence, proposed two classes of self-talk antecedents: personal and situational. Zourbanos et al. (2010, 2011), meanwhile, examined the influence of coaches on athletes'

self-talk and found that aspects of coaching behaviour have an important impact on athletes' organic self-talk. In view of these findings, but also the importance of motivational climate and team dynamics for athletes' cognitions and emotions, Theodorakis et al. (2012) introduced a third class of antecedents designated as social environmental factors. Empirical evidence in the sport psychology literature regarding these clusters of self-talk antecedents are presented in the next section of this chapter.

Personal Factors

A primary factor of importance in human functioning are the variables that relate to individual differences. Among them, Hardy et al. (2009) identified personality traits as a type of self-talk antecedent. Research in sport has indeed shown that more global personality traits (e.g., self-concept, trait anxiety, motivation) may be related to athletes' self-talk. Particularly, Perry and Marsh (2000) attributed the extremely negative-spontaneous self-talk exhibited by an elite swimmer to his negative self-concept. Regarding trait anxiety, Conroy and Metzler (2004) found that recreational athletes' organic self-talk was strongly related to fear of failure and sport anxiety, and mildly related to fear of success. In particular, considering the conceptualisation of organic self-talk, negative-spontaneous self-talk, such as self-blame, self-attack, and self-neglect were positively related to trait anxiety, whereas goal-directed self-talk, such as self-affirmation, self-protection, and self-control were negatively related to trait anxiety.

Among the potential personal self-talk antecedents, motivational orientations have attracted considerable research attention. In a series of studies, Hatzigeorgiadis and Biddle examined the relation between athletes' negative-spontaneous self-talk and their goal orientations (Hatzigeorgiadis, 2002; Hatzigeorgiadis & Biddle, 1999, 2002). This line of studies reached some interesting findings regarding a type of negative-spontaneous self-talk that expresses the desire to disengage from a competition. With regards to goal-orientation,

(1) task orientation was negatively related to disengagement self-talk. Furthermore, (2) for athletes with lower perceived competence, ego orientation was positively related to disengagement self-talk, whereas for athletes with higher perceived competence, no relationship between ego orientations and disengagement self-talk emerged. In addition, (3) athletes with high ego and low task orientations were more vulnerable to disengagement self-talk than were athletes with different goal profiles. Lastly, (4) self-consciousness mediated the relationship between ego orientations and disengagement self-talk. Overall, these studies evidenced that goal-orientation is linked to observations of negative-spontaneous self-talk. Looking at more positive, goal-directed self-talk, Harwood et al. (2004) examined self-talk as a psychological skill used by athletes during practice and competition, similar to imagery or goal setting. Harwood et al. reported that athletes with higher task and moderate ego orientations had more positive-goal-directed self-talk than did athletes with lower task and moderate ego orientations and athletes with moderate task and lower ego orientations. The aforementioned findings suggest that task orientation is related to more adaptive self-talk (at least in terms of self-talk content), whereas for ego orientation, relationships with self-talk may depend on other personal or situational factors.

In a similar vein, Karamitrou, Comoutos, Hatzigeorgiadis, and Theodorakis (2017) examined the links between athletes' organic self-talk and motivation under the self-determination theory prism. They found that autonomous motivation positively predicted positive-goal-directed self-talk and negatively predicted negative-spontaneous self-talk. Otherwise, controlled motivation negatively predicted positive-goal-directed self-talk and positively predicted negative-spontaneous self-talk. Overall, the results of this study provided further support for the role of motivation in shaping athletes' self-talk, suggesting that autonomous motivation encourages athletes' self-regulation via the use of more goal-directed self-talk, whereas controlled motivations makes people self-regulate less and therefore dwell

on their unpleasant or detrimental psychological processes, which are often expressed through spontaneous self-talk.

Regarding other personal factors, Hardy et al. (2009) looked at Paivio's (1971) dual coding theory to propose coding preferences as a potential factor influencing athletes' self-talk. According to Paivio, each person prefers encoding and processing information either verbally or nonverbally. Hardy et al. (2009) hypothesised that athletes with a strong verbal cognitive processing preference are likely to use self-talk more frequently than athletes with a strong nonverbal processing preference. However, this hypothesis has not yet been confirmed in sports-specific research, which is limited, compared to research in general psychology, by the lack of relevant sport-specific assessment tools. Thus, more research is needed to test the above hypothesis on significant differences between athletes in terms of their processing preferences. The focus of interest would be on the impact of verbal cognitive and nonverbal processing preferences on the frequency of organic self-talk and, in particular, on the occurrence of spontaneous self-talk and use of goal-directed self-talk and their respective subcategories.

Moreover, athletes' belief in the true potential of their self-talk in bringing about a change in psychological processes, has been identified as an important antecedent for using goal-directed self-talk. Related to athletes' self-talk beliefs, a study in sport-specific research (Van Raalte, Brewer, Rivera, & Petitpas, 1994) showed that tennis players who believed that self-talk influences the outcome of their matches won more points than non-believers, despite there being no differences between them in the amount of observable self-talk displayed. Yet, this study only assessed observable self-talk, which reflects only a small part of one's actual self-talk; therefore, the findings can only be considered cautiously. More recently, in further support of previous findings, athletes in reflexive self-talk interventions (Latinjak, Hernando-Gimeno, Lorigo-Méndez, & Hardy, 2019; see also, Chapter 7) have identified that belief in

their inner voice is crucial. The study of beliefs about the effectiveness of self-talk warrants further attention, as it has considerable implications for sport psychology practice and the development of effective self-talk interventions. Future research on that topic could explore cognitive factors that are related to beliefs regarding the power of self-talk, such as mental fatigue or ego depletion. Overall, compared to the other clusters of antecedents, research on personal factors that may shape athletes' organic self-talk has been limited. Further examination of personal factors will facilitate our understanding regarding individual differences in self-talk experiences.

Situational Factors

Although self-talk is partly determined by personal factors that describe who we are, it is also shaped by the immediate events that precede a self-talk experience. These events are called situational factors, and include aspects as diverse as winning or losing a point, or having had an argument with a team mate. A key situational self-talk antecedent proposed by Hardy et al. (2009) is match circumstances. First, Van Raalte, Cornelius, Brewer, and Hatten (2000) examined match circumstances as an antecedent of positive and negative self-talk in tennis players. They found that for most players, negative-spontaneous self-talk was observed following lost points or fault serving, even though some participants, after losing points used goal-directed, mainly instructional and motivational self-talk. However, the study assessed only observable self-talk and therefore provided only preliminary evidence that competition progress could influence athletes' self-talk. In another early relevant study, Hardy, Hall, and Hardy (2005) found that athletes use more self-talk in competition than during practice. The authors also reported that athletes use almost all the goal-directed self-talk functions (e.g., relaxation, nerve control, mental preparation, focus, copying) more in competition than in practice. Finally, Hardy et al. found that athletes use more self-talk during their practice and competition compared to moments before or after sport practice.

Hatzigeorgiadis and Biddle (2008) provided additional support to Van Raalte et al.'s above preliminary findings when they examined discrepancies between goals and performance as predictors of negative-spontaneous self-talk in middle-distance runners during a race. Hatzigeorgiadis and Biddle found that goal-performance discrepancies strongly predicted performance worries. Hence, these results confirmed that what happens during the competition determines to a large degree athletes' spontaneous self-talk; at least its negative facet. In the same study, Hatzigeorgiadis and Biddle also examined the relationship of the intensity and the direction of pre-competitive anxiety with negative-spontaneous self-talk. They reported that the intensity of pre-competitive cognitive anxiety positively predicted negative-spontaneous self-talk in the form of performance worries. In addition, they reported that a facilitative interpretation of anxiety symptoms was negatively related to this type of negative-spontaneous self-talk. Lastly, Hatzigeorgiadis (2006) also provided experimental support for the role of goal-performance discrepancies in shaping negative-spontaneous self-talk. After creating conditions of attainable and unattainable goals in a rowing task, he found that participants in unattainable goal conditions experienced more self-talk reflecting impulses to disengage.

After the introduction of the spontaneous/goal-directed distinction in organic self-talk research in sports, a series of qualitative studies have examined the role of practice and match circumstances in relation to new self-talk classifications. Particularly, Latinjak, Masó, and Comoutos (2018) investigated novice Ultimate Frisbee players' goal-directed self-talk during technical skill acquisition, looking into three situations: before task execution, and after unsuccessful throws, and successful throws. The results showed that players used mainly instructional self-talk in all situations. However, before their throws, self-talk was generally aimed at technical instruction (e.g., keep your back straight); after unsuccessful throws at negative reinforcement (e.g., that was wrong), error detection (e.g., you bent your back), and

technical adjustment (e.g., keep your back straighter); whereas after successful throws self-talk aimed at positive reinforcement (e.g., well done) and technical transference (e.g., continue to keep your back straight).

In another recent qualitative study, Latinjak, Torregrossa, Comoutos, Hernando-Gimeno, and Ramis (2019) examined basketball players goal-directed self-talk in stereotypical competitive situations: seconds before a challenging game, while clearly winning or clearly losing, and at the close of a tight game. In line with previous studies, Latinjak et al. concluded that athletes' self-talk may serve functions specific to the psychological demands experienced in each situation. For instance, prior to a challenging game self-talk was about anxiety control and goal engagement; while clearly winning self-talk was aimed to down-regulate excesses of confidence and control dysfunctional low-arousal states (e.g., relaxation); while clearly losing self-talk could help to prevent from disengagement and control debilitating low-arousal states (e.g., sadness); and at the close of a tight game self-talk may serve to instruct and motivate.

Finally, Latinjak, Masó, et al. (2019) in a third related qualitative study examined the situational antecedents of athletes' goal directed self-talk. They found that goal-directed self-talk may be used more in competition than in training. More specifically, they found that goal-directed self-talk may be used more in competitions that are perceived as demanding compared to undemanding, and that athletes may use more goal-directed self-talk to self-regulate during the competition than prior to or after the competition. Although the qualitative evidence presented in this study cannot confirm Hardy et al.'s (2005) previous quantitative findings, it is in line with earlier studies on the situational antecedents of athletes' goal-directed self-talk. In addition, the study by Latinjak, Masó, et al. (2019) reported that in both competition and training, goal-directed self-talk was elicited after both

successful and unsuccessful actions; however, it was more frequent after unsuccessful actions, which fits well with previous qualitative findings (Latinjak et al., 2018).

Overall, research on situational factors has shown that the progress of a competition and the quality of performance relative to goals determine in a high degree the athletes' organic self-talk. Regarding spontaneous self-talk, there is considerable evidence suggesting that failure and goal-performance discrepancies are associated with athletes' negative-spontaneous self-talk. Regarding goal-directed self-talk, quantitative research before the conceptualisation of organic self-talk, and qualitative research after the conceptualisation of organic self-talk, have indicated that athletes also use goal-directed self-talk to cope with success and failure both in practice and competition, and to face the psychological demands experienced in different competitive situations. To further confirm these findings, and to advance our knowledge regarding the situational antecedents of organic self-talk, a direction for future research would be to examine the situational antecedents of athletes' spontaneous and goal-directed self-talk through quantitative methods.

Social-Environmental Factors

Based on research in educational settings (Burnett, 1996), Zourbanos and colleagues considered the role of significant others in shaping athletes' selftalk, focusing primarily on the role of one of the key agents in the social environment of the athletes: their coaches. In a series of preliminary studies (Zourbanos, Hatzigeorgiadis, & Theodorakis, 2007; Zourbanos et al., 2006), there was evidence in support of the links between coaching variables and athletes' self-talk, thus encouraging further research. Following the development of the Automatic Self-talk Questionnaire for Sports (ASTQS; Zourbanos et al., 2009), which contributed to a more systematic framework for research into self-talk antecedents, Zourbanos et al. (2010) in a multimethod investigation provided more robust field-correlational evidence regarding the links between coaching behaviours and athletes' organic

self-talk. The results from a correlational field-study (Zourbanos et al., 2010; Study 2) showed that supportive coaching behaviours were positively related to positive-goal-directed self-talk and negatively related to negative-spontaneous self-talk. Accordingly, unsupportive coaching behaviours were negatively related to positive-goal-directed self-talk, and positively related to negative-spontaneous self-talk. Importantly, these findings were confirmed through experimental evidence (Zourbanos et al., 2010; Study 3) regarding the impact of coaching behaviours on athletes' organic self-talk, thus supporting the causal nature of the relationship.

More specifically, it was found that in the experimental condition, supportive coaching behaviours decreased tennis players' negative-spontaneous self-talk related to worry, whereas unsupportive coaching behaviours were found to decrease tennis players' positive-goal-directed self-talk related to confidence, psych up, and instruction. De Muynck et al. (2017) extended and partially supported the above evidence with an experimental study in tennis clubs, combining the ASTQS and a thinking-aloud procedure for the assessment of self-talk. In line with Zourbanos et al. (2010; Study 3), they reported that positive normative feedback decreased tennis players' negative-spontaneous self-talk. However, positive normative feedback was not found to cause tennis players to use more positive-goal-directed self-talk, supporting Zourbanos et al.'s (2010; Study 2) assertion that negative-spontaneous self-talk is more vulnerable to the influence of significant others than positive-goal-directed self-talk. Lastly, in another cross-sectional study, Zourbanos and colleagues (Zourbanos et al., 2011) found that perceived social support provided by their coach was positively related to athletes' positive-goal-directed self-talk and negatively related to athletes' negative-spontaneous self-talk.

Coach-created motivational climate is another social-environmental factor that may influence athletes' self-talk. Duda (2013) integrated achievement goal theory and self-determination theory to propose a hierarchical conceptualisation of the coach-created

motivational climate. According to Duda's conceptualisation, an empowering climate is task-involving, autonomy supportive, and socially supportive. Inversely, a disempowering climate is highly ego-involving and controlling. Duda suggested that an empowering climate will satisfy athletes' basic psychological needs for competence, autonomy, and relatedness, whereas a disempowering climate will thwart these needs, and this will have an impact on athletes' cognition and emotion. Based on the above assumptions, Zourbanos et al. (2016) examined the links between coach-created climate and athletes self-talk and found that empowering coaching positively predicted athletes' positive-goal-directed self-talk, whereas disempowering coaching positively predicted athletes' negative-spontaneous self-talk. Finally, further supporting the existing evidence regarding the important role of the social environment in relation to athletes' self-talk, Karamitrou et al. (2017) looked at self-determination theory to examine whether satisfaction of basic psychological needs within a sport environment could predict athletes' self-talk. They found that satisfaction of the need for competence positively predicted positive-goal-directed self-talk and negatively predicted negative-spontaneous self-talk, both directly and indirectly via autonomous motivation. Satisfaction of the need for autonomy positively predicted positive-goal-directed self-talk both directly and indirectly via autonomous motivation. It also negatively predicted negative-spontaneous self-talk, in an indirect way via both autonomous and controlled motivation (inversely). Lastly, perceptions of relatedness indirectly predicted athletes' positive-goal-directed self-talk (positively) and negative-spontaneous self-talk (negatively) through autonomous motivation.

Overall, research on social-environmental antecedents indicated that social context can determine athletes' organic self-talk. Supportive coaching behaviours, an empowering coach-created motivational climate, and a need-supportive sporting environment have been linked with athletes' use of goal-directed self-talk, and thus self-regulation attempts, while

simultaneously diminishing the use of negative-spontaneous self-talk. Conversely, negative coaching behaviours and a disempowering coach-created motivational climate have been positively linked to athletes' negative-spontaneous self-talk. Although we attempted to present the existing research on social-environmental antecedents of athletes' organic self-talk in terms of spontaneous/goal-directed self-talk, a limitation of this body of research is that it has been based entirely on the wider positive/negative distinction of self-talk. Thus, it is important to note that (a) this interpretation is considered with caution, and (b) further examination of the social-environmental antecedents of athletes' organic self-talk is warranted, adopting the recent conceptualisation of organic self-talk, to further advance our understanding regarding the influences of social contexts on athletes' self-talk.

Future Research Directions

Along with the future research directions already mentioned in the previous sections of this chapter, a number of important methodological suggestions can be raised. It should be noted that research on organic self-talk antecedents are almost exclusively field-correlational studies, thus not justifying causal inferences. This is particularly so, considering that many of the identified links between antecedents and organic self-talk may reflect reciprocal relationships. Consequently, longitudinal and experimental studies are warranted to better understand these relationships and to claim causality with some confidence.

In addition, several other antecedents warrant further investigation. The highest priority should be given to antecedents susceptible to change by interventions (Theodorakis et al., 2012). Some of these include the motivational climate created by coach, peers or parents, leadership factors, athletes' basic needs being satisfied or thwarted, behavioural regulations, goal-orientations, and interpretation of competitive situations. Finally, as future research should focus on the antecedents of organic self-talk based on this recent self-talk conceptualisation, the need for quantitative instruments reflecting this perspective is

important. Although, there are some qualitative findings regarding the antecedents of athletes' spontaneous and goal-directed self-talk (Latinjak, Hatzigeorgiadis, & Zourbanos, 2017; Latinjak et al., 2018; Latinjak, Masó, et al., 2019), concepts of spontaneous and goal-directed self-talk have not yet been operationalised. Such efforts provide assessment appropriate for quantitative research methodologies. While the ASTQS includes statements, and accordingly factors, that can be described as spontaneous self-talk (e.g., worry and disengagement), and goal-directed self-talk (e.g., instruction and anxiety control), these distinctions have not been made in the development of ASTQS. Thus, a direction that would help guide future research is the refinement of ASTQS, so that the questionnaire takes into consideration the recent self-talk classifications. Such a refinement will allow us to examine quantitatively the recent self-talk classifications in relation to different antecedents, thus further enhancing our understanding regarding athletes' organic self-talk and the factors that shape it.

Interventions Regulating Athletes' Organic Self-talk

According to Theodorakis et al. (2012), studying the factors that shape athletes' organic self-talk is an important research direction because it could help us to intervene and change such factors, thus regulating organic self-talk according to individual needs. Regulating athletes' organic self-talk includes both preventing unwanted self-talk and fostering facilitative self-talk (Theodorakis et al., 2012).

Based on the existing research evidence, interventions could be implemented at three levels of self-talk antecedents to change athletes' organic self-talk in effective directions: attempting to change personal factors, regulating perceptions of circumstances and consequences, and changing the environment within which sport takes place. We begin this section by describing interventions on social-environmental self-talk antecedents (such as motivational climate and coaching behaviour), because based on existing knowledge, such

interventions have the potential to also change personal self-talk antecedents (goal orientation, anxiety, emotions; Duda, 2013) and situational perceptions. Therefore, we assume that without such interventions, we will be less effective in our attempts to regulate athletes' organic self-talk to match athletes' individual needs.

Research on social-environmental self-talk antecedents indicated that supportive coaching behaviours, an empowering coach-created motivational climate, and an environment that supports athletes' psychological needs are positively linked with athletes' positive-goal directed self-talk and negatively related to negative-spontaneous self-talk. Inversely, negative coaching behaviours, and a disempowering coach-created motivational climate, which is a need-thwarting environment, have been positively linked to athletes' negative-spontaneous self-talk. Overall, the above social-environmental antecedents correspond to Duda's (2013) integrative approach introducing the concepts of empowering (i.e., task-involving, autonomy-supportive and socially supportive) and disempowering coach-created motivational climate (ego-involving and controlling). Thus, interventions that educate coaches how to create a more empowering and less disempowering motivational climate (e.g., Empowering Coaching™; Duda, 2013) have the potential to diminish unproductive negative-spontaneous self-talk and maximise positive-goal-directed self-talk, in turn facilitating self-regulation and performance.

Previous implementation of Empowering Coaching interventions have resulted in improving athletes' well-being (e.g., self-esteem) and reduced ill-being (e.g., anxiety). Thus, a positive motivational climate appears to influence factors (such as task-orientation, anxiety, emotions, self-esteem) that are related to organic self-talk, thus further assisting, indirectly, the prevention of unwanted self-talk and the promotion of facilitative self-talk. Experimental studies in sport (De Muynck et al., 2017) and educational contexts (Oliver, Markland, Hardy, & Petherick, 2008) provide support to the above assertion and further confirm the

correlational evidence in sport settings. Especially, De Muynck et al. (2017) in their experimental study in tennis clubs found that positive feedback and an autonomy-supportive style of providing it, positively influenced tennis players' enjoyment and persistence, with psychological need satisfaction and self-talk playing a mediating role. More specifically, the beneficial effect of positive feedback was explained via greater satisfaction of the need for competence and decreased negative self-talk, whereas the beneficial effect of an autonomy-supportive communication style was explained via greater satisfaction of the need for autonomy.

Regarding personal and situational self-talk antecedents, interventions that target goal orientations and trait/state anxiety can help regulate organic self-talk. Previous research showed that task orientation was related to less negative-spontaneous self-talk, while trait/state anxiety were related to more negative-spontaneous self-talk. Also, the progress of the competition or the performance quality relative to the goals, was considered a crucial self-talk antecedent (Theodorakis et al., 2012). Thus, interventions aimed to promote the pursuit of self-referenced and controllable goals will likely reduce athletes' negative-spontaneous self-talk, due to the self-referenced nature of goals, and by reducing the probabilities of large goal-performance discrepancies and accompanying negative emotions. Regarding precompetitive anxiety, research has shown that anxiety intensity and direction are respectively positively and negatively related to spontaneous-negative self-talk. Thus, cognitive behavioural interventions (see for example, Chapter 8) could be designed with the aim of training athletes to reduce anxiety symptoms, and accompanying negative-spontaneous self-talk, with the use of cognitive restructuring and relaxation strategies. Concerning anxiety interpretation, athletes could be trained to accept anxiety as a normal response to competition and interpret it as facilitative to their performance (for ideas on mindfulness-acceptance approaches, see Chapter 15). Cognitive restructuring could also help

athletes to regulate other dysfunctional emotions and accompanying negative-spontaneous self-talk. In line with cognitive behavioural interventions, acceptance approaches, and cognitive reconstruction, an intervention has been developed that aims to address many of the personal antecedents of organic self-talk. Reflexive self-talk interventions (Latinjak, Font-Lladó, Zourbanos, & Hatzigeorgiadis, 2016; see also, Chapter 7) could further assist the regulation of organic self-talk by training athletes to identify problematic sport situations and goal-directed self-talk, and substitute problematic goal-directed self-talk with alternative, more facilitative self-instructions. This intervention has shown that it is possible to increase awareness of negative-spontaneous self-talk and to promote belief in the potential of goal-directed self-talk to solve psychological challenges.

In summary, research has expanded our knowledge of self-talk antecedents. Although much research has been done with a self-talk model that differentiates between positive and negative self-talk, in this chapter we have succeeded in translating some key findings into the new self-talk framework. One might think that recognising spontaneous and goal-directed self-talk might invalidate earlier research, but we have come to appreciate reality as being closer to the opposite. The recent advances in conceptualization discussed in this book are in line with previous findings, reinforcing their value and, meanwhile, opening up new fascinating research questions for the future.

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Organic Self-Talk Questionnaire for Sport: Development and Validation of a Theory-Based, State Measure of Athletes' Organic Self-Talk

Research Article Submitted for Publication

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Abstract

This paper outlines the development and initial validation of the Organic Self-Talk Questionnaire for Sport (OSTQS), a new theory-grounded, self-report measure, designed to assess the content and the structure of athletes' organic self-talk (i.e., uncontrolled/spontaneous and controlled/goal-directed self-talk) in a state level during sport participation. Two studies were conducted. In the first study, a prospective instrument was developed based upon (a) the operational definitions of athletes' spontaneous and goal-directed self-talk in sport, and (b) raw data collected from athletes in this study through open-ended questionnaires and semi-structure interviews. In the second study, the psychometric properties of the developed questionnaire were tested through examination of factorial validity, discriminant validity, and reliability. Confirmatory factor analyses (CFA) revealed (a) an adequate fit of a 17-item four-factor correlated model for spontaneous self-talk and a 28-item seven-factor correlated model for goal-directed self-talk; as well as (b) the superiority of these models over to their respective single-factor and hierarchical models. Furthermore, discriminant validity and reliability analyses of the subscale scores provided further evidence regarding the psychometric integrity of the instrument. The results of this study confirm previous research evidence regarding the multidimensionality of athletes' self-talk, indicating that OSTQS is a valid and reliable scale that could help us further enhancing our understanding regarding athletes' organic self-talk, its antecedents, and its consequences.

Keywords: inner speech, automatic self-talk, spontaneous self-talk dimensions, goal-directed self-talk functions, scale development, psychometrics

Introduction

People experience approximately 4,000 thoughts on a 16-hour day (Clark & Rhyno, 2005), and thoughts in the form of inner conversation deluge our mind. Almost 96% of adults reported that talk to themselves (Winsler et al., 2006), engaging in what is called internal dialogue, inner speech, or self-talk. Even though, most of the times we do not realize this internal dialogue, and much more its content, according to cognitive behavioral theories (Ellis, 1994; Meichenbaum, 1977) it influences our emotions, our behavior, while sometimes it may prevent us from performing our best. Although various terms have been used in general psychology to describe this internal dialogue such as: automatic thoughts, internal dialogue, inner conversation, self-statements, self-verbalizations, self-instructions, and many others descriptions, in the sport psychology literature the term self-talk has been prevailed (Theodorakis et al., 2012).

In sport psychology, the systematic study of self-talk has started between the eighties and nineties of the 20th century. As with other underdeveloped areas within sport psychology, research on self-talk faced several challenges, due to among other reasons, the vague definition and a lack of theory behind self-talk research (Latinjak, Hatzigeorgiadis, et al., 2019). However, in recent years, the research on self-talk in sport psychology has expanded rapidly, and the relevant literature has developed substantially. The three major developments within the self-talk literature in sport psychology include: (a) the identification of two distinct self-talk entities, namely organic self-talk and strategic self-talk (Latinjak, Hatzigeorgiadis, et al., 2019); (b) the passage from purely data-driven approaches (e.g., Theodorakis et al., 2008; Zourbanos et al., 2009) to theory-driven approaches into the study, understanding, and classification of self-talk in sport, and especially organic self-talk (Latinjak et al., 2014; Van Raalte et al., 2016); and (c) the development of new conceptualizations of self-talk in sport (Latinjak et al., 2014; Van Raalte et al., 2016).

Self-talk Entities

With regard to the first development, Latinjak, Hatzigeorgiadis, et al. (2019) identified two distinct self-talk entities, which were initially reflected in two different research perspectives (Theodorakis et al., 2012) in the study of self-talk in sport. The first entity, introduced by the authors as *organic* self-talk, previously also called as *automatic* (Zourbanos et al., 2009) or *spontaneous* self-talk (Van Raalte et al., 2014), refers to self-talk as inherent self-statements that athletes address to themselves, mostly during sport performance. In this case, self-talk, either represents psychological processes or emanates from metacognitive knowledge and skills (Latinjak, Hatzigeorgiadis, et al., 2019). Specifically, according to Latinjak, Hardy, et al. (2020) organic self-talk is the result of inherent psychological and cognitive processes, and not part of a psychological intervention, even though it may be indirectly influenced by interventions, like cognitive-behavioral therapy or mindfulness-acceptance approaches.

The second self-talk entity identified by Latinjak, Hatzigeorgiadis, et al. (2019) was termed *strategic self-talk* (Theodorakis et al., 2012) and was described as the use of predetermined cue words and phrases, mostly developed through interventions, that athletes address to themselves, with the aim of enhancing performance or achieving other related performance outcomes. In this case, self-talk stems from adherence to strategic plans and is based on memory (Latinjak, Hatzigeorgiadis, et al., 2019).

Theory-Driven Approaches into the Study of Self-Talk in Sport

With regard to the second development, that is the transition from the purely data-driven approaches (e.g., Theodorakis et al., 2008; Zourbanos et al., 2009) to the theory-driven approaches into the study and classification of self-talk in sport, and especially organic self-talk, the introduction of thought-processing theories is of particular importance for addressing the overlaps between the content and the functions of data-driven classifications of organic

self-talk. Particularly, although the content and the functions constitute separate dimensions of self -talk, data-driven classifications have sometimes blurred the boundaries between content and functions.

Previous research in psychology and the sport sciences have recurrently distinguished between (a) thought processes related to cognitive control, such as conscious, operant, reflexive, or goal-directed thinking, and (b) more automatic and uncontrolled processes, such as unconscious, respondent, or spontaneous thinking (Christoff, 2012; Klinger, 1977). According to Lieberman (2003) controlled thought processes typically require effort, intention, and awareness, tend to interfere with one another, and are usually experienced as self-generated thoughts. Conversely, automatic and uncontrolled processes occur without effort, intention, and awareness, tend to not interfere with one another, and are usually experienced as perceptions or feelings.

With regard to self-talk in sport, Van Raalte et al. (2016) adapted Kahneman's (2011) dual processing theory to explain the self -talk phenomenon in sport. They identified: (a) an intuitive type of self-talk (also called System I self-talk) that is fast, comes to mind spontaneously, and brings current experiences into awareness in a way that represents the immediate, emotionally-charged reaction to a situation; and (b) a rational type of self-talk (called, System II self-talk) which is slower, emotionally neutral, and is influenced by different perspectives and new information. In a similar vein, Latinjak and colleagues (Latinjak et al., 2014, 2017) adapted and modified Christoff's (2012) theoretical framework used in neuropsychology studies, into the organic self-talk paradigm used in sport psychology. This line of neuropsychological research distinguished between goal-directed (controlled) and undirected (uncontrolled) thought processes.

Using Christoff's (2012) terminology, Latinjak et al. (2014) distinguished between goal-directed self-talk, a controlled psychological process which deliberately and effortfully

used for self-regulation; and undirected self-talk, an uncontrolled psychological process which takes place automatically. In line with Christoff et al. (2011), Latinjak Hatzigeorgiadis, et al. (2019) described athletes' goal-directed self-talk as an expression of controlled mental process deliberately used toward solving a problem or making progress on a task, and it usually occurs during reasoning, problem-solving, and decision-making. Inversely, indirected self-talk refers to involuntary statements that appear unintentionally (Latinjak et al., 2014). Regarding to undirected self-talk subtypes, according to Latinjak et al. (2014) athletes' spontaneous self-talk refers to unintended, non-instrumental statements that come to mind unbidden and effortlessly, which are, however, linked to the task or activity at hand and relevant contextual stimuli. On the other hand, stimulus-independent statements refers to statements which are related to the sport context, however unrelated to the ongoing stimuli a person receives, whereas mind-wandering (also called task-unrelated thoughts; Christoff, 2012) refers to statements that are unrelated to the both sport context and the task at hand. Using this classification, research within the context of sport, has predominantly focused on spontaneous and goal-directed self-talk (Latinjak, Hatzigeorgiadis, et al., 2019).

Latinjak et al. (2014, 2017) described several differences between spontaneous and goal-directed self-talk in terms of structure, content, and nature. In terms of structure, spontaneous self-talk varies in terms of two dimensions: valence (from positive to negative) and time perspective (from past-related to future-related), whereas goal-directed self-talk varies in terms of two dimensions: time orientation (from past-oriented to future-oriented) and activation (from low to high). Although valence and arousal have previously been used in self-talk research in sport (Hardy et al., 2001), the identification of the two time dimensions (i.e., time perspective for spontaneous, and time orientation for goal-directed self-talk) is relatively new in sport psychology literature. Generally, the main difference between the two time dimensions lies in their foundation (Latinjak et al., 2017). Time perspective

distinguished between statements based on their content; whereas time orientation reflects the purpose or the function of the goal-directed statement.

Thus, with regard to their content, spontaneous self-talk mostly describes, evaluates and explains past outcomes, and makes predictions about future events. In contrast, goal-directed self-talk aims to control cognitive reactions and dysfunctional activated or deactivated affective states, and to promote functional activated and deactivated affective states, task instructions, and positive predictions about future. Overall, the structure and the content of spontaneous and goal-directed self-talk provided by Latinjak et al. (2014) has the potential to accommodate all self-statements, and does not simply reflect some categories of self-talk. Moreover, Latinjak, Torregrossa, et al. (2019) provided subsequently six subcategories of athletes' future-oriented goal-directed self-talk focusing on positive predictions, as it was found the most frequent goal-directed self-talk function used by basketball players in stereotypical competitive situations in order to self-regulate. These six subcategories of athletes' future-oriented goal-directed self-talk were: (a) up-regulating self-confidence, (b) down-regulating self-confidence, (c) promoting mastery goals, (d) promoting performance-approach goals, (e) promoting performance-avoidance goals, and (f) promoting intrinsic motivation.

With regard to differences between spontaneous and goal-directed in terms of nature, Latinjak, Corbalan-Frigola, et al. (2020) based on research evidence concluded that spontaneous self-talk can be viewed as a window into the athlete's mind as it informs, among other things, about athletes' performance beliefs, goal orientations, irrational beliefs, thoughts of disengagement, causal attributions of success, and of failure. Conversely, goal-directed self-talk is a rational process of thought that is deliberately used for self-regulation. Finally, according to Latinjak and Hatzigeorgiadis (2021) spontaneous self-talk is a kind biopsychological descriptor (like emotions, feelings, thoughts, etc.) that describes how people

are at certain moments, whereas goal-directed self-talk is a type of psychological skill (like guided imagery, concentration, etc.) that help people to regulate themselves.

Overall, the self-talk model presented by Van Raalte et al. (2016) and the organic self-talk framework outlined by Latinjak et al. (2014) share important similarities, such as the distinction between intuitive/spontaneous and rational/goal-directed self-talk. However, there is an important difference between the two approaches. Van Raalte et al. distinguished intuitive or System I self-talk from rational self-talk or System II self-talk, grouping strategic self-talk within the second category. On the other hand, Latinjak et al. within their conceptualization of organic self-talk distinguished spontaneous from goal-directed self-talk, leaving strategic self-talk used in interventions outside of their framework. As a result a theoretical debate has taken place between the two self-talk research groups, with regard to the better conceptualizations of self-talk in sport, where a main point of argument has been the distinction between strategic from naturally occurring organic self-talk. According to Van Raalte et al. (2019), there was a lack of theoretical clarity and empirical support to distinguish strategic self-talk from naturally occurring organic self-talk. Particularly, they argued that strategic self-talk has considerable overlap with organic, goal-directed self-talk, as both are predetermined, fixed, and typically said out loud. Consequently Van Raalte et al. claimed that these categories are not orthogonal, and that is useful to consider them as belonging to the same category. In response to Van Raalte et al.'s above comment, Latinjak, Hardy, et al. (2019) although agreed that strategic and goal-directed self-talk share some similarities, especially with regard to their aim for performance enhancement, they affirmed that they would never consider self-talk as belonging simultaneously to both categories. Particularly, according to their view, strategic and goal-directed self-talk differ in their origin and use. Although, the content and use of cue words or phrases in strategic self-talk are always predetermined and frequently fixed, athletes' decision to use goal-directed self-talk always

results from momentary events. Specifically, for goal-directed self-talk, the content is never predetermined, and the timing of self-statements is never prefixed but arises from ongoing cognitive self-regulatory processes. Inversely, strategic self-talk arises from predetermined plans.

Organic Self-Talk Assessment

According to Vygotsky (1986), “the area of inner speech is one of the most difficult to investigate” (p. 226). Consequently, the study of self-talk has faced plentiful methodological difficulties and challenges; and self-talk measurement has been itself a challenging research topic, mainly due to the often hidden and subjective nature of the phenomenon (Brinthaup et al., 2015). Similarly to the literature of cognitive assessment, in the field of sport psychology, various methods have been applied to identify and assess athletes’ organic self-talk, including think-aloud processes, private speech recordings, descriptive experience sampling, videotape reconstruction, interviews, self-monitoring, thought listing, self-report psychometric questionnaires and observational tools (Brinthaup & Morin, 2020). However, as in other areas of assessment across many fields, in sport psychology self-report psychometric questionnaires have been the most widely used form of assessing athletes’ organic self-talk (Van Raalte et al., 2019).

Briefly, initially athletes’ organic self-talk was measured via the Test of Performance Strategies-2 (TOPS-2), the Self-Talk Use Questionnaire (STUQ), the Self-Talk Questionnaire (S-TQ), and the Functions of Self-Talk Questionnaire (FSTQ); (for a review about athletes’ organic self-talk instruments, see Theodorakis et al., 2012). However, none of the above questionnaires actually assess the content and the structure of athletes’ organic self-talk, such as the Thought Occurrence Questionnaire for Sport (TOQS; Hatzigeorgiadis and Biddle, 2000) and the Automatic Self-Talk Questionnaire for Sports (ASTQS; Zourbanos et al., 2009). Karamitrou et al. (2020) in their review stated that a refinement of ASTQS is needed,

so that the measure takes into account the recent self-talk conceptualizations. In addition, as the majority of self-talk self-reports in sport, ASTQS is a trait measure of athletes' organic self-talk, as its validation was based on a trait approach (Zourbanos et al., 2009). Thus, the development of a state measure of athletes' organic self-talk will fill this gap in the assessment of athletes' organic self-talk, and also will help us to partially overcome the disadvantage of mnemonic biases, that all retrospective self-reports have, but mainly these which are based on a trait approach.

Present Research

Therefore, using Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary conceptual framework of organic self-talk in sport, the aim of this investigation was to develop and test the psychometrics properties of a theoretically-grounded instrument assessing the content and the structure of athletes' state organic self-talk, the Organic Self-Talk Questionnaire for Sport (OSTQS). We used Latinjak, Hatzigeorgiadis, et al.'s contemporary conceptual framework of organic self-talk in sport for the following reasons: First, it is purely a conceptual framework of organic self-talk in sport which in line with previous research literature (Theodorakis et al., 2012), distinguishes organic from strategic self-talk. In contrast, Van Raalte et al. (2016) in their theoretical framework, included strategic self-talk within the System II self-talk category, claiming that organic and strategic self-talk are not distinct orthogonal categories, and thus it is useful to view and examine them as belonging to the same category. Second, Latinjak, Hatzigeorgiadis, et al.'s conceptual framework of organic self-talk has been investigated and supported in several studies in the sport domain (e.g., Latinjak, 2018a, 2018b; Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014, 2017, 2018), whereas Van Raalte et al. (2016) theoretical framework has not yet been studied so much, although has received support (Hong et al., 2020), in the sport context.

The development of an instrument assessing the content and the structure of athletes' organic self-talk based on the contemporary conceptual framework of organic self-talk in sport, will offer us the opportunity to examine quantitatively the contemporary distinctions (i.e., undirected and goal-directed self-talk) of organic self-talk in sport and their classifications, and thus better understand the organic self-talk phenomenon in sport, its antecedents and its consequences related to sport performance. Finally, the OSTQS will help us to better identify and modify athletes' irrational or maladaptive organic self-talk, and also to develop more appropriate organic self-talk interventions aimed to change athletes' organic self-talk in effective directions (Karamitrou et al., 2020).

Study 1

The purpose of the first study was: (a) to explore the content and structure of athletes' undirected and goal-directed self-talk during training and competition, and (b) based on Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary conceptual framework of organic self-talk in sport, to develop a pool of items for a state measure of athletes' organic self-talk, that would be tested in the study 2. Item selection was based upon the operational definitions of athletes' spontaneous and goal-directed self-talk in sport and their respective subcategories (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014), and raw data collected from athletes in this study through open-ended questionnaires and semi-structure interviews.

Method

Description of Three Samples

The total sample in this study consisted of 537 athletes from different individual and team sports. Sample one completed a self-reported questionnaire immediately after the end of a competition, while the sample two completed the same self-reported questionnaire immediately after the end of a regular training. Finally, the athletes from the sample three were interviewed immediately after the end of their training or the end of a competition. For

more information about the description of the three samples, please see Supplementary File 1, pp. 88-89.

Sample One

The sample one consisted of 273 athletes (160 males and 113 females) with a mean age of 19.30 (\pm 8.20) years.

Sample Two

The sample two consisted of 254 athletes (165 males and 89 females) with a mean age of 19.16 (\pm 4.83) years.

Sample Three

The sample three comprised of 10 athletes (five males and five females; mean age 22.60 \pm 6.42 years; mean competitive experience 3.90 \pm 2.13 years).

Instruments

In this study we used a self-reported questionnaire or a semi-structured interview as the main methods of data collection, which are described in Supplementary File 1, pp. 89-94.

Procedure

Ethical approval was obtained from the University of Thessaly Ethics Committee for both of the studies reported in this paper. Athletes were recruited via sports clubs, administrators, and clubs coaches. The purpose and nature of the study was explained, and all were informed regarding the voluntary participation in the study, the participants' right to withdraw from the study at any time they wished to, and the anonymity and confidentiality of participants' answers. Subsequently, coach and athlete consent were provided prior to participation, while, parental consent was obtained for every athlete under the age of 16.

Data Analyses

To analyse participants' qualitative answers, we used Latinjak et al.'s (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014) contemporary conceptual framework of

organic self-talk in sport, and we performed qualitative content data analyses following the deductive approach, and especially the respective data categorization procedures employed by Latinjak and colleagues (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014). Our qualitative content data analyses are described in details in Supplementary File 2, pp. 96-99.

Results and Discussion

Our qualitative findings and their discussion are presented in Supplementary File 2, pp. 100-106.

The Development of OSTQS

With regard to the development of items for assessing athletes' indirect self-talk, we decided based on the frequencies of athletes' responses, to include in the developed scale only spontaneous statements (88.8%), and to exclude mind-wandering (7.5%), and stimulus-independent statements (3.7%). Moreover, previous research (Latinjak et al., 2018a, 2018b) has showed differences in the content, intentionality, and the distribution among the three types of undirected self-talk. Finally, besides the aforementioned reasons, the inclusion of mind-wandering and stimulus-independent statements into the developed scale may further reduce its psychometric properties, due to relative small numbers of mind-wandering and stimulus-independent statements collected in this study. Consequently, we decided to develop items assessing only athletes' state spontaneous self-talk. In order the developed spontaneous self-talk scale to combine both adequate psychometric properties and brevity, we decided, after agreement of all judges, to include in it, only the first four spontaneous self-talk categories (i.e., retrospective-negative self-talk, anticipatory-negative self-talk, retrospective-positive self-talk, and anticipatory -positive self-talk) with the highest observed frequencies, both in our study and also in previous research (Latinjak, Corbalan-Frigola et al., 2020; Latinjak et al., 2014, 2017). Thus, we developed a 20-item scale, the Spontaneous Self-Talk Scale (S-STs), comprising four subscales (five items per subscale) which assess four

dimensions of athletes' spontaneous self-talk state, namely: Retrospective-Negative Self-Talk, Anticipatory-Negative Self-Talk, Retrospective-Positive Self-Talk, and Anticipatory - Positive Self-Talk. Table 3.S1. in Supplementary File 3 (p. 109) presents the items developed for each subscale of S-STTS.

Regarding the development of items for assessing athletes' state goal-directed self-talk, we develop a 40-item scale, the Goal-Directed Self-Talk Scale (GD-STTS) that comprises seven subscales assessing the following seven functions of athletes' goal-directed self-talk: (a) Controlling Cognitive Reactions (5 items); (b) Controlling Dysfunctional Activated/Deactivated States (10 items); (c) Creating Functional Activated States (5 items); (d) Creating Functional Deactivated States (5 items); (e) Up-Regulating Self-Confidence (5 items); (f) Instruction (5 items); and (g) Promoting Goals and Intrinsic Motivation (5 items). Table 3.S2. in Supplementary File 3 (p. 110) presents the items developed for each subscale of GD-STTS.

For both S-STTS and GD-STTS, item selection was based upon on the frequency of athlete's self-statements observed in our study, as well as on the results of previous relevant self-talk research in sport (Latinjak, Corbalan-Frigola et al., 2020; Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014, 2017; Zourbanos et al., 2009). *Also, recommendations for items wording (e.g., DeVellis, 2012) were closely followed to maximize their clarity, their specificity, and their shortness. Moreover, care was taken to improve items generalisability across sports. Finally, based on Amsel and Fichten's (1998) recommendations regarding end points for self-statements inventories, and in consistency with previous measure of athletes' organic self-talk (ASTQS; Zourabanos et al., 2009), responses were given on a 5-point scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = very often).* Overall, a 60-item questionnaire was developed, the OSTQS which includes 11 subscales, four assessing athletes' state spontaneous self-talk (20 items), and

seven assessing athletes' state goal-directed self-talk (40 items). The initial 60-item OSTQS is listed in Supplementary File 3, pp. 111-113.

Study 2

The purpose of the second study was to test on a large sample, aspects of validity, and the reliability of the 60-item questionnaire that emerged from the previous study.

Method

Participants

The sample consisted of 691 athletes (363 males and 328 females) with a mean age of 21.65 (\pm 8.06) years (more information about the description of the sample is presented in Supplementary File 3, p. 114).

Measures

Demographic Form

Initially, the athletes completed a demographic form related to their sex, age, sport participation, sport and competitive experience, competitive level, and so forth.

OSTQS

The 60-item OSTQS (Supplementary File 3, pp. 111-113) developed in Study 1 was used to assess athletes' organic self-talk.

Data Analysis

The factorial validity of the developed questionnaire was examined via Confirmatory Factor Analysis (CFA) using the SPSS statistical program AMOS 22 (Arbuckle, 2013). The use of CFA is recommended when there is a theoretical base for the hypothesized model (Williams, 1995), as in the current research. Fit indices were used to assess the adequacy of the tested models because they appear to be more accurate at rejecting misspecified models (for more information, see Supplementary File 3, pp. 114-116).

Results and Discussion

Distribution of the OSTQS Items

For more information about the distribution of the OSTQS items, please see Supplementary File 3, p. 116.

Factorial Validity, Reliability, and Discriminant Validity of the S-STS

The hypothesized correlated four-factor, first-order model of state spontaneous self-talk (Figure 3.1. in Supplementary File 3, p. 117) was examined and results of the initial CFA indicated poor model fit: $\chi^2 (164, N = 691) = 982.43, p < 0.001, CFI = .84, TLI = .81, RMSEA = .08, RMSEA 90\% CI [.08, .09]$. Model misspecification was identified through assessments of standardized factor loadings, modification indices, and standardized residuals. More specifically, item 20 (“What will others think of my poor performance”) had a low standardized factor loading (.31) on Negative Anticipatory Self-Talk factor that it was designed to measure, and it also reduced the Cronbach's alpha of this subscale. Moreover, the large modification index (29.60) related to the factor loading of item 20 on Retrospective Negative Self-Talk factor suggested that the item 20 could load more appropriately on Retrospective Negative Self-Talk factor (expected parameter change = .37), instead for the Anticipatory Negative Self-Talk factor that it was designed to measure. Thus, in the first re-specified model of factorial structure of spontaneous self-talk, item 20 was specified to load on the Retrospective Negative Self-Talk factor, instead for the Anticipatory Negative Self-Talk. The findings from the estimation of this re-specified model revealed a slight improvement to model fit : $\chi^2 (164, N = 691) = 916.58, p < 0.001, CFI = .85, TLI = .82, RMSEA = .08, RMSEA 90\% CI [.08, .09]$, whereas the standardized factor loading of item 20 on Retrospective Negative Self-Talk factor increased to .45 from .31 that was for the Anticipatory Negative Self-Talk factor .

Further examination of the modification indices and standardized residuals identified three additional items as problematic. These were: the anticipatory negative self-talk item 4 (“I am going to fail”); the retrospective negative self-talk item 10 (“I should have been better”), and the anticipatory positive self-talk item 15 (“Today will be my day”). The above items were removed in three subsequent re-specified and re-estimated models (one item per model), because the estimation of modification indices in Amos is based on a univariate approach and making a single change to a model can lead to a completely different set of modification indices values (Byrne, 2010). The final four-factor correlated model demonstrated an acceptable fit to the data: $\chi^2 (113, N = 691) = 420.94, p < 0.001, CFI = .92, TLI = .91, RMSEA = .06, RMSEA 90\% CI [.06, .07]$ and included 17-items assessing the following four dimensions of athletes' spontaneous self-talk state: Retrospective-Positive Self-Talk (five items), Anticipatory-Positive Self-Talk (four items), Retrospective-Negative Self-Talk (five items), and Anticipatory-Negative Self-Talk (three items). Table 3.1. displays the descriptive statistics and the standardized factor loadings (with their 95% bias-corrected bootstrap CI and bootstrap standard errors) for each spontaneous self-talk item in the final four-factor model. All items loaded on their respective factors significantly and well (loadings ranging from .44 to .85) with relatively low errors, which in addition to the adequacy of the fit indices, support the hypothesized factor structure of the S-STS. The final 17-item S-STS is listed in Supplementary File 4, p. 120.

Descriptive statistics, Cronbach's alpha, and standardized factor correlations (with their bootstrap standard errors) for all S-STS subscales are presented in Table 3.2. Descriptive statistics indicated the highest scores on athletes' positive self-talk and particularly on the Anticipatory Positive Self-Talk subscale, and the lowest on athletes' negative self-talk, and particularly on the Anticipatory Negative Self-Talk subscale of S-STS. Internal consistency was acceptable for all the subscales, with Cronbach's alpha varying from

.75 to .82. Factor correlations ranged from low (-.29) to high (.74), and all were in the expected directions, however none of the 95% bias-corrected bootstrap CI of the interfactor correlations encompassed ± 1.0 (range = -.55 to .81). This result provided evidence for the discriminant validity of the S-STTS scores.

To further examine the latent structure of the 17-item S-STTS, we also tested a hierarchical model in which the four first-order latent factors were represented by one higher-order latent factor. The results showed that the fit for the hierarchical model, was just under acceptable levels: $\chi^2 (115, N = 691) = 517.39, p < 0.001, CFI = .90, TLI = .88, RMSEA = .07, RMSEA 90\% CI [.065, .078]$, and thus worse to that of the first-order model. A one-factor model was also tested, where all items were hypothesized to load on a single spontaneous self-talk factor and this produced a very poor fit to the data: $\chi^2 (120, N = 691) = 1,920.98, p < 0.001, CFI = .55, TLI = .49, RMSEA = .15, RMSEA 90\% CI [.14, .15]$. Overall, our results indicated that the 17-item correlated four-factor model of state spontaneous self-talk was the only model that fit the data adequately, and statistically better than the alternative models. Thus, our results suggest that spontaneous self-talk is a multidimensional construct represented by a number of separate, but related spontaneous self-talk dimensions.

Factorial Validity, Reliability, and Discriminant Validity of the GD-STTS

The hypothesized correlated seven-factor, first-order model of state goal-directed self-talk (see Figure 3.2. in Supplementary File 3, p. 118) was examined and results of the initial CFA demonstrated a poor model fit to the data: $\chi^2 (719, N = 691) = 3,058.69, p < 0.001, CFI = .82, TLI = .80, RMSEA = .07, RMSEA 90\% CI [.066, .071]$. Except for the above hypothesized seven-factor model, we also tested a hypothesized correlated eight-factor, first-order model of state goal-directed self-talk, in which the Controlling Dysfunctional Activated/Deactivated States factor was divided into two separate factors: a) the Controlling Dysfunctional Activated States factor which contained items 2, 10, 18, 26, and 34; and b) the

Controlling Dysfunctional Deactivated States factor which contained items 3, 11, 19, 27, and 35. Again, items were only allowed to load on their intended factor, factors were allowed to correlate, whereas error terms were not, and for purposes of identification and latent variable scaling, one item from each factor was fixed to 1.0. In support of our hypothesized correlated seven-factor model of state goal-directed self-talk, the CFA of eight-factor correlated model, showed that the solution was not admissible due to a non-positive definite latent variable covariance matrix.

To screen for the correlated seven-factor model of goal-directed self-talk misspecification, again we examined standardized factor loadings, standardized residuals, and modification indices. Overall, large standardized residuals ($> \pm 2.58$) and large modification indices suggesting that the error term of an item correlated with that of another item, identified 12 items as problematic. These items were: (a) item 1 (“It does not matter. You will make it the next time”) from Controlling Cognitive Reactions factor; (b) item 2 (“Do not be anxious”), item 18 (“Do not be angry”), item 34 (“Do not be nervous”), item 3 (“Do not give up”), item 11 (“Do not relax”) and item 19 (“Do not stop”) from Controlling Dysfunctional Activated/Deactivated States factor; (c) item 12 from Creating Functional Deactivated States factor (“Relax”); (d) item 21 from Creating Functional Activated States factor (“Try more”); (e) item 6 from Instruction factor (“Concentrate”); (f) item 31 (“You are very well prepared”) from Up-Regulating Self-Confidence factor; and (g) item 40 (“The goal is to enjoy the competition/training”) from Promoting Goals and Intrinsic Motivation factor. The above 12 items deleted in 12 re-specified and re-estimated models (one item per model), as the estimation of modification indices in Amos is based on a univariate approach and making a single change to a model can lead to a completely different set of modification indices values (Byrne, 2010).

The final 28-item correlated seven-factor model of goal-directed self-talk displayed an acceptable fit to the data: $\chi^2(329, N = 691) = 1,064.06, p < 0.001, CFI = .92, TLI = .90, RMSEA = .06, RMSEA\ 90\% CI [.05, .06]$ and included seven 4-item factors, namely: Controlling Cognitive Reactions, Controlling Dysfunctional Activated/Deactivated States, Creating Functional Deactivated States, Creating Functional Activated States, Instruction, Up-Regulating Self-Confidence, and Promoting Goals. Table 3.3. displays the descriptive statistics and the standardized factor loadings (with their 95% bias-corrected bootstrap CI and bootstrap standard errors) for each goal-directed self-talk item at the final 28-item seven-factor model. As can be seen in Table 3.3., all items loaded on their intended factors significantly and well (factor loadings ranged from .50 to .84), with relatively low errors, which, in addition to the adequacy of the fit indices, support the hypothesized factor structure of the GD-STS. The final 28-item GD-STS is listed in Supplementary File 4, p. 121.

Descriptive statistics, Cronbach's alpha, and standardized factor correlations (with their bootstrap standard errors) for all GD-STS subscales are presented in Table 3.4. Descriptive statistics indicated the highest scores on the Creating Functional Activated States and Up-Regulating Self-Confidence subscale, and the lowest on the Controlling Cognitive Reactions subscale of the GD-STS. Internal consistency was acceptable for all the subscales, with Cronbach's alpha varying from .74 to .82. Factor correlations ranged from low (.30) to high (.89), and all were significant, and in the expected directions (see Table 3.4.). However, none of the 95% bias-corrected bootstrap CI of the interfactor correlations encompassed ± 1.0 (range = .21 to .94), thus supporting the discriminant validity of the GD-STS scores.

To further examine the latent structure of the 28-item GD-STS we also tested a hierarchical model, in which the seven first-order latent factors were represented by one higher-order latent factor. The results showed that the fit for the hierarchical model was worse to that of the first-order model: $\chi^2(343, N = 691) = 1,396.18, p < 0.001, CFI = .88,$

TLI=.87, RMSEA = .07, RMSEA 90% CI [.063, .070]. Also, a one-factor model was tested where all items were hypothesized to load on a single goal-directed self-talk factor and this produced a very poor fit to the data: $\chi^2 (350, N = 691) = 2,794.33, p < 0.001, CFI = .72, TLI=.70, RMSEA = .10, RMSEA 90\% CI [.097, .104]$. Overall, our results indicated that the 28-item correlated 7-factor model of goal-directed self-talk was the only model that fit the data adequately and statistically better than the alternative models. Therefore, as in the case of spontaneous self-talk, our results suggests that goal-directed self-talk is a multidimensional construct represented by a number of separate, but related goal-directed self-talk dimensions/functions.

Overall, the final OSTQS (see Supplementary File 4, pp. 120-121) consists of 45 items, 17 assessing four dimensions of athletes' state spontaneous self-talk, and 28 assessing seven dimensions/functions of athletes' state goal-directed self-talk.

General Discussion

The aim of the present investigation was to develop and test the psychometrics properties of a theoretically-grounded questionnaire assessing the content and the structure of athletes' state organic self-talk, based on Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary conceptual framework of organic self-talk in sport. Two studies were conducted. In the first study, we explored the content and the structure of athletes' undirected and goal-directed self-talk during training and competition, and we developed a pool of items for the state measure of athletes' organic self-talk. Item selection was based on the operational definitions of athletes' spontaneous and goal-directed self-talk in sport and their respective subcategories (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014), and raw data collected from athletes in our study via open-ended self-report questionnaires and semi-structure interviews. In the second study, we examined the psychometrics properties of the

60-item questionnaire that emerged from study 1, and we performed some descriptive analyses.

More specifically, in study 1, following the data categorization procedures for athletes' spontaneous and goal-directed self-talk, we developed a 20-item scale assessing athletes' state spontaneous self-talk, the S-STS; and a 40-item scale assessing athletes' state goal-directed self-talk, the GD-STS. The S-STS consisted of four subscales (five items per subscale) that assess four dimensions of athletes' state spontaneous self-talk, namely: Retrospective-Positive, Retrospective-Negative, Anticipatory-Negative, and Anticipatory-Positive Self-Talk. On the other hand, the GD-STS comprises seven subscales assessing the following seven functions of athletes' state goal-directed self-talk, namely: Controlling Cognitive Reactions (5 items); Controlling Dysfunctional Activated/Deactivated States (10 items); Creating Functional Activated States (5 items); Creating Functional Deactivated States (5 items); Up-Regulating Self-Confidence (5 items); Instruction (5 items); and Promoting Goals and Intrinsic Motivation (5 items).

The purpose of Study 2 was to examine aspects of validity and the reliability of the two scales developed in study 1. With regard to the factorial validity of the two scales, the CFAs revealed satisfactory fit indices for the revised 17-item four-factor correlated model of S-STS, and the revised 28-item seven-factor correlated model of GD-STS. The factorial validity of the revised 17-item S-STS and the revised 28-item GD-STS, were accompanied also by evidence regarding their convergent validity, via indicating the statistical superiority of the revised 17-item four-factor correlated model of S-STS, and the revised 28-item seven-factor correlated model of GD-STS, compared to their respective single-factor and hierarchical models. In addition, the discriminant validity analyses supported the separability of the four factors for the revised S-STS responses, and the separability of the seven factors for the revised GD-STS responses, indicating that the items operate as indicators of distinct

constructs. Taken together, our results suggest that athletes' spontaneous and goal-directed self-talk are multidimensional constructs that are best represented by a number of separate, but related spontaneous or goal-directed self-talk dimensions. Finally reliability analyses provided support for the internal consistency of the S-STTS and GD-STTS.

Examination of the descriptive statistics for spontaneous self-talk, indicated that participants had the highest scores on positive self-talk and particularly on the anticipatory positive self-talk, and the lowest scores on negative self-talk, and particularly on the anticipatory negative self-talk. These results are in line with previous quantitative self-talk research in sport (Hardy et al., 2005; Zourbanos et al., 2009) which showed that athletes used more positive self-talk and less negative self-talk. Moreover, with the addition of the time perspective dimension into the classification and the assessment of athletes' spontaneous self-talk, the above results come to add to our previous knowledge that athletes use more anticipatory positive than retrospective positive self-talk, and more retrospective negative than anticipatory negative self-talk.

Examination of descriptive statistics of goal-directed self-talk functions, indicated the highest scores on creating functional activated states, up-regulating self-confidence, and instruction functions, followed by promoting goals, creating functional deactivated states, controlling dysfunctional activated/deactivated states, and controlling cognitive reactions functions of self-talk. Similar results were also reported by previous quantitative research which assess athletes' self-talk on a contextual level. Particularly, Zourbanos et al. (2009) similarly to our study, found the highest scores on psych up and instruction, followed by confidence, and anxiety control dimensions of ASTQS. Likewise, Theodorakis et al. (2008) reported the athletes' highest scores on effort and attention, followed by confidence, cognitive and emotional control, and automaticity functions of self-talk. Finally, Hardy et al. (2005) found that among the self-talk functions that athletes had the highest scores were the

psych up, motivation, instruction, and focus functions, followed by nerve control, relaxation, and goal functions of self-talk. Comparing the OSTQS with the ASTQS (Zourbanos et al., 2009), we can identify both similarities and differences between the two measures of athletes' organic self-talk. For more information see Supplementary File 4, pp. 122-125.

Limitations and Future Validation

One methodological limitation with regard to the present research and measure of self-talk is the use of self-reports. Particularly, with regards to the assessment of self-talk, according to Zourbanos et al. (2009) verbal reports are related with cognitive processes that sometimes may be beyond meta-conscious control, and thus cannot be described by the individuals. Moreover, as self-reports are relied on one's memory, sometimes the information may have been forgotten or recalled inaccurately (Nisbett & Wilson, 1977). However, in our studies the time elapsed since the athletes' actual self-talk occurred, was remarkably shorter (just after the training or the competition) compared to previous studies (one month; e.g., Latinjak et al., 2014; Zourbanos et al., 2009). Another important limitation of most assessments based on self-reports is that they are susceptible to socially desirable responses (Zourbanos et al., 2009). To minimize the likely effects of social desirability, participants received instructions aiming at reducing their socially desirable responses. Nevertheless, further validation of the instrument could consider the effects of social desirability. Overall, and despite the above self-reports limitations, cognitive processes cannot still be accurately assessed through objective methods, and thus the use of self-reports provide us with metacognitive knowledge which can help us understand individuals' perceptions, motives, and cognitions (Guerrero, 2005). Finally, all thought-sampling procedures have limitations (Guerrero, 2005), mainly due to the often hidden and subjective nature of the phenomenon (Brinthaup et al., 2015). Therefore, the use of multiple data sampling procedures with

different respective advantages and limitations has been advocated (Latinjak, Hardy, et al., 2019).

When examine the psychometric properties of a new measure it is not possible to test all types of validity in a single research. Thus, future research could examine the concurrent, predictive, and incremental validity of the current instrument. Moreover, the measurement invariance of OSTQS scores across gender, sport type, age, competitive level, and competitive experience could also be examined in future studies. Finally, the development and the examination of psychometric properties of OSTQS were achieved in the current investigation using samples of Greek-speaking individuals. Thus, future researchers may translate the OSTQS into different languages, and examine the psychometric properties of these translated versions using participants from different nations and sociolinguistic groups. These translated versions of the OSTQS will further allow us to test in future research the measurement invariance of OSTQS scores across cultures.

Conclusion

In conclusion, the OSTQS is a theory-grounded, multidimensional, state measure of athletes' organic self-talk, that captures according to the contemporary conceptual framework of organic self-talk in sport (Latinjak, Hatzigeorgiadis, et al., 2019) two major types of athletes' organic self-talk: spontaneous (uncontrolled) self-talk, via the assessment of four spontaneous self-talk dimensions; and goal-directed (controlled) self-talk via the assessment of seven goal-directed dimensions/functions. Our results provide initial support for various psychometric properties of the OSTQS, indicating it as a valid and reliable instrument for the assessment of athletes' organic self-talk in sport. Future researchers could take advantage of this instrument for the comprehensive study of athletes' organic self-talk, its antecedents, its consequences, as well as for the development and application of effective organic self-talk interventions.

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Table 3.1.

Descriptive Statistics of Spontaneous Self-talk Items, Standardized Factor Loadings [with their 95% Bias-Corrected Bootstrap Confidence Intervals], and their Bootstrap Standard Errors, at the Final 17-Item Four-Factors Model (Study 2)

Factors and Items	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	<i>SL</i> [95 % Bias-Corrected Bootstrap CI]	Bootstrap <i>SE</i>
Retrospective Positive Self-Talk						
I have performed well (1)	2.70	.92	-.43	-.03	.62 [.56, .68]	.03
I have achieved it (5)	2.67	1.00	-.60	.04	.74 [.69, .79]	.02
Perfectly (9)	2.40	1.18	-.41	-.66	.65 [.59, .71]	.03
My efforts have been rewarded (13)	2.19	1.12	-.20	-.51	.57 [.50, .64]	.04
I have become better (16)	2.64	.92	-.46	.09	.58 [.51, .65]	.04
Anticipatory Positive Self-Talk						
I will do well (3)	2.90	1.03	-.85	.22	.72 [.65, .77]	.03
I will win (7)	2.84	1.11	-.81	.01	.63 [.56, .69]	.03
I can do it (11)	3.35	.83	-1.28	1.58	.69 [.62, .74]	.03
I will succeed (15)	3.00	.91	-.77	.35	.80 [.74, .85]	.03
Retrospective Negative Self-Talk						
I'm wrong again (2)	2.22	1.00	.02	-.56	.58 [.50, .65]	.04
I have failed (6)	1.26	1.04	.51	-.39	.64 [.57, .70]	.03
Today I have performed very poorly (10)	1.71	.98	.19	-.16	.71 [.64, .77]	.03
I am worthless (14)	.63	1.00	1.65	2.03	.72 [.65, .79]	.04
What will others think of my poor performance (17)	1.65	1.26	.30	-.91	.44 [.37, .52]	.04
Anticipatory Negative Self-Talk						
I want to give up (4)	.78	1.03	1.29	.99	.85 [.79, .89]	.02
I will stop (8)	.68	.96	1.50	1.81	.81 [.76, .86]	.03
I can't take it anymore (12)	1.18	1.12	.84	-.01	.69 [.63, .75]	.03

Note. All factor loadings are statistically significant at $p < 0.001$. *SL* = Standardized Factor Loadings; CI = Confidence interval. Number in the parentheses

represents the number of an item in the final 17-item scale.

Table 3.2.

Descriptive Statistics, Cronbach's Alpha, and Standardized Factor Correlations (with their Bootstrap Standard Errors) for All Subscales of the Final 17-Item Spontaneous Self-Talk Scale (S-STSS) in Study 2

Subscales	Descriptive Statistics		Cronbach's Alpha	Correlations			
	<i>M</i>	<i>SD</i>		1	2	3	4
1. Retrospective Positive Self-Talk	2.52	.75	.77	-			
2. Anticipatory Positive Self-Talk	3.03	.76	.79	.74 (.04)	-		
3. Retrospective Negative Self-Talk	1.49	.75	.75	-.41 (.05)	-.45 (.06)	-	
4. Anticipatory Negative Self-Talk	.88	.89	.82	-.29 (.05)	-.31 (.05)	.58 (.05)	-

Note. Bootstrap standard errors of the correlations are presented in parentheses. All factor correlations are statistically significant at $p < 0.001$.

Table 3.3.

Descriptive Statistics of Goal-Directed Self-talk Items, Standardized Factor Loadings [with their 95% Bias - Corrected Bootstrap Confidence Intervals], and their Bootstrap Standard Errors, at the Final 28-Item Seven-Factors Model (Study 2)

Factors and Items	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	<i>SL</i> [95 % Bias - corrected bootstrap CI]	Bootstrap <i>SE</i>
Controlling Cognitive Reactions						
It does not matter. No one is perfect (1)	1.64	1.30	.30	-1.01	.75 [.69, .79]	.03
It is only a game/race/training (9)	1.64	1.33	.27	-1.10	.51 [.44, .57]	.04
Everyone can have a bad day (17)	1.95	1.12	.02	-.70	.72 [.66, .77]	.03
Everyone makes mistakes (23)	1.91	1.18	.03	-.79	.84 [.79, .88]	.02
Controlling Dysfunctional Activated/Deactivated States						
Do not be afraid (2)	2.12	1.43	-.13	-1.31	.67 [.62, .72]	.03
Do not worry (10)	1.91	1.23	.04	-.93	.78 [.73, .82]	.02
Do not be disappointed (3)	2.14	1.21	-.18	-.83	.76 [.71, .81]	.02
Do not quit (11)	2.30	1.39	-.33	-1.13	.60 [.54, .66]	.03
Creating Functional Deactivated States						
Calm down (4)	2.71	1.20	-.72	-.38	.65 [.58, .71]	.03
Be patient (12)	2.63	1.23	-.60	-.59	.61 [.55, .68]	.03
Keep calm (18)	2.38	1.25	-.41	-.77	.77 [.71, .81]	.03
Take a deep breath (24)	2.36	1.29	-.33	-.96	.58 [.51, .64]	.03
Creating Functional Activated States						
Let's go (5)	3.07	1.12	-1.17	.61	.70 [.64, .76]	.03
Give it all (13)	3.15	1.04	-1.28	1.18	.72 [.65, .77]	.03
Keep going (19)	3.02	0.99	-1.09	.99	.73 [.67, .78]	.03
Strong (25)	2.94	1.13	-1.06	.44	.70 [.64, .76]	.03
Instruction						
Focus on your technique/tactic (6)	2.97	1.07	-.98	.37	.65 [.58, .71]	.03
Concentrate on your goal (14)	2.95	1.05	-.97	.48	.76 [.71, .81]	.03
Focus on what you need to do now (20)	2.86	1.04	-.87	.42	.75 [.70, .80]	.03
Pay attention (26)	2.47	1.18	-.51	-.46	.69 [.63, .74]	.03
Up-Regulating Self-Confidence						

You will do well (7)	2.87	1.08	-.87	.18	.75 [.70, .80]	.03
You can do it (15)	3.16	0.97	-1.13	.83	.73 [.67, .78]	.03
You are strong (21)	2.71	1.22	-.78	-.24	.74 [.69, .78]	.02
Believe in yourself (27)	2.77	1.28	-.79	-.47	.71 [.66, .76]	.03
Promoting Goals						
The goal is to perform well (8)	2.61	1.22	-.63	-.52	.73 [.68, .78]	.03
The goal is your personal improvement (16)	2.88	1.16	-.95	.11	.68 [.61, .73]	.03
The goal is to win (22)	2.45	1.32	-.43	-.95	.50 [.42, .57]	.04
The aim is to achieve your goal (28)	2.70	1.18	-.69	-.35	.77 [.73, .82]	.02

Note. All factor loadings are statistically significant at $p < 0.001$. *SL* =Standardized factor loadings; *CI* = Confidence interval. Number in the parentheses

represents the number of an item in the final 28-item scale.

Table 3.4.

Descriptive Statistics, Cronbach's Alpha, and Standardized Factor Correlations (with their Bootstrap Standard Errors) for All Subscales of the Final 28-Item Goal-Directed Self-Talk Scale (GD-STS) in Study 2

Subscales	Descriptive Statistics		Cronbach's Alpha	Correlations							
	<i>M</i>	<i>SD</i>		<i>α</i>	1	2	3	4	5	6	7
1. Controlling Cognitive Reactions	1.78	.97	.79	-							
2. Controlling Dysfunctional Activated/Deactivated States	2.12	1.03	.79	.63 (.04)	-						
3. Creating Functional Deactivated States	2.52	.93	.74	.51 (.05)	.85 (.03)	-					
4. Creating Functional Activated States	3.04	.86	.81	.30 (.05)	.65 (.04)	.62 (.05)	-				
5. Instruction	2.81	.86	.80	.41 (.04)	.68 (.03)	.65 (.04)	.82 (.03)	-			
6. Up-Regulating Self-Confidence	2.88	.92	.82	.41 (.04)	.73 (.03)	.57 (.04)	.89 (.03)	.76 (.03)	-		
7. Promoting Goals	2.66	.93	.76	.45 (.05)	.60 (.04)	.50 (.05)	.76 (.04)	.80 (.04)	.80 (.03)	-	

Note. Bootstrap standard errors of the correlations are presented in parentheses. All factor correlations are statistically significant at $p < 0.001$.

Supplementary File 1

Description of Three Samples in Study 1

Sample One

The sample one consisted of 273 athletes (160 males and 113 females) with a mean age of 19.30 (\pm 8.20) years. They competed in 12 different team (basketball, football, volleyball, handball, water polo and rowing: $n = 96$) and individual (tennis, badminton, taekwondo, swimming, cycling, and athletics: $n = 177$) sports. At the data collection time, all athletes were active at regional or higher level of competition. In particular, 31.2% were competing at international level, 47.6% athletes were competing at national level, and 21.2% were competing at regional or county level. The mean competitive experience of the participants was 6.34 (\pm 4.18) years.

Sample Two

The sample two consisted of 254 athletes (165 males and 89 females) with a mean age of 19.16 (\pm 4.83) years. They competed in 19 different team (football, basketball, volleyball, water polo, hockey, and handball: $n = 129$) and individual (athletics, swimming, finswimming, rhythmic gymnastics, tennis, badminton, taekwondo, karate, boxing, kickboxing, fencing, pankration, and shooting $n = 125$) sports. With regard to their competitive level, 5.5% of them had competed at international level, 46.5% at national level, and 48.0% at regional or county level. Finally, the mean competitive experience of the participants was 6.52 (\pm 5.08) years.

Sample Three

The sample three comprised of 10 athletes (five males and five females; mean age 22.60 \pm 6.42 years; mean competitive experience 3.90 \pm 2.13 years) representing a variety of individual (athletics, tennis, and badminton: $n = 5$) and team (football, basketball, volleyball, water polo, and rowing: $n = 5$) sports. In particular, we interviewed five athletes immediately

after their regular training (three males and two females; mean age 19.20 ± 3.90 years; mean competitive experience 5.00 ± 1.58 years). With regard to their competitive level, one of them had competed at international level, two at national level, and two at regional or county level. Also we interviewed five athletes immediately after a competition (two males and three females; mean age 26.00 ± 6.96 years; mean competitive experience 3.20 ± 1.79 years). Finally, regarding to their competitive level, one of them had competed at international level, one at national level, and three at regional or county level.

Instruments in Study 1

Self-Reported Questionnaire

The samples one and two completed immediately after the end of their competition and their regular training respectively, a self-reported questionnaire consisted of four parts (the self-reported questionnaire listed in Supplementary File 1, p. 91-94). Particularly, the first part contained a demographic form related to athletes' sex, age, sport participation, sport and competitive experience, competitive level, and so on. The second part contained a thought listing technique in which athletes were asked to write down within three minutes, any thought and/or internal talk they had experienced during the competition or training they just had participated in. As in Zourbanos et al.'s (2009) study, the procedure was based on Cacioppo and Petty's (1981) and Glass and Arnkoff's (1997) recommendations on thought listing technique and retrospective recalls, regarding both the instructions provided, as well as the amount of time allowed for athletes to report their thoughts. Cacioppo and Petty (1981) recommended a three minute period for thought listing, because if the most salient thoughts are desired, which was our goal in this study, then a brief interval is better than a long one. In contrast, if the interval is too long participants have the time to generate, select and maybe delete some of their responses.

The third part of the questionnaire contained an open-format self-talk listing self-report consisted of five columns. Particularly, in order to explore athletes' organic self-talk in a variety of sport-related situations, the first column included a variety of emotions that athletes may experience during training or competition such as sadness, anger, anxiety, excitement, fear, shame, guilt, and so forth. Previous research (Latinjak et al., 2020, 2017, 2014) has shown that the use of emotion-elicited situations is an effective method to facilitate participants recalling their undirected and goal-directed self-talk in a variety of sport-related situations. Thus, according to the written instructions provided, athletes were asked to read each emotion and check it if they had experienced it during the competition or training they had just participated in. Once they had experienced one of the emotions included in the first column, participants were asked to go on with the completion of the next respective columns. Specifically, in the second column they were asked to briefly describe the sport-related situation in which the specific emotion has occurred, while in the third column they were asked to write down what exactly they had said to themselves before they started to feel this emotion. In the fourth column they were asked if they said to themselves anything else as a response-reaction to the thoughts or self-statements of the third column, and if yes, they were asked to write down what exactly they said to themselves. Finally, in the fifth column they were asked to write down how finally they behaved in this emotional situation.

Lastly, the fourth part of the self-reported questionnaire contained four open-ended questions in which athletes were asked, except for the above thoughts and situations, to write down if in the competition or the training they have just participated, they had said to themselves anything else, and if yes, what they had said to themselves in order: (a) to increase their effort; (b) to improve their performance or to achieve their goal(s); (c) to increase their self-confidence; and d) to feel better or to feel a desired emotional or mood state (e.g., vitality, relaxation, euphoria, calmness, vigilance, etc.).

Semi-Structured Interview

As stated above, the sample three was interviewed immediately after the end of a competition or their regular training. A semi-structured interview guide was developed in order to facilitate the interview process and help athletes to recall their undirected and goal-directed self-talk that they had used during the competition or training they just have participated in. Particularly, the interview guide was consisted of three parts, which were the same with the parts 1, 3, 4 of self-reported questionnaire described above and listed below.

Self-Reported Questionnaire in Study 1

The aim of this study is to investigate the content and the structure of athletes' self-talk during competition or training. Self-talk refers to what you say to yourself during sport performance and it may have the form of either a positive, negative, or a neutral thought, or the form of instructions toward yourself.

In the following pages, you are asked to fill out a questionnaire regarding the thoughts you had been experiencing **during the competition or practice session that you have just participated in**. The questionnaire is anonymous and the data are collected confidentially.

Please Read Carefully the Instructions Before You Fill Out the Questionnaire

Part 1. Demographic Form

Sex: Man Woman

Age:

Please specify the sport you participate in:
Team name:

How long have you been participating in the sport you
have specified above:

How long have you been participating in competitions
in the sport you have specified above:

At what level of sport do you generally
participate/compete?
(regional, national, european, international, etc.)

How many days on average do you train per week?
How many hours on average do you train per week?
How many training sessions have you done the last two weeks?

Have you participated in any competition the last two weeks?	No	Yes
How long have you been training with this coach?		

Part 2. A Thought Listing Technique

We would like to ask you to write down any thought had passed through your mind during the **competition** or training you have just participated in. You can write your thoughts in the form of cue-words (e.g., Strong), phrases (e.g., I am exhausted) or full sentences (e.g., I am thinking of how many jobs I have to do today). There are no right or wrong answers. You should write down as many thoughts have passed through your mind within 3 minutes.

LIST OF THOUGHTS

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Part 3. Open-Format Self-Talk Listing Self-Report

Below there is a list of different emotions that athletes may experience during their competition or their training. **Please read each emotion and check it if you had experienced during the competition or practice session you have just participated in. If you have experienced this emotion, go on with the completion of the next respective columns. If you have not experienced this emotion, continue with the next emotion in the list and so on.**

Emotions	Situation Briefly describe the situation or the event in which the specific emotion has appeared	What exactly had passed through your mind or what exactly you had said to yourself before you started to feel this emotion?	Have you said to yourself anything else as a response-reaction to these thoughts (of the 3rd column)	Behavior Finally how did you behave in this situation?
Sadness				
Anger				
Anxiety-Worry				
Happiness				
Excitement				
Relief				
Confidence				
Fear				
Shame				
Embarrassment				
Disappointment				
Guilt				
Hurt				
Resignation				
Other				
Emotion(s). Define the emotion(s).				

Part 4. Open-Ended Questions

Except for the above thoughts and situations, in the competition or practice session you have just participated, had you said to yourself anything else in order to:

1. Increase your effort. If yes, what exactly had you said to yourself?
2. To improve your performance or to achieve your goal(s). If yes, what exactly had you said to yourself?
3. To increase your self-confidence. If yes, what exactly had you said to yourself?
4. To feel better or to feel a desired emotional or mood state (e.g., vitality, relaxation, euphoria, calmness, vigilance, etc.). If yes, please write down what exactly you wanted to feel and what exactly you had said to yourself in order to induce this emotional or mood state.

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN OUR STUDY!

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Supplementary File 2

Qualitative Data Analyses in Study 1

Overall, the data analysis was performed by five independent judges in two stages, which followed a preparatory phase. In the preparatory phase, complex statements were broken into elementary meaning units. In the first stage, initially each meaning unit was categorized as undirected or goal-directed self-talk, in accordance to the definitions provided by Christoff et al. (2011). Afterwards, all undirected statements were categorized further into three subcategories, namely, spontaneous statements, mind wandering and stimulus-independent statements based on the definitions offered by Christoff et al. Lastly, in the second stage, all spontaneous and goal-directed statements were classified further into the respective categories of spontaneous and goal-directed self-talk in sport provided by Latinjak and colleagues (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014). These stages are described in more details below.

In the preparatory phase participated three judges, experts in the field of sport and exercise psychology. The first one held an academic position in the sport science department of a university, while the other two were Phd candidates in the field of sport and exercise psychology. All of them had particular expertise in self-talk research, and also practical experience in qualitative research methodology and analysis. In the preliminary phase, the three judges initially split complex answers into elementary meaning units. According to Lyons (1981), a meaning unit is an independent statement with significance of its own, and also cannot be further divided without altering its significance. Subsequently, the three judges screened the pool of meaning units and eliminated: a) the meaning units that were not constituted self-talk but other related things (e.g., non-verbal thoughts, mental imagery, statements that are not directed to the self but to others), and b) the statements that

they perceived as redundant (participant gave twice the exact same answer) or incomprehensible (not being able to read the answer or make sense of its content).

In the first and second stage, two other judges, also experts in the field of sport and exercise psychology were asked to contribute to the analysis. Both of them held an academic position in the sport science department of a university, and had particular expertise in self-talk research. They also had practical experience in psychometrics, and qualitative research methodology and analysis. In the first stage, the five judges were asked to organize independently the meaning units into different types of self-talk following the process described by Boyatzis (1998). Firstly they were asked to categorized each meaning unit as undirected or goal-directed, in accordance to the definitions offered by Christoff et al. (2011). The judges were further informed that the main difference between the two types of self-talk is intentionality: goal-directed self-talk is used intentionally to make progress on a task, whereas undirected self-talk appears unintentionally. Finally, the judges were also informed that both types of self-talk can have either facilitative or debilitating effects on performance.

After that, the judges were asked to categorize all undirected statements into three subcategories, namely, spontaneous statements, mind wandering and stimulus-independent statements according to Christoff et al.'s (2011) definitions. Also the judges receive further the explanation that the content of mind-wandering is unrelated to the context in which the thought appears. In contrast, the content of spontaneous and stimulus-independent statements is related to the sport context. Nevertheless, spontaneous statements are related to the thought eliciting situation, whereas stimulus-independent statements are unrelated to the thought eliciting situation. In order to confirm that the judges comprehended the differences among the three types of statements, sport unrelated examples were used. For each step, all judges confirmed that the guidelines were clear and understandable. On completion, inter-rater

agreement ($[\text{number of agreements} / \text{number of themes}] * 100$) for each statement type was calculated, and in case of disagreement in either step, the five judges convened to discuss until agreement was reached.

In the second stage, the five judges were asked to further classify all spontaneous and goal-directed statements into the respective categories of spontaneous and goal-directed self-talk in sport provided by Latinjak et al. (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014). Particularly, with regard to spontaneous self-talk, the five judges were asked to classify independently each spontaneous statement into 12 categories that resulted from the combination of two dimensions: valence (which contains three categories) and time perspective (which contains four categories). The judges were informed about the meaning of each dimension and examples were given to better understand the concepts. Moreover, with regard to the classification, the judges were informed that in terms of valence, the spontaneous statement would be classified as: (a) positive if the content of the statement was positive for the athlete (e.g., “I performed well”); (b) negative if the content of the statement was negative for the athlete (e.g., “I performed bad”); and (c) neutral if the content of the statement was (n)either good (n)or bad (e.g., It is over) for the athlete. In terms of time perspective, the judges were informed that the spontaneous statement would be classified as: (a) retrospective if the content of the statement referred to something in the past (e.g., the last point); (b) anticipatory if the content of the statement referred to something in the future (e.g., the next point); (c) present related if the content of the statement referred to (n)either future (n)or past but to an ongoing task; and (d) contextual if the content of the statement referred to (n)either future (n)or past, but to the sport, the self, or others in general. The judges were also reminded that time perspective is related to the statements referent (i.e., the events a statement refers to), and that time perspective does not always relate to verbal tense and to

the events that trigger the cognitive process. Lastly, spontaneous statements that were earlier classified in terms of both valence and time perspective were grouped interactively.

With regard to goal-directed self-talk, the five judges were asked to classify independently each goal-directed statement into the seven major categories/functions of goal-directed self-talk in sport (Latinjak et al., 2014) that resulted from the combination of two dimensions: activation (activated states, neutral, deactivated states) and time-orientation (past, past-present, present-future, and future oriented). These seven major categories/functions of goal-directed self-talk in sport were: (a) dealing with cognitive reactions self-talk, (b) controlling activated states self-talk, (c) controlling deactivated states self-talk, (d) creating activated states self-talk, (e) creating deactivated states self-talk, (f) regulating cognitions and behavior self-talk, and (g) future-oriented self-talk. Afterwards, the five judges were also asked to classify further the future-oriented self-talk statements into the six subcategories of future-oriented self-talk in sport provided by Latinjak, Torregrossa, et al. (2019), that is: (a) up-regulating self-confidence, (b) down-regulating self-confidence, (c) promoting mastery goals, (d) promoting performance-approach goals, (e) promoting performance-avoidance goals, and (f) promoting intrinsic motivation. Again the judges were explained the meaning of each dimension, and category/function of goal-directed self-talk, and were presented with examples to better understand the concepts. For both spontaneous and goal-directed self-talk classification, all judges confirmed that the guidelines were clear and understandable. On completion, the inter-rater agreement for each category of spontaneous and goal-directed self-talk was calculated, and again in case of disagreement in any statement, the five judges convened to discuss until agreement was reached.

Supplementary File 2

Results and Discussion-Study 1

Preparatory Phase

No athlete reported any problem understanding what was required and recalling relevant information. In the preparatory phase, all complex answers were broken down into meaning units by the three judges. After removing all meaning units which were not constituted self-talk but other related things, and also all redundant and incomprehensible statements, overall 4,524 statements were analyzed (2,756 statements came from competition and 1,768 came from training).

First Stage

Initially the five judges categorized the statements into goal-directed and undirected statements. In line with a similar study in physical education (Brisimis, 2021), which used the same self-reported questionnaire as study 1, our results indicated that on a state level, athletes used mainly goal-directed (54.1%; $n = 2,447$) and less undirected self-talk (45.9%; $n = 2,077$). Inter-rater agreement was 98%. Secondly, the judges categorized the undirected statements ($n = 2,077$) into spontaneous statements, mind-wandering, and stimulus-independent statements (Inter-rater agreement = 99%). In line with previous qualitative studies (Brisimis, 2021; Latinjak, 2018; Latinjak et al., 2014), the results indicated that on a state level, the participants' undirected statements were mainly spontaneous (88.8%; $n = 1,845$), and rarely stimulus independent (3.7%; $n = 77$) or mind-wandering (7.5%; $n = 155$).

Second Stage

In the second stage, the five judges classified further all spontaneous ($n = 1,845$) and goal-directed statements ($n = 2,447$) into the respective categories of spontaneous and goal-directed self-talk in sport provided by Latinjak and colleagues (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014).

The Structure and Content of Athletes' Spontaneous Self-Talk

In order to explore the structure and the content of athletes' state spontaneous self-talk, the five judges were asked to classify independently all spontaneous statements ($n = 1,845$) into Latinjak et al.'s (2014) 12 spontaneous self-talk categories that resulted from the combination of dimensions of valence (three categories: positive, negative, neutral) and time perspective (four categories: retrospective, present-related, contextual, and anticipatory). Inter-rater-agreement for each category ranged between 95% and 100%. With regard to valence, in line with previous qualitative studies (Brisimis, 2021; Latinjak et al., 2014), we found that athletes used mainly negative (61.2%; $n = 1,129$), and less positive (34.3 %; $n = 633$) or neutral self-talk (4.5%; $n = 83$). With regard to time perspective, and in consistency with Latinjak et al. (2014) findings, we found that athletes used mainly retrospective (42.2 %; $n = 778$), and less anticipatory (35.5%; $n = 655$), present-related (17.5 %; $n = 324$), and contextual (4.8%; $n = 88$) self-talk.

With respect to the content of the 12 categories of state spontaneous self-talk, that resulted from the combination of dimensions of valence and time perspective, in line with previous research findings (Latinjak, 2018; Latinjak et al., 2014, 2017, 2020), retrospective-negative self-talk (27%; $n = 498$), contained statements related to internal-controlled attributions of failure (e.g., "I performed poorly"), external-uncontrolled attributions of failure (e.g., "We were unlucky"), the consequences of failure (e.g., "I am worthless"), and emotional expression (e.g., "I want to hit him"). In contrast, retrospective-positive self-talk (14.5%; $n = 267$), contained statements related to internal-controlled attributions of success (e.g., "I have performed well"), external-uncontrolled attributions of success ("We were lucky to win"), the consequences of success (e.g., "I am proud of myself"), and emotional expression (e.g., "Yes! / I achieved it!"). Finally, only 0.7% ($n = 13$) of the spontaneous

statements were classified as retrospective neutral (e.g., “It’s finished”) because their content was (n) either good (n) or bad for athlete.

Supporting previous research findings (Latinjak, 2018, Latinjak et al., 2014, 2020), anticipatory-negative self-talk (21.3%; $n = 393$), contained statements related to negative predictions (e.g., “I am going to fail”) and disengagement (e.g., “I want to give up”). In contrast, anticipatory-positive self-talk (11.4%; $n = 211$) contained statements related to positive predictions (e.g., “I will succeed”) and engagement (e.g., “I want to play”). Lastly anticipatory-neutral self-talk (2.8%; $n = 51$) contained doubts (e.g., “Will we be able to win?”), achievement goals (e.g., “I hope to win” / “I have to show how good I am”), and avoidance goals (e.g., I must not lose).

In line with Latinjak et al. (2014) findings, present-related negative (e.g., “Difficult practice”; I feel pain”; 11.1%; $n = 204$), present-related positive (e.g., “Very good exercise!”, “I feel completely refreshed; 5.5%; $n = 102$), and present-related neutral self-talk (e.g., “Today, there more spectators”; 1.0%; $n = 18$); contained respectively positive, negative and neutral statements, related to ongoing task or events, and current feelings. Finally, contextual negative (e.g., “The opponents are better”; 1.8%; $n = 34$), contextual positive (e.g., “I am very good!”; 2.9%; $n = 53$), and contextual neutral self-talks (e.g., “*This sport requires a lot of stamina*”; 0.1%; $n = 1$) included respectively positive, negative and neutral statements, referred to the self, to others, and the sport in general.

Overall, our results are in line with previous research findings (Latinjak, 2018 ;Latinjak et al., 2014, 2017, 2020) regarding the structure and the content of athletes’ spontaneous self-talk, where either researchers’ or participants’ classification (Latinjak, 2018; Latinjak et al., 2017) of self-talk were taken into account, thus strengthening our confidence on the data categorization procedure. Furthermore, the judges agreed that all meaning units could adequately and sufficiently be placed within the 12 categories of athletes’ spontaneous

self-talk provided by Latinjak et al. (2014), supporting therefore further the adequacy of this coding scheme.

The Structure and Content of Athletes' Goal-Directed Self-Talk

In order to explore the structure and the content of athletes' state goal-directed self-talk, in the first step the five judges classified independently all goal-directed self-talk statements ($n = 2,447$) into the seven major categories/functions of goal-directed self-talk provided by Latinjak et al. (2014). Inter-rater agreement for each major category/function ranged between 94% and 100%. According to the participants' answers, most goal-directed self-talk was identified as aimed at regulating cognition and behavior (29.5%; $n = 723$) and as future-oriented (28.2%; $n = 691$). There were also significant amounts of self-talk aimed at creating functional activated states (18.8%; $n = 459$) and controlling cognitive reactions (11.5%; $n = 282$). Observations of self-talk creating functional deactivated states (5.0%; $n = 123$), and controlling dysfunctional deactivated (3.7%; $n = 91$), and activated states (3.2%; $n = 78$), were the least frequent. Overall, the above results are in line with previous research (Latinjak, 2018; Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014, 2017) where similar distributions of goal-directed functions were found. Finally, the judges concluded that the seven major categories/functions of goal-directed self-talk were adequate and sufficient to allocate all meaning units, thus further supporting the adequacy of Latinjak et al.'s (2014) coding scheme.

With respect to the content of the seven major categories/functions of goal-directed self-talk, in consistency with previous findings (Latinjak, 2018; Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014, 2017), our results showed that:

1. Controlling cognitive reactions self-talk included statements aimed to reappraise cognitively real, perceived, or anticipative negative events (e.g., "Nothing

happened”). Sometimes the reappraised events could also be positive (e.g., “You are no Michael Phelps”).

2. Controlling activated states self-talk included statements aimed to control activated states, negative (e.g., “Don’t be anxious”) or positive (e.g., “Don't be so cheerful, you haven’t win yet”), which are deemed dysfunctional for performance.
3. Controlling deactivated states self-talk included statements aimed to control negative (e.g., “Don't give up”) or positive deactivated states (e.g., “Don't relax”), which are deemed dysfunctional for performance.
4. Creating activated states self-talk contained statements aimed to create or maintain functional activated states (e.g., “Do your best”, “Keep going”).
5. Creating deactivated states self-talk included statements aimed to create or maintain functional deactivated states (e.g., “Calm Down”, “Patience”).
6. Regulating cognitions and behavior self-talk involved statements directed at general and task-specific instructions with the aim to increase concentration (e.g., “Concentrate”), modify behavior (e.g., “Play fairly”), and change technical or tactical aspects of task execution (e.g., “Improve your technique”).
7. Future-oriented self-talk included statements used to precipitate facilitative attitudes for the future, by reinforcing self-efficacy (e.g., “You will succeed”), self-esteem (e.g., “You are good), and motivational orientation, (e.g., “Your goal is to perform well”).

In the second step, the five judges classified all future-oriented self-talk statements into the six subcategories of future-oriented self-talk in sport provided by Latinjak, Torregrossa, et al. (2019). Inter-rater agreement for each subcategory ranged between 96% and 100%. The judges agreed that the six subcategories/functions of future-oriented self-talk

were successful to allocate all meaning units, thus supporting the suitability of this coding scheme (Latinjak, Torregrossa, et al., 2019)

The results indicated that athletes used future-oriented self-talk in order of decreasing frequency, to up-regulate self-confidence (15.5%; $n = 379$), to promote mastery goals (8.3%; $n = 204$), performance-approach goals (2.8%; $n = 69$), performance-avoidance goals (1.0%; $n = 25$), intrinsic motivation (0.5%; $n = 12$), and to down-regulate self-confidence (0.1%; $n = 2$). These findings are consistent with previous studies showing approximately similar distribution of future-oriented self-talk functions (Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019).

Concerning the content of the six subcategories/ functions of future-oriented self-talk, in line with previous research findings our results showed that:

1. Up-regulating self-confidence self-talk included statements aimed to enhance self-efficacy beliefs (e.g., “You will win today”) and self-esteem (e.g., “Believe in yourself”).
2. Down-regulating self-confidence included statements aimed to restrict self-efficacy beliefs and self-esteem by anticipating potential negative outcomes (e.g., “Playing like this, we will lose”).
3. Promoting mastery goals included statements aimed to promote task-related goals, in which competence is defined in intrapersonal terms and positively valanced. (e.g., “The goal is to perform well”)
4. Promoting performance-approach goals contained statements aimed to promote ego-related or outcomes goals, in which competence is defined by interpersonal comparisons and positively valanced (e.g., “The goal is to win”);
5. Promoting performance-avoidance goals involved statements aimed to promote performance-avoidance goals such as avoiding mistakes or failure in comparison

with others. Thus, competence is defined again by interpersonal comparisons, but is negatively valenced (e.g., “You mustn't lose today”)

6. Promoting intrinsic motivation included statements aimed to promote the intrinsic reasons for sport participation, such as the enjoyment and pleasure of sport activity (e.g., “Go and enjoy it”).

Overall, the alignment of our results with previous research findings regarding the content of future-oriented subcategories and goal-directed self-talk major categories (Latinjak, 2018; Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014), where either researchers' or participants' classification (Latinjak, 2018; Latinjak et al., 2017) of self-talk were taken into consideration, enhances our confidence on the data categorization procedure.

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Supplementary File 3

Table 3.S1.

Items per Subscale of the Initial 20-Item Spontaneous Self-Talk Scale (S-STTS)

Subscales			
Retrospective Positive Self-Talk	Anticipatory Positive Self-Talk	Retrospective Negative Self-Talk	Anticipatory Negative Self-Talk
I have performed well (1)	I will do well (3)	I'm wrong again (2)	I am going to fail (4)
I have achieved it (5)	I will win (7)	I have failed (6)	I want to give up (8)
Perfectly (9)	I can do it (11)	I should have been better (10)	I will stop (12)
My efforts have been rewarded (13)	Today will be my day (15)	Today I have performed very poorly (14)	I can't take it anymore (16)
I have become better (17)	I will succeed (19)	I am worthless (18)	What will others think of my poor performance (20)

Note. Number in the parentheses represents the number of an item in the initial scale.

Supplementary File 3

Table 3.S2.

Items per Subscale of the Initial 40-Item Goal-Directed Self-Talk Scale (GD-STS)

Controlling Cognitive Reactions	Controlling Dysfunctional Activated/Deactivated States		Subscales		Instruction	Up-Regulating Self-Confidence	Promoting Goals and Intrinsic Motivation
	Controlling Dysfunctional Activated States	Controlling Dysfunctional Deactivated States	Creating Functional Activated States	Creating Functional Deactivated States			
It does not matter. You will make it the next time (1)	Do not be anxious (2)	Do not give up (3)	Let's go (5)	Calm down (4)	Concentrate (6)	You will do well (7)	The goal is to perform well (8)
It does not matter. No one is perfect (9)	Do not be afraid (10)	Do not relax (11)	Give it all (13)	Relax (12)	Focus on your technique/tactic (14)	You can do it (15)	The goal is your personal improvement (16)
It is only a game/race/training (17)	Do not be angry (18)	Do not stop (19)	Try more (21)	Be patient (20)	Concentrate on your goal (22)	You are strong (23)	The goal is to win (24)
Everyone can have a bad day (25)	Do not worry (26)	Do not be disappointed (27)	Keep going (29)	Keep calm (28)	Focus on what you need to do now (30)	You are very well prepared (31)	The aim is to achieve your goal (32)
Everyone makes mistakes (33)	Do not be nervous(34)	Do not quit (35)	Strong (37)	Take a deep breath (36)	Pay attention (38)	Believe in yourself (39)	The goal is to enjoy the competition/training (40)

Note. Number in the parentheses represents the number of an item in the initial scale.

Supplementary File 3

Initial 60-Item Organic Self-Talk Questionnaire for Sport (OSTQS)

Self-talk, a common experience for most athletes, refers to what athletes say to themselves during their sport performance. Self-talk may happen spontaneously (unintentionally) or may be used intentionally by the athletes with the aim to enhance their performance or to achieve their goals.

On the following questionnaire, there are two lists of different statements that athletes usually experience or intentionally use while performing. Please read each statement carefully, and indicate **using the following rating scale, how often** you had told it to yourself **during the practice session or the competition you have just participated**. **Remember:** Your responses will be kept in **absolute confidence**, and there are **no right or wrong answers**. Please be honest.

0 = “never”, 1 = “rarely”, 2 = “sometimes”, 3 = “often”, 4 = “very often”

Initial 20-Item Spontaneous Self-talk Scale (S-STS)

Please indicate how often during the practice session/competition you have just participated in , you had experienced spontaneous thoughts, that is thoughts that comes to our mind spontaneously and unintentionally, as the followings:		Never	Rarely	Sometimes	Often	Very often
1.	I have performed well	0	1	2	3	4
2.	I'm wrong again	0	1	2	3	4
3.	I will do well	0	1	2	3	4
4.	I am going to fail	0	1	2	3	4
5.	I have achieved it	0	1	2	3	4
6.	I have failed	0	1	2	3	4
7.	I will win	0	1	2	3	4
8.	I want to give up	0	1	2	3	4
9.	Perfectly	0	1	2	3	4
10.	I should have been better	0	1	2	3	4
11.	I can do it	0	1	2	3	4
12.	I will stop	0	1	2	3	4
13.	My efforts have been rewarded	0	1	2	3	4
14.	Today I have performed very poorly	0	1	2	3	4
15.	Today will be my day	0	1	2	3	4
16.	I can't take it anymore	0	1	2	3	4
17.	I have become better	0	1	2	3	4
18.	I am worthless	0	1	2	3	4
19.	I will succeed	0	1	2	3	4
20.	What will others think of my poor performance	0	1	2	3	4

Initial 40-Item Goal-Directed Self-Talk Scale (GD-STS)

Please indicate how often during the practice session/competition you have just participated in , you had intentionally told to yourself in order to achieve a goal, statements such as the followings:		Never	Rarely	Sometimes	Often	Very often
1.	It does not matter. You will make it the next time	0	1	2	3	4
2.	Do not be anxious	0	1	2	3	4
3.	Do not give up	0	1	2	3	4
4.	Calm down	0	1	2	3	4
5.	Let's go	0	1	2	3	4
6.	Concentrate	0	1	2	3	4
7.	You will do well	0	1	2	3	4
8.	The goal is to perform well	0	1	2	3	4
9.	It does not matter. No one is perfect	0	1	2	3	4
10.	Do not be afraid	0	1	2	3	4
11.	Do not relax	0	1	2	3	4
12.	Relax	0	1	2	3	4
13.	Give it all	0	1	2	3	4
14.	Focus on your technique/ tactic	0	1	2	3	4
15.	Give it all	0	1	2	3	4
16.	The goal is your personal improvement	0	1	2	3	4
17.	It is only a game/race/training	0	1	2	3	4
18.	Do not be angry	0	1	2	3	4
19.	Do not stop	0	1	2	3	4
20.	Be patient	0	1	2	3	4
21.	Try more	0	1	2	3	4
22.	Concentrate on your goal	0	1	2	3	4
23.	You are strong	0	1	2	3	4
24.	The goal is to win	0	1	2	3	4
25.	Everyone can have a bad day	0	1	2	3	4
26.	Do not worry	0	1	2	3	4
27.	Do not be disappointed	0	1	2	3	4
28.	Keep calm	0	1	2	3	4
29.	Keep going	0	1	2	3	4
30.	Focus on what you need to do now	0	1	2	3	4
31.	You are very well prepared	0	1	2	3	4
32.	The aim is to achieve your goal	0	1	2	3	4
33.	Everyone makes mistakes	0	1	2	3	4
34.	Do not be nervous	0	1	2	3	4
35.	Do not quit	0	1	2	3	4

36.	Take a deep breath	0	1	2	3	4
37.	Strong	0	1	2	3	4
38.	Pay attention	0	1	2	3	4
39.	Believe in yourself	0	1	2	3	4
40.	The goal is to enjoy the competition/training	0	1	2	3	4

Supplementary File 3

Participants in Study 2

The sample consisted of 691 athletes (363 males and 328 females) with a mean age of 21.65 (\pm 8.06) years. The athletes represented a variety of team (e.g., football, basketball, volleyball, water polo, and handball: $n = 421$) and individual (e.g., athletics, swimming, finswimming, rhythmic gymnastics, tennis, taekwondo, karate, boxing, kickboxing, wrestling weight lifting, fencing, windsurfing, etc.: $n = 270$) sports. With regard to competitive level, 12.7% of them had competed at international level, 39.5% at national level, and 47.8% at regional or county level. Finally, the mean competitive experience of the participants was 7.58(\pm 5.44) years. The procedure and the instructions offered to participants were similar to those of the questionnaire completion in the first study.

Data Analysis in Study 2

The factorial validity of the developed questionnaire was examined via Confirmatory Factor Analysis (CFA) using the SPSS statistical program AMOS 22 (Arbuckle, 2013). The use of CFA is recommended when there is a theoretical base for the hypothesized model (Williams, 1995), as in the current research. Fit indices were used to assess the adequacy of the tested models, because they appear to be more accurate at rejecting misspecified models. Prior to the CFA, first the data were cleaned and screened for univariate and multivariate outliers, and were scanned for univariate and multivariate normality. The univariate normality of the items was assessed using the skewness and kurtosis of the responses, whereas the multivariate normality was tested using Mardia's (1970) normalized coefficients of multivariate kurtosis. In order to examine the factor structure underlying the spontaneous self-talk scores, we hypothesized and estimated a correlated four-factor, first-order CFA model, in which five items were used to define each factor, each item was only allowed to load on its intended factor, and correlations among the four first-order factors were freely

estimated, but error terms were not (see Figure 3.1. in Supplementary File 3, p. 117). Similarly, regarding the factor structure underlying the goal-directed self-talk scores, we hypothesized and estimated a correlated seven-factor, first-order CFA model, in which items were only allowed to load on their intended factor, factors were allowed to correlate, but error terms were not (see Figure 3.2. in Supplementary File 3, p. 118). Finally, in both models, for purposes of identification and latent variable scaling, one item from each factor was fixed to 1.0. To evaluate the fit of the data to the hypothesized models, we use a selection of goodness-of-fit indices, including Chi-square (χ^2), Comparative Fit Index (CFI), Tucker-Lewis index (TLI), and Root Mean Square Error of Approximation (RMSEA). CFI and TLI values > 0.95 and RMSEA values < 0.06 are considered as indicators of excellent fit (Hu & Bentler, 1999), whereas CFI and TLI values > 0.90 and RMSEA < 0.08 (Marsh et al., 2004) are considered as indicators of acceptable fit.

To screen for model misspecification we analyzed standardized factor loadings, standardized residuals, and modification indices. In line with previous research in scale development (e.g., Gaudreau & Blondin, 2002) problematic items were identified and removed based on one or more of the following criteria: (a) items with low standardized factor loadings (e.g., $< .40$); (b) items with large standardized residual ($> \pm 2.58$); (c) items with large modification indices suggested that the item could load on a non intended factor or that the error term of an item correlated with that of another item, and (d) items that reduce Cronbach's alpha. Alongside these statistical criteria, the conceptual coverage of the items was also considered (i.e., ensuring that the remaining items captured the content self-talk dimensions/functions that we want to measure). Overall, in reducing the number of items, our aim was to retain the items that preserved the content of the measured self-talk dimensions/functions, with at least three internally consistent items per subscale, and that resulted in a factor structure in which goodness-of-fit indexes were acceptable. The

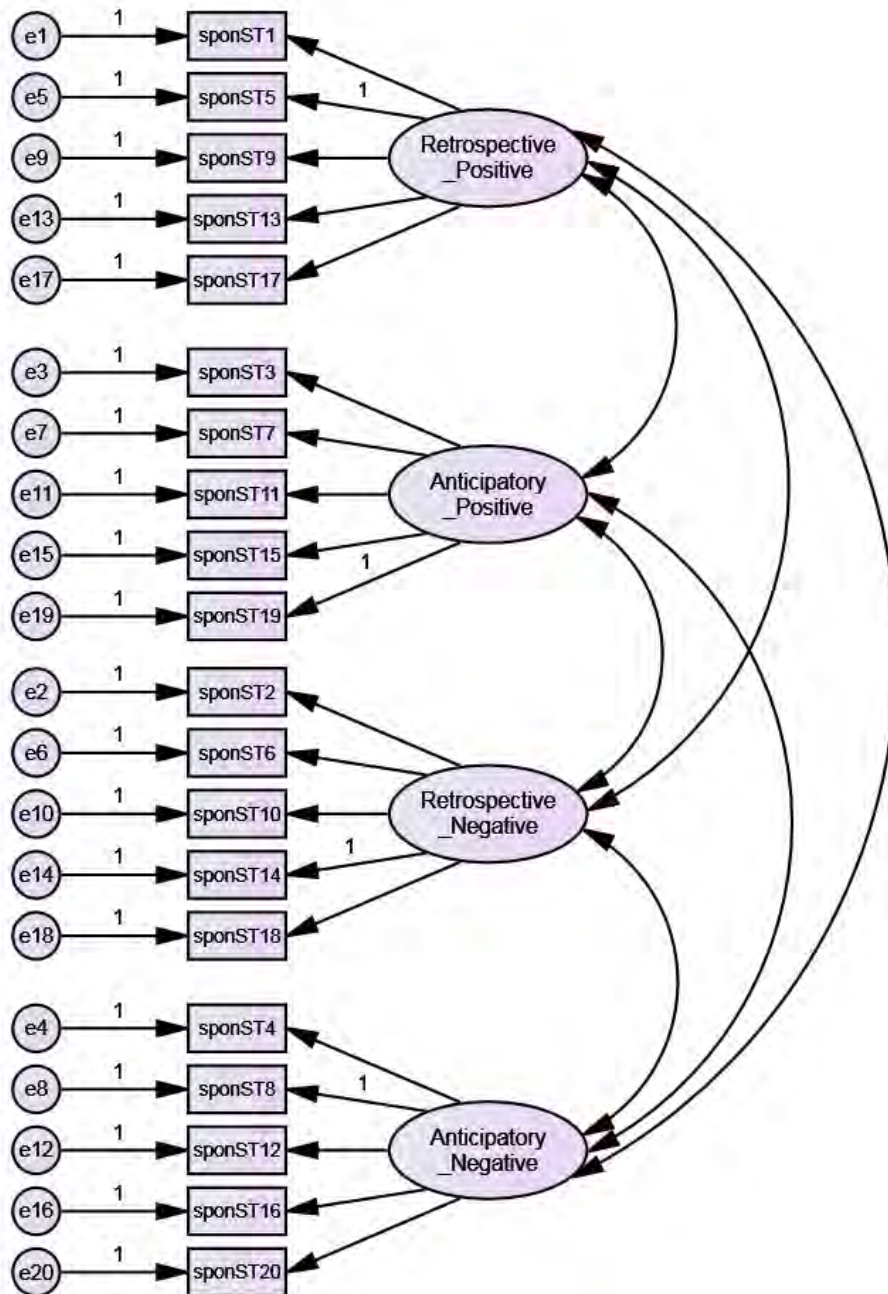
discriminant validity of the factor scores was investigated by examining the 95% confidence intervals (CI) of the interfactor correlations. To further examine the latent structure of each self-talk scale we also tested: (a) a single-factor model, hypothesizing that all items are indicators of a single construct, and (b) a hierarchical model, hypothesizing that the correlations between factors are explained by a second-order factor. Finally, the internal consistency of scores from each subscale was assessed by examining Cronbach's alpha coefficients.

Distribution of the OSTQS Items in Study 2

The univariate skewness values of the OSTQS items ranged from -1.28 to 1.65 and the univariate kurtosis values ranged from -1.31 to 2.01 , suggesting that all items were within the acceptable ranges for normality (skewness $< \pm 2$, kurtosis $< \pm 7$). However, an examination of Mardia's (1970) normalized coefficient of multivariate kurtosis indicated that the data departed from multivariate normality (Mardia's coefficient was 41.75 for the four-factor model and 81.15 for the seven-factor model), and this can result in standard error biases (Zhang, 2005). Maximum likelihood estimation (MLE) with bootstrapping have been found to be a robust alternative to other robust MLE methods (e.g., the Satorra–Bentler chi-square), and to perform effectively under non-normal data conditions for samples larger than 500 (Nevitt & Hancock, 2001). Thus, the MLE method with bootstrapping (10,000 resamples) were employed in all CFAs to obtain accurate estimations of standard errors with accompanying CI (95% bias-corrected bootstrap CI) and p -values (Byrne, 2010).

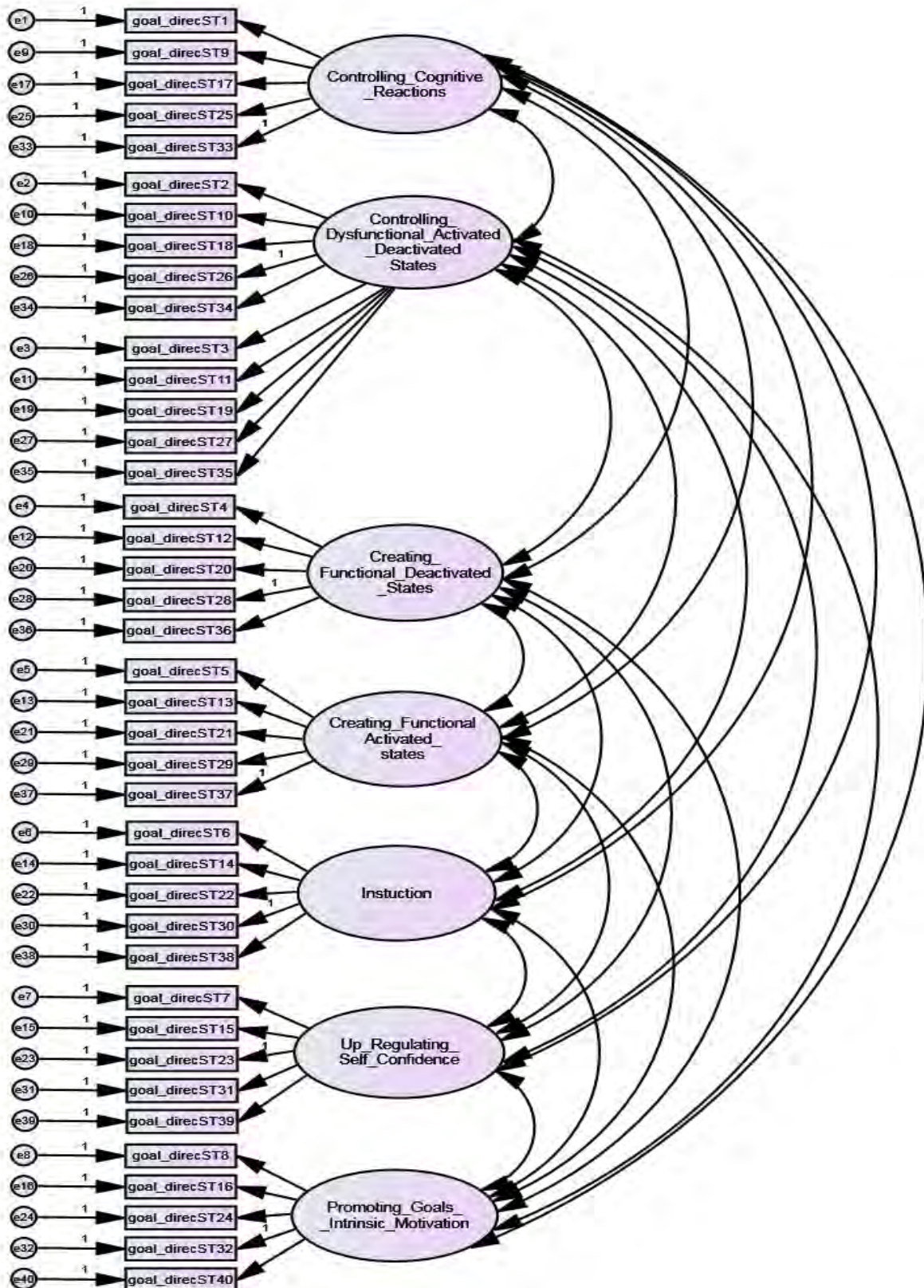
Figure 3.1.

The Hypothesized Correlated Four-Factor, First-Order Model of State Spontaneous Self-Talk in Study 2



Note. sponST = spontaneous self-talks items.

Figure 3.2. The Hypothesized Correlated Seven-Factor, First-Order Model of State Goal-Directed Self-Talk in Study 2



Note. goal_diracST = goal-directed self-talk items.

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Supplementary File 4

Final 45-Item Organic Self-Talk Questionnaire for Sport (OSTQS)

Self-talk, a common experience for most athletes, refers to what athletes say to themselves during their sport performance. Self-talk may happen spontaneously (unintentionally) or may be used intentionally by the athletes with the aim to enhance their performance or to achieve their goals.

On the following questionnaire, there are two lists of different statements that athletes usually experience or intentionally use while performing. Please read each statement carefully, and indicate **using the following rating scale, how often** you had told it to yourself **during the practice session or the competition you have just participated. Remember:** Your responses will be kept in **absolute confidence**, and there are **no right or wrong answers**. Please be honest.

0 = “never”, 1 = “rarely”, 2 = “sometimes”, 3 = “often”, 4 = “very often”

Final 17-Item Spontaneous Self-talk Scale (S-STS)

Please indicate how often during the practice session /competition you have just participated in , you had experienced spontaneous thoughts, that is thoughts that comes to our mind spontaneously and unintentionally, as the followings:		Never	Rarely	Sometimes	Often	Very often
1.	I have performed well	0	1	2	3	4
2.	I'm wrong again	0	1	2	3	4
3.	I will do well	0	1	2	3	4
4.	I want to give up	0	1	2	3	4
5.	I have achieved it	0	1	2	3	4
6.	I have failed	0	1	2	3	4
7.	I will win	0	1	2	3	4
8.	I will stop	0	1	2	3	4
9.	Perfectly	0	1	2	3	4
10.	Today I have performed very poorly	0	1	2	3	4
11.	I can do it	0	1	2	3	4
12.	I can't take it anymore	0	1	2	3	4
13.	My efforts have been rewarded	0	1	2	3	4
14.	I am worthless	0	1	2	3	4
15.	I will succeed	0	1	2	3	4
16.	I have become better	0	1	2	3	4
17.	What will others think of my poor performance	0	1	2	3	4

Final 28-Item Goal-Directed Self-Talk Scale (GD-STTS)

Please indicate how often during the practice session /competition you have just participated in , you had intentionally told to yourself in order to achieve a goal, statements such as the followings :		Never	Rarely	Sometimes	Often	Very often
1.	It does not matter. No one is perfect	0	1	2	3	4
2.	Do not be afraid	0	1	2	3	4
3.	Do not be disappointed	0	1	2	3	4
4.	Calm down	0	1	2	3	4
5.	Let's go	0	1	2	3	4
6.	Focus on your technique/ tactic	0	1	2	3	4
7.	You will do well	0	1	2	3	4
8.	The goal is to perform well	0	1	2	3	4
9.	It is only a game/race/training	0	1	2	3	4
10.	Do not worry	0	1	2	3	4
11.	Do not quit	0	1	2	3	4
12.	Be patient	0	1	2	3	4
13.	Give it all	0	1	2	3	4
14.	Concentrate on your goal	0	1	2	3	4
15.	You can do it	0	1	2	3	4
16.	The goal is your personal improvement	0	1	2	3	4
17.	Everyone can have a bad day	0	1	2	3	4
18.	Keep calm	0	1	2	3	4
19.	Keep going	0	1	2	3	4
20.	Focus on what you need to do now	0	1	2	3	4
21.	You are strong	0	1	2	3	4
22.	The goal is to win	0	1	2	3	4
23.	Everyone makes mistakes	0	1	2	3	4
24.	Take a deep breath	0	1	2	3	4
25.	Strong	0	1	2	3	4
26.	Pay attention	0	1	2	3	4
27.	Believe in yourself	0	1	2	3	4
28.	The aim is to achieve your goal	0	1	2	3	4

Supplementary File 4

Comparing the OSTQS with the ASTQS

Comparing the OSTQS with the ASTQS (Zourbanos et al., 2009), we can identify both similarities and differences between the two measures of athletes' organic self-talk. With respect to their similarities, we can see some common subscales, and by extension some similar and common items between the two instruments. Particularly, the S-STS has three subscales in common with the ASTQS:

1. The Retrospective Negative Self-Talk subscale of S-STS that fits in the negative Worry subscale of the ASTQS, with the item ("I'm wrong again") to be common between the two subscales.
2. The Anticipatory Negative Self-Talk subscale of S-STS that fits in the negative Disengagement subscale of the ASTQS.
3. The Anticipatory Positive Self-Talk of S-STS that would fit in the positive Confidence subscale of the ASTQS.

Similarly, the GD-STS has four subscales in common with the ASTQS:

1. The Creating Functional Activated States subscale of GD-STS that fits in the positive Psych-Up subscale of the ASTQS, with two items (i.e., "Let's go" and "Strong ") to be common between the two subscales.
2. The controlling dysfunctional activated states items from the Controlling Dysfunctional Activated/Deactivated States subscale of the GD-STS, and the Creating Functional Deactivated States subscale of the GD-STS, that fit in the positive Anxiety Control subscale of the ASTQS, with the item ("Calm down") of the Creating Functional Activated States subscale of the GD-STS to be included also in the Anxiety Control subscale of the ASTQS.

3. The Up-Regulating Self-Confidence subscale of GD-STS that fits in the positive Confidence subscale of the ASTQS.
4. The Instruction subscale of GD-STS that fits in the homonym positive subscale Instruction of the ASTQS

With respect to the differences between the OSTQS and the ASTQS, the major difference is that the OSTQS is a state measure of athletes' organic self-talk assessing 11 dimensions of the two contemporary, theory-driven distinctions of organic self-talk, that is spontaneous (four dimensions) and goal directed self-talk (seven dimensions/functions). On the other hand, the ASTQS is a trait measure of athletes' organic self-talk assessing according to the data-driven traditional distinction between positive and negative self-talk, four positive and four negative organic self-talk dimensions, without taking into consideration the contemporary theory-based distinctions (Latinjak et al., 2014) between organic spontaneous and organic goal-directed self-talk, as well as their classifications.

Consequently, the OSTQS contains subscales measuring additional self-talk dimensions to these that have already been assessed by ASTQS. Particularly, the S-STS taking into account, except for valence, also the time perspective dimension into the assessment of organic spontaneous self-talk, contains the Retrospective Positive Self-Talk subscale assessing the homonym spontaneous self-talk dimension, and which includes items referring mainly to internal-controlled attributions of success (e.g., "I have performed well") and emotional expression (e.g., "Perfectly"). Although, this spontaneous self-talk dimension is not assessed by ASTQS, is directly linked to Attribution theory, a significant research area in sport psychology (Latinjak et al., 2014). Therefore, its assessment and its quantitative examination are deemed worthwhile, as they will further enhance our understanding regarding its antecedents and its consequences.

Similarly, GD-STS assesses three new goal-directed self-talk dimensions/functions that have not been assessed by ASTQS. Particularly:

1. The cognitive reappraisal function of goal-directed self-talk assessed by the Controlling Cognitive Reactions subscale of GD-STS, and includes items referring mainly to the cognitive reappraisal of real, perceived, or anticipative negative events (e.g., “Everyone makes mistakes”). Although the cognitive reappraisal function of goal-directed self-talk has not been previously considered in the organic self-talk paradigm, and has not been assessed by ASTQS, it has been deemed an effective cognitive coping strategy (Latinjak et al., 2014) in both general and sport psychology. Additionally, cognitive reappraisal is a core element of the cognitive behavioral psychotherapeutic approaches, including Rational-Emotive Behavior Therapy (Ellis, 1994) and Cognitive-Behavior Modification (Meichenbaum, 1977), that have been previously applied effectively to the sports (Neil et al., 2013; Turner & Barker, 2014). Consequently, the assessment and quantitative examination of cognitive reappraisal function of goal-directed self-talk are valuable, as they will help us understand its antecedents and its consequences, and also develop and implement appropriate organic self-talk interventions, and evaluate their effectiveness.
2. The controlling dysfunctional deactivated states function of goal-directed self-talk assessed by the respective items of Controlling Dysfunctional Activated/Deactivated States subscale of GD-STS, and which are related to the control of negative deactivated states (e.g., “Do not be disappointed, Do not quit”), deemed dysfunctional for sport performance. Although, this goal-directed self-talk function has not been previously considered in the organic self-talk paradigm, and has not been assessed by ASTQS, it has been found to be an important goal-directed self-talk function that athletes used to regulate their emotions, and especially their dysfunctional deactivated emotions (Latinjak, Maso, et. al, 2019; Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014,

2017). Therefore, the assessment and quantitative examination of controlling dysfunctional deactivated states function of goal-directed self-talk are important, as they will help us understand its antecedents and its consequences, and also to develop, and apply organic self-talk interventions, matched with athletes' needs, evaluating its effectiveness.

3. The promoting goals function of goal-directed self-talk assessed by the Promoting Goals subscale of GD-STS, and which includes items referring mainly to the promotion of mastery (e.g., "The goal is your personal improvement") and performance-approach goals (e.g., "The goal is to win"). Although the promoting goals function of self-talk have been discussed in previous literature (Hardy et al., 2005), has not been assessed by ASTQS. Moreover, this goal-directed self-talk function is directly linked to goal and motivation theories (i.e., Needs Achievement Theory; Nicholls, 1989), a very significant research area in sport and exercise psychology. Thus, the assessment and quantitative examination of promoting goals function of goal-directed self-talk are worthwhile, as they will forward our understanding regarding its antecedents and its consequences. Finally, they will further help us to develop and implement organic self-talk interventions according to athletes' needs, and evaluate their effectiveness.

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**The Role of Big Five Personality Traits, Basic Psychological Need Satisfaction, and
Need Frustration in Predicting Athletes' Organic Self-Talk**

Research Article Accepted for Publication

Karamitrou, A., Comoutos, N., Brisimis, E., Latinjak, A. T., Hatzigeorgiadis, A.,
Theodorakis, Y., Loules, G., Tzioumakis, Y., & Krommidas, C. (in press). The role
of big five personality traits, basic psychological need satisfaction, and need
frustration in predicting athletes' organic self-talk. *Sustainability*.

Abstract

Good health and the promotion of well-being for all is the third of the 17 Global Goals included in the 2030 Agenda for Sustainable Development. Contributing to this goal, the current study aimed to examine the relationships between one kind of athletes' well-being, namely state organic self-talk, with personality traits, and basic psychological need satisfaction and frustration within their sport. Athletes ($N = 691$; mean age 21.65) from a variety of individual ($n = 270$) and team sports ($n = 421$) completed a multisection questionnaire capturing the targeted variables. Three-step hierarchical regression analyses revealed that: In step 1, all personality traits were to some extent a significant predictor of athletes' organic, spontaneous self-talk dimensions and goal-directed self-talk functions. In step 2, need satisfaction significantly contributed to all spontaneous self-talk dimensions and goal-directed self-talk functions (except for creating functional deactivated states) over and above personality. Finally, in step 3, need frustration significantly contributed to negative spontaneous self-talk dimensions, and to all goal-directed self-talk functions (except for instruction) over and above personality and need satisfaction. Overall, our results indicate the importance of personality traits as personal antecedents, and perceptions of basic psychological need satisfaction and frustration as social-environmental antecedents, in shaping athletes' state organic self-talk.

Keywords: inner speech; spontaneous self-talk; goal-directed self-talk; big five personality traits; self-determination theory; autonomy; competence; relatedness; sport

Introduction

Organic Self-Talk

According to the Sustainable Development Goal 3 (SDG3) incorporated in 2030 Agenda for Sustainable Development, the promotion of physical and mental health, and well-being for all people at all ages has become an important goal to be pursued by 2030. Self-talk is a kind of well-being, and especially a form of cognition that plays a key role in the formulation of our emotions, our behavior, and our performance, as well as in our self-regulation, almost in all domains of our life. Thus, it is not surprising that the study of self-talk has attracted the interest within a broad range of disciplines including philosophy, neuroscience, developmental, educational, clinical, social, sport psychology, and so on. In sport psychology the systematic study of self-talk has started between the eighties and nineties of the 20th century, while in recent years the self-talk research literature in sport has expanded rapidly [1]. The major developments include the passage from purely data-driven approaches [2] to theory-driven approaches into the study and classification of self-talk in sport, which had as a result the development of new, more theory-based conceptualizations of athletes' self-talk [1,3]. Particularly, these theory-driven approaches [1,3] based on dual-process theories, distinguish between an uncontrolled type of self-talk, which is automatic and reflects underlying psychological processes; and a controlled type of self-talk, which is rational, effortful, and intentionally used for self-regulation.

According to the contemporary self-talk conceptualizations, Van Raalte et al. [3] defined self-talk "as the syntactically recognizable articulation of an internal position that is expressed either internally or out loud where the message-sender is also the intended receiver" (p. 141). Three years later, Latinjak et al. [1] proposed a new integrative definition of self-talk, able to accommodate the recent literature, and also serve as a conceptual framework for the study of self-talk in future. Specifically, the researchers

conceptualized self-talk as “verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it also either (a) reflects dynamic interplays between organic, spontaneous, and goal-directed cognitive processes or (b) conveys messages to activate responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes (p. 11). According to Latinjak et al.’ s [1] aforementioned conceptualization there are two distinct self-talk entities (i.e., organic self-talk and strategic self-talk), which were initially reflected in two different research perspectives [4] in the study of self-talk in sport. *Organic* self-talk, which has been previously called *automatic* [2], refers to self-talk as inherent self-statements that athletes address to themselves, mostly during sport performance [1], and reflect various spontaneous and goal-directed psychological events [5]. Significantly, *organic* self-talk is not part of a psychological intervention, even though it may be indirectly influenced by interventions like cognitive-behavioral therapy or mindfulness-acceptance approaches [5]. On the other hand, strategic self-talk is described as the use of predetermined cue words and phrases, mostly developed through interventions, which athletes verbalize to themselves with the aim of enhancing performance or achieving other related goals [1].

With regard to organic self-talk, Latinjak et al.’s [1] conceptualization further distinguishes between spontaneous and goal-directed self-talk. Spontaneous self-talk is a type of uncontrolled self-talk, and consists of unintended, non-working, and non-instrumental statements that come to mind unbidden and effortlessly, and are linked to the task or activity at hand [5]. On the other hand, goal-directed self-talk is a controlled type of self-talk, and consists of statements that are intentionally used by athletes in order to self-regulate, to enhance their performance, to solve a problem or to make progress on a task [5]. Similarly to the spontaneous/goal-directed self-talk distinction [1], Van Raalte et al. [3], in their sport-specific model of self-talk identified: (a) an intuitive/uncontrolled type of

self-talk (called System 1 self-talk) that is fast, comes to mind spontaneously, and brings current experiences into awareness in a way that represents the immediate, emotionally-charged reaction to a situation; and (b) a controlled/rational type of self-talk (called System 2 self-talk) which is slower, emotionally neutral, and is influenced by different perspectives and new information.

Latinjak et al. [5–7] described several differences between spontaneous and goal-directed self-talk in terms of structure, content, and nature. In terms of structure, spontaneous self-talk varies in terms of two dimensions: valence (from positive to negative; e.g., “I performed well/I performed bad”) and time perspective (from past-related to future-related; e.g., “I was lucky/I will win”), whereas goal-directed self-talk varies in terms of two dimensions: time orientation (from past-oriented to future-oriented; e.g., “Everybody makes mistakes/ You will succeed”) and activation (from low to high; e.g., “Relax/ Give your best”) [5–7]. With regard to the content, spontaneous self-talk mostly describes, evaluates and explains past outcomes (e.g., “I played bad/I was unlucky”), and makes predictions about future events (e.g., “I will succeed”). In contrast, goal-directed self-talk aims to control cognitive reactions (e.g., “Nothing happened”); and dysfunctional activated (e.g., “Do not be anxious”) and deactivated affective states (e.g., “Do not be sad”); to create or maintain functional activated (e.g., “Give it all”) and deactivated affective states (e.g., “Calm down”); to promote task instructions (e.g., “Pay attention/Pass the ball”); and to create facilitative attitudes for the future mainly by up-regulating self-confidence (e.g., “You will achieve it”), by promoting mastery (e.g., “ “The goal is to do your best”), performance-approach (e.g., “Your goal is to win”) and performance-avoidance goals (e.g., “You mustn’t lose today”), and motivation (e.g., “Go and have fun ”) [5–9]. Finally, in terms of nature, spontaneous self-talk can be viewed as a window into the athlete’s mind as it informs, among other things, about athletes’ performance beliefs (“I can perform well”),

goal orientations (“I want be better than others”), irrational beliefs (“I have to win”), thoughts of disengagement (“I want to give up”), and causal attributions of success (“I played well”), and of failure (“I was unlucky”) [5]. Conversely, goal-directed self-talk is a rational process of thought that is deliberately employed for self-regulation [5].

Although, the two theory-driven approaches that had been recently introduced into the study of self-talk [1,3,6] in sport, have been of particularly importance in forwarding the self-talk literature and advancing our understanding regarding athlete’s self-talk, their emerged concepts have not been operationalized yet to allow assessment suitable for quantitative research methodologies [10,11]. To date, in sport psychology, the research on strategic self-talk, and especially on its effects on sport performance has dominated the self-talk literature [1,3,4]. Moreover, another research area that has attracted significant research attention in recent years is the study of the potential mechanisms/functions that may explain the facilitative effects of self-talk on sport performance [12]. On the contrary, the research on organic self-talk, and especially on the antecedents of athletes’ organic self-talk is yet at a developmental stage [4,11]. Given the wide-reaching behavioral, motivational, affective, and cognitive consequences of self-talk [13], several researchers [4,14] have repeatedly suggested that determining the factors that shape athletes’ organic self-talk should become a priority in self-talk research in sport psychology. The study of the factors that shape athletes’ organic self-talk has been considered an important research direction, because it will help us to intervene and change these factors, thus regulating athletes’ organic self-talk according to individual needs [4,11].

Hardy et al. [13] proposed a working framework for the study and application of self-talk within sport and based on the existing research evidence, they suggested two general classes of self-talk antecedents: personal and situational; and four possible underpinning mechanisms that may explain the self-talk-performance relationship:

cognitive, motivational, behavioral, and affective. Personal antecedents include factors such as individuals' cognitive processing preferences, belief in self-talk, global personality traits, and achievement goal orientations [13]. On the other hand, situational antecedents involve factors such as task difficulty, match circumstances, the influence of significant others, and competitive setting [13]. Theodorakis et al. [4] supported the framework, but considering the research findings [15–18] outlining the influence of coaches' behavior on athletes' organic self-talk, they advocated that coaches' and significance others' behavior should be separated to form a third class of self-talk antecedents, termed social-environmental factors. Although Hardy et al. [13] provided a strong theoretical framework for self-talk research in sport, they noticed that their proposed model was sequential in form, and that the relationships among self-talk and related variables could be more complex, possibly circular and reciprocal. Thus, Van Raalte et al. [3] built upon Hardy et al.'s [13] self-talk framework in sport, integrating discursive and dual process theories, and created a sport specific model of self-talk. In summary, Van Raalte et al. [3] in their sport-specific model of self-talk attempted to illustrate and explain the dynamic interrelationships that maybe exist among: personal factors, situational factors (referred to as contextual factors in this model), System 1 and System 2 processing (which have respectively the same characteristics with System 1 and System 2 self-talk mentioned above), System 1 and System 2 self-talk, and behavior.

Sport-specific research on personal antecedents of organic self-talk has shown that achievement goal orientations [19–21], autonomous/controlled motivation [10], belief in self-talk [22], and global personality traits such as self-concept [23] and trait anxiety [14] are related to athletes' organic self-talk. Similarly, sport-specific research on situational antecedents of organic self-talk has indicated that match circumstances [8,9,24], practice circumstances [9,25], goal-performance discrepancies [26,27], competitive setting, [9,28],

pre-competitive state anxiety [26], and emotion-eliciting sport-situations [7,29] are linked to athletes' organic self-talk. Finally, sport-specific research on social-environmental antecedents of organic self-talk revealed that supportive and unsupportive coaching behaviors [15–17], perceived coach's social support [18], perceptions of empowering and disempowering coach-created motivational climate [30], and athletes' perceived satisfaction of Basic Psychological Needs (BPNs; i.e., for autonomy, competence and relatedness) within their sport environment [10], could shape athletes' organic self-talk. In this point, we should mention that almost all the aforementioned research into the antecedents of athletes' organic self-talk [10,14–24,26–28,30] had been conducted either before researchers distinguishing between uncontrolled type (i.e., spontaneous and System 1 self-talk) and controlled type of self-talk (i.e., goal-directed and System 2 self-talk), or before operationalizing these constructs to allow assessment suitable for qualitative methodologies. The only exception are Latinjak et al.'s qualitative studies into the antecedents of athletes' organic, spontaneous [7,29] and goal-directed [7–9,25] self-talk, which were conducted after the classification of organic self-talk into these two major categories.

As a result, most of the quantitative research into the antecedents of athletes' organic self-talk had adopted the wider, traditional distinction between positive and negative organic self-talk, and their respective sub-dimensions [10,14–22,24,26–28,30], using for their assessment various measures, sport-specific or measures that adapted from other contexts into sport. However, researchers [10,17,18,30] used mainly the latest years for the measurement of athletes' organic self-talk, the Automatic Self-Talk Questionnaire for Sports (ASTQS), a comprehensive, sport-specific, instrument developed by Zourbanos et al. [2], for the assessment of the content and the structure of athletes' organic self-talk. Particularly ASTQS is a psychometrically sound, trait, self-report questionnaire assessing

four positive (psych up, anxiety control, confidence, instruction); and four negative (worry, disengagement, somatic fatigue, irrelevant thoughts) self-talk dimensions. Even though, ASTQS includes statements, and therefore factors that can be described as spontaneous or System 1 self-talk (e.g., worry and disengagement) and goal-directed or System 2 self-talk (e.g., instruction and confidence), these distinctions had not been made in the development of ASTQS, as they introduced years later.

Thus, in an attempt to develop a measure that will take into account also the contemporary theory-driven classifications of athletes' organic self-talk, Karamitrou et al. [31] developed the Organic Self-Talk Questionnaire for Sport (OSTQS). The OSTQS is a theory-based, multidimensional, state measure of athletes' organic self-talk, that assesses according to Latinjak et al.'s contemporary conceptual framework of organic self-talk in sport [1,6], the two major types of athletes' organic self-talk on a state level: spontaneous (uncontrolled) and goal-directed (controlled) self-talk. Spontaneous (uncontrolled) organic self-talk consists of four spontaneous self-talk dimensions, namely: retrospective-positive, anticipatory-positive, retrospective-negative, and anticipatory-negative self-talk. On the other hand, goal-directed (controlled) organic self-talk consists of seven goal-directed functions, namely: controlling cognitive reactions, controlling dysfunctional activated/deactivated states, creating functional activated states, creating functional deactivated states, up-regulating self-confidence, instruction, and promoting goals. Karamitrou et al. [31] provided support for the psychometrics properties of the OSTQS, though evidence of construct validity (i.e., factorial, convergent, and discriminant validity), and internal consistency of the scale, in athletes from a variety of team and individual sports, and age groups. However, to the best of authors' knowledge, there are no to date quantitative studies into the antecedents of athletes' spontaneous and goal-directed self-talk. Thus, contributing to the achievement of SDG3, and using a quantitative research design

and OSTQS for the assessment of athletes' spontaneous and goal-directed self-talk, the purpose of this study was twofold:

1. To examine three unexplored, potential antecedents of athletes' spontaneous and goal-directed self-talk, and particularly: a) personality traits as personal antecedents and b) athletes' BPNs satisfaction, and c) BPNs frustration within their sport environment, as social-environmental antecedents of athletes' spontaneous and goal-directed self-talk.
2. To provide evidence regarding the nomological validity of OSTQS (i.e., the extent to which the construct assessed by the scale relates to other concepts such as antecedents or consequences, based on existing theory or a theoretical model [32]) by a detailed examination of the relations between athletes' spontaneous and goal-directed self-talk with their antecedents, that is the variables of the big five personality traits, BPNs satisfaction, and BPNs frustration.

Personality and Athletes' Organic Self-Talk

Similarly to all people, athletes' personality inevitably contribute to how they think, talk to themselves feel, and, behave, when they participate in their sport, as well as in other domains of their life. Cervone and Pervin [33] defined personality as “psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking and behaving” (p. 8). Trait theorists have achieved a consensus that we are able to understand personality via five major personality traits, or in other words a five-factor model, typically termed the *Big Five Model (BFM)* of *personality* traits [34,35]. The *BFM* constitutes a widely accepted, robust, and comprehensive broad-based taxonomy of individual differences in personality [34,35]. It is a hierarchical model that suggests that the five major personality trait dimensions, named emotional stability, extraversion, openness/intellect, agreeableness, and conscientiousness, each enclose a number of more

specific traits (termed facets) [34,35]. Emotional stability (also often referred to by its inverse—Neuroticism), includes traits like experiencing stable and positive emotional states (e.g., calm, secure, controlled, and even-tempered); generation of rational and positive thoughts, and holding rational beliefs [34,35]. Extraversion refers to an individual's tendency to experience positive emotions, and to be sociable, outgoing, talkative, energetic, enthusiastic, cheerful, and assertive [34,35]. Openness/intellect (also often referred to as openness to new experiences or imagination) reflects the extent to which an individual is intellectually curious, creative, imaginative, and open to new experiences, ideas, and change [34,35]. Agreeableness contrasts with antagonism and refers to the extent to which an individual is trusting, compassionate (i.e., warm-hearted, unselfish, and forgiving), modest, cooperative, altruistic, and compliant [34,35]. Finally, conscientiousness refers to an individual's tendency toward organization, punctuality, hardworkingness, reliability, self control, self-discipline, and to be persistent, goal-directed, and purposeful in cognition and behavior [34,35].

As already mentioned above, previous research on athletes' organic self-talk antecedents has indicated that global personality traits such as self-concept [23], trait anxiety [14], and achievement goal orientations [19–21] are related to athletes' organic self-talk. Thus, it is reasonable to expect that the big five personality traits to be also a kind of personal antecedents of athletes' organic self-talk, both spontaneous and goal-directed self-talk. Moreover, previous research in sport has shown that the big five personality traits influence athletes' sport-related cognitive appraisals, emotional regulation, and coping behaviors. Athletes' spontaneous and goal-directed self-talk *constitute an integral part, and play an essential role in all of these processes*. For instance, Lazarus and Folkman [36] defined cognitive appraisal as the process of a cognitive evaluation of an environmental stimulus, that is internal or external to the individual, with regard to its significance for

individual well being, and/or the attainment of personal goals. Lazarus [37] *differentiates* between two important and equal types of appraisal: primary appraisal and secondary appraisal. Primary appraisal refers to individual evaluation of a situation in relation to a person's goals and values, and may happen consciously and/or unconsciously. Lazarus and Folkman [36] identified three types of primary appraisal: Emotional irrelevant appraisals refer to those situations that are appraised as neither threatening nor harmful, nor of potential benefit to the individual. Benign-positive appraisals, refers to the evaluations of situations with a potential to enhance an individual's well-being. Stressful appraisals, refers to evaluations that indicate a substantial threat to individual well-being. The situations appraised as stressful can include perceptions of harm/loss (the situation has already left damage to one's goal, values, or beliefs), threat (the damage to one's goal, values, or beliefs is possible), or challenge (i.e., the person positively perceives an obstacle towards their goal, values, or beliefs). The secondary appraisal refers to the conscious and/or unconscious evaluation of one's coping resources for dealing with the situation, as well as the level of control over it that one possesses [36]. As it is evident from the description of cognitive appraisal processes above, spontaneous and goal-directed self-talk play a key role in cognitive appraisals, both primary and secondary. The same also happens with the coping process. According to a recent coping conceptualization [38], coping refers to both intentional/volitional and automatized/ unintentional cognitive, emotional, and behavioral responses to stress. As this definition implies, both spontaneous and goal-directed organic self-talk play a key role in the coping process, as intentional (i.e., goal-directed self-talk) and unintentional (i.e., spontaneous self-talk) cognitive responses to stress.

With respect to the research findings on the relationships between big five personality traits and cognitive appraisals, Kaiseler et al. [39] in a study in sport setting, examined the relationships between athletes' big five personality traits with their appraisals

(intensity, control) of a sport-specific, self-selected stressor. The authors found that neuroticism (low emotional stability) significantly predicted higher levels of stress intensity and lower levels of perceived stressor control. Conversely, agreeableness significantly predicted lower levels of stress intensity, whereas consciousness significantly predicted higher levels of perceived stressor control. Similar research findings were also found in studies conducted in non-sport settings. For instance, Eysenck [40] reported that individuals high in Neuroticism, and in particular in trait anxiety, tended to appraise events as more harmful (i.e., damage that has already occurred) or threatening (i.e., anticipation of harms and losses that may occur). Similarly, Gunthert et al. [41] found that college students high in Neuroticism, compared with students low in Neuroticism, had more negative primary and secondary appraisals of their stressful daily events, and also they reacted with more distress in response to those appraisals. In contrast, Semmer [42] reported that extraversion has been positively related to positive appraisal of coping resources.

With regard to the research findings on the relationships between big five personality traits and coping, Allen et al. [43,44] in two studies in sport, examined the relationships between athletes' big five personality traits with their sport-related, dispositional coping. The researchers found that extraversion [43] and consciousness [44] significantly and positively predicted athletes' problem-focused coping in their sport (i.e., strategies aimed to actively change and remain in the sport-related stressful situation; e.g., "I look for ways to solve the problem or change the situation."). Consciousness was also found [43] to be a significant (positive) predictor of athletes' emotion-focused coping in their sport (i.e., strategies used to change the meaning of stressful situation and regulate emotional arousal and distress that arises, while remaining in this; e.g., "I try to view the situation in a way that make it seem less stressful."). In contrast, the researchers reported that athletes' avoidance coping in their sport (i.e., strategies aimed to remove oneself

mentally or physically from the sport-related stressor; e.g., “I try to get away from the situation to reduce the stress.”) was significantly predicted by neuroticism (low emotional stability) (positively) [43,44], agreeableness (negatively) [44], and openness (negatively) [43,44].

Similarly, Kaiseler et al. [39] in their study in sport context reported above, examined also the relationships between athletes’ big five personality traits with coping strategies during a specific stressful event in their sport (situational measure of coping). The authors found that neuroticism (low emotional stability) significantly and positively predicted the avoidance coping strategy behavioral disengagement (e.g., “I decreased the amount of time and effort I put into my performance”), and the emotion-focused coping strategies venting emotions (e.g., “I felt a lot of upset feelings, and I showed those feelings a lot.”), and wishful thinking (e.g., “I wished the situation would go away or somehow be over.”). Conversely, the researchers found that neuroticism (low emotional stability) significantly and negatively predicted the problem-focused coping strategies planning (e.g., “I thought hard about what steps to take to manage this situation.”), suppression of competing activities (e.g., “I stopped doing other things in order to concentrate on my performance.”), and increasing effort (e.g., “I worked harder.”). On the other hand, consciousness was found to significantly and positively predict the problem-focused coping strategies planning and suppression of competing activities, as well as the emotion-focused coping strategy seeking emotional social support (e.g., “I talked about my feelings with someone.); whereas it was found to significantly and negatively predict the emotion-focused coping strategies humor (e.g., “I made jokes about my performance”), and wishful thinking. Likewise, extraversion significantly and positively predicted the emotion focused coping strategy seeking emotional social support, as well as the problem-focused coping strategies increasing effort, and seeking informational social support (e.g., “I talked to

someone who could do something about my performance.”). Agreeableness was a significant and positive predictor only of problem-focused coping strategy active coping (e.g., “I did what had to be done, one step at a time.”), whereas emerged as a significant and negative predictor of the problem-focused coping strategy planning, and the emotion-focused coping strategies venting emotions, and self-blame (e.g., “I blamed myself for the situation.”). Finally, openness was found to be a significant and positive predictor of problem-focused coping strategy planning and the emotion-focused coping strategy wishful thinking.

Finally, Kaiseler et al. [45] in another relevant study in sport setting examined the relationships between athletes’ big five personality traits with dispositional coping during sport competitions. The results showed that extraversion, agreeableness, and openness significantly and positively predicted task-oriented coping, that is strategies used by athletes to manage the internal and external demands of sport competitions, such as thought control (e.g., “I replace my negative thoughts with positive ones.”), logical analysis (e.g., “I think about the possible solutions in order to manage the situation.”), effort expenditure (e.g., “I give my best effort.”), mental imagery (e.g., “I visualize myself doing a good performance.”), relaxation (e.g., “I try to relax my body.”), and seeking support (e.g., “I talk to someone who is able to motivate me.”). Agreeableness, conscientiousness, and extraversion significantly and negatively predicted distraction-oriented coping, which refers to strategies that used by athletes to direct their attention **temporarily** to factors that are unrelated to a sport competition, such as distancing from the social interactions (e.g., “I keep all people at a distance.”), and mental distraction (e.g., “I entertain myself in order not to think about the competition.”). Moreover, agreeableness and conscientiousness significantly and negatively predicted disengagement -oriented coping, which refers to strategies that used by athletes to disengage from the processes that could lead to their goal

attainment such as disengagement/resignation (e.g., “I doubt my ability to attain my goal.”), and venting of unpleasant emotions (e.g., “ I use swear words loudly or in my head in order to expel my anger.”). In contrast, neuroticism (low emotional stability) and extraversion significantly and positively predicted disengagement -oriented coping. Finally neuroticism (low emotional stability) emerged as a significant and positive predictor of distraction-oriented coping, and the only significant and negative predictor of coping effectiveness.

BPNs Satisfaction, Frustration, and Athletes’ Organic Self-Talk

Self-determination theory (SDT; [46,47]) is a meta-theory of human motivation and personality that has been applied in a variety of life domains (e.g., sport and exercise, education, workplace, health care, personal relationships, psychotherapy) and cultures, receiving a plethora of empirical support. Besides these, SDT has also provided a framework which could help us to enhance our understanding regarding the antecedents [10,48,49] and the interpretation of self-talk [50]. More particularly, Basic Psychological Needs Theory (BPNT; [47]), one of the six mini-theories within the SDT, proposes that people have three BPNs for autonomy, competence and relatedness, the satisfaction of which is essential for optimal functioning, growth, and well-being [47,51]. BPNT postulates a dual-process model in explaining human functioning with two parallel pathways, a bright and a dark pathway, based on the distinction between the satisfaction and the frustration of the three BPNs. BPNs satisfaction constitutes the bright pathway of human functioning, as it contributes to proactivity, integration, and well-being, whereas BPNs frustration represents the dark pathway of human functioning, as makes one vulnerable to passivity, fragmentation, and illness [52,53]. Autonomy satisfaction refers to the experience of volition, the self-endorsement of one’s actions, and psychological freedom. On the other hand, autonomy frustration refers to the experience of a sense of pressure and often internal conflict, such as feeling pushed in an unwanted direction [53].

Competence need refers to the experience of effectiveness and mastery, and is satisfied by capably engaging in activities, and also by experiencing opportunities for using and extending skills and expertness. In contrast, competence frustration refers to the experience of a sense of inefficacy, or even failure and helplessness [53]. Finally, relatedness need concerns the experience of warmth, bonding, and care in interpersonal relationships, and is satisfied by genuinely connecting to and feeling significant to others. Conversely, relatedness frustration refers to the experience of a sense of social alienation, exclusion, and loneliness [53].

Decades of SDT-based research has broadly shown in different life domains the benefits of need satisfaction for the quality of motivation, growth, human functioning, and physical and psychological well-being [52,53]. Moreover, over the past few years, the concept of need frustration has received increased research attention, where studies have shown the detrimental consequences of need frustration [52–56]. SDT-based research has also broadly indicated in different life domains that need satisfaction and need frustration may co-occur to different degrees within the same context, rather than being two opposite poles along a need satisfaction continuum. Need satisfaction and need frustration constitute distinct psychological experiences, and are related to different antecedents and consequences [52,53,57]. Particularly, need frustration is experienced when the three BPNs are actively undermined within social contexts, and is a different, stronger, and more harmful experience than the mere lack of need satisfaction, which represents a more passive obstruction of the three BPNs [52,53]. For instance an athlete may feel low relatedness to teammates in his team, and thus he may have less vitality and excitement for sport participation. But an athlete may also be actively rejected or excluded by his teammates, and in this case he may suffer from depression or severe symptoms of stress. Thus, the relationship between need satisfaction and need frustration is considered to be asymmetrical

[52,53]. That is, low levels of need satisfaction do not necessarily imply the presence of need frustration, whereas need frustration by definition involves low need satisfaction [52]. Supporting the presumed asymmetrical relation between need satisfaction and need frustration a moderate negative relationship between both was found in previous research [52].

SDT-based research in sport settings has repeatedly focused on both need satisfaction and need frustration, and explored their differential associations with motivation and psychological functioning [52,54,55]. It was found that measures of athletes' perceived need satisfaction were positively related to adaptive responses, including higher levels of autonomous motivation and flow, higher frequency of positive self-talk, better sport performance, greater persistence in sport, more adaptive developmental experiences, and increased well-being as measured by indicators such as self-esteem, positive affect, enjoyment, and subjective vitality [58–64]. Conversely, athletes' low scores on measures of perceived need satisfaction were found to be related to maladaptive consequences, such as negative affect, negative self-talk, physical symptoms, burnout and drop out from sport [59,60,63,66]. Specifically, with regard to the study of athletes' organic self-talk antecedents, Karamitrou et al. [10], using the ASTQS for the assessment of athletes' organic self-talk, examined the relationships among basic need satisfaction, behavioral regulations, with athletes' organic self-talk among a sample of 381 athletes. They found that satisfaction of the need for competence positively predicted positive self-talk and negatively predicted negative self-talk, both directly and indirectly via autonomous motivation. Satisfaction of the need for autonomy positively predicted positive self-talk both directly and indirectly via autonomous motivation, whereas negatively predicted negative self-talk, in an indirect way via both autonomous and controlled motivation (inversely). Lastly, satisfaction of the need for relatedness indirectly predicted

athletes' positive self-talk (positively) and negative self-talk (negatively) through autonomous motivation.

Although previous SDT-based research in sport has indicated that low need satisfaction is associated with ill-being, this finding has not always been replicated in the literature, and some studies showed that low scores on need satisfaction were unrelated to ill-being [58,67]. Bartholomew et al. [54] suggested that this may be the result of the fact that previous SDT-based research has not explicitly assessed need frustration in relation to negative outcomes, but inadvertently equated it with low need satisfaction. Specifically, Bartholomew et al. [54] posited that low scores on measures of need satisfaction may simply reflect need dissatisfaction, and not adequately tap the active nature and intensity of need frustration that Deci and Ryan [47] described as states of need thwarting (e.g., "I do not feel related" vs. "I feel I am rejected"). Indeed, subsequent studies [55,68] has also included assessments of need frustration, and showed that athletes' need frustration, in relation to low need satisfaction, was consistently a better predictor of maladaptive outcomes (disordered eating, burnout, depression, negative affect, and physical symptoms).

With regard to the study of organic self-talk antecedents, Brisimis et al. [48] in a study conducted in the context of physical education, examined among primary and secondary education students, the relationships between need satisfaction, need frustration, and organic self-talk. The researchers used the ASTQS for the assessment of organic self-talk, as it was adapted for the context of physical education. They found that only competence need frustration significantly predicted (negatively) students' positive self-talk. Conversely, relatedness and autonomy needs satisfaction emerged as the two negative and significant predictors of students' negative self-talk, whereas competence and relatedness needs frustration emerged as the two positive and significant predictors of students' negative self-talk. Nevertheless, to date, as far as we know, no studies in the sport context

have examined athletes' BPNs frustration as an antecedent of athletes' organic self-talk. Additionally, to the best of our knowledge, to date there are no quantitative studies in the sport context that examined athletes' BPNs satisfaction and frustration as antecedents of the two contemporary classifications of athletes' organic self-talk, that is spontaneous and goal-directed self-talk, and their sub-classifications.

Therefore, based on SDG3, BFM of personality traits, and SDT; and using a quantitative research design and the OSTQS for the assessment of athletes' spontaneous and goal-directed self-talk, the purpose of this study was twofold:

3. To provide evidence regarding the nomological validity of OSTQS (i.e., the degree to which the construct assessed by the scale relates to other concepts such as its antecedents or its consequences, according to an existing theory or a theoretical model [32]) by a detailed examination of the relations between athletes' spontaneous and goal-directed self-talk with their antecedents, and particularly the variables of the big five personality traits, BPNs satisfaction, and BPNs frustration

4. To examine whether a) the big five personality traits as personal antecedents, and b) athletes' BPNs satisfaction and frustration within their sport environment, as social-environmental antecedents would predict athletes' spontaneous and goal-directed self-talk. More specifically, we are interested in analyzing the incremental contribution of BPNs satisfaction and frustration to the prediction of athletes' spontaneous and goal-directed self-talk, over and above athletes' big five personality traits and BPNs satisfaction respectively.

The research into the factors that shape athletes' organic self-talk is important, because it will help us to intervene and modify these factors, so as to regulate athletes' organic self-talk according to their personal needs [4,11], and also to promote athletes' physical and mental health and well-being in line with SDG3. Although, athletes' big five

personality traits are considered relatively stable, and consequently more difficult to be changed through interventions, athletes' BPNs satisfaction and frustration within their sport environment could be easily changed through the appropriate interventions [11]. Finally, the interventions that aim to change the social-environmental antecedents of athletes' organic self-talk (such as motivational climate and coaching behavior), have been considered as having the potential to also change the personal antecedents of athletes' organic self-talk (e.g., goal orientation, behavioral regulations, self-concept, trait anxiety, etc) as well athletes' situational perceptions [11].

Materials and Methods

Participants

The participants in this study were 691 athletes (363 males and 328 females) with a mean age of 21.65 (\pm 8.06) years. The athletes represented a variety of team (e.g., football, basketball, volleyball, water polo, and handball: $n = 421$) and individual (e.g., athletics, swimming, finswimming, rhythmic gymnastics, tennis, taekwondo, karate, boxing, kickboxing, wrestling weight lifting, fencing, windsurfing, etc.: $n = 270$) sports. With regard to competitive level, 12.7% of them had competed at international level, 39.5% at national level, and 47.8% at regional or county level. Finally, the mean competitive experience of the participants was 7.58(\pm 5.44) years.

Measures

The Big-Five Personality Traits

The Greek version of the 50-item International Personality Item Pool (IPIP) **big-five factor markers** [69] was used to assess athletes' big five personality traits. The instrument is a self-report personality scale consisting of 50 items and five factors (10 items per factor) designed to assess the big five personality traits (i.e., extraversion, agreeableness,

conscientiousness, emotional stability, and intellect/openness) as expressed in Costa and McCrae's [34] revised NEO personality inventory (NEO-PI-R). Example items for each personality trait include: "I make friends easily" for extraversion; "I sympathize with others' feeling" for agreeableness; "I follow a schedule" for conscientiousness; "I get stressed out easily" (reversed item) for emotional stability; and "I am quick to understand things" for intellect/openness. As in the original measure, participants were instructed to respond regarding how accurately they believed each statement described themselves on a 5-point Likert-type scale ranging from 1 (very inaccurate) to 5 (very accurate). Ypofanti et al. [70] reported satisfactory evidence for the validity and reliability of the translated scale on the general population in Greece.

Athletes' Organic Self-Talk

Athletes' organic self-talk was measured using the OSTQS. The OSTQS is a theory-grounded, multidimensional, state measure of athletes' organic self-talk, that assesses according to Latinjak et al.'s contemporary conceptual framework of organic self-talk in sport [1,6], the two major types of athletes' organic self-talk: spontaneous and goal-directed self-talk. The instrument consists of 45 items, 17 assessing four dimensions of athletes' state spontaneous self-talk, and 28 assessing seven functions of athletes' state goal-directed self-talk. Particularly, athletes' state spontaneous self-talk is consisted of the dimensions of retrospective positive (five items; e.g., "I have performed well"), anticipatory-positive (four items; e.g., "I will succeed"), retrospective-negative (five items; e.g., "I have failed"), and anticipatory-negative (three items; e.g., "I want to give up") self-talk. On the other hand, athletes' state goal-directed self-talk consists of the functions of controlling cognitive reactions (four items; e.g., "It does not matter. *No one is perfect*"), controlling dysfunctional activated/deactivated states (four items; e.g., "Do not worry"/"Do not be disappointed"), creating functional deactivated states four items (e.g., "Calm

down”), creating functional activated states (e.g., “Give it all”), instruction (e.g., “Focus on your technique/tactic ”), up-regulating self-confidence (e.g., “You can do it”), and promoting goals (e.g., “The goal is to perform well”). The participants were asked to read each statement and to indicate how frequently they had told it to themselves during the competition or training they just had participated in a 5-point Likert-type scale ranging from 0 (*never*) to 4 (*very often*). Karamitrou et al. [31] has supported the validity and the reliability of the OSTQS in athletes from a variety of team and individual sports, and age groups.

Athletes’ BPNs Satisfaction

Items from three previous validated questionnaires were used to assess athletes’ perceptions of the degree to which they experienced satisfaction of the three BPNs. Particularly, to assess satisfaction of the need for autonomy, we used the five items (e.g., “I have some choice in what I want to do in my sport”) collated by Standage et al. [71]. Satisfaction of the need for competence was assessed using the five items (e.g., “I think I am pretty good at my sport”) from the competence subscale of the Intrinsic Motivation Inventory (IMI; [72]). Lastly, satisfaction of the need for relatedness was assessed using the five-items (e.g., “When participating in my sport I feel supported”) from the acceptance subscale of the Need for Relatedness Scale (NRS-10; [73]). Responses for all three questionnaires were provided on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The psychometric properties of three aforementioned questionnaires have been previously examined in Greek athletes with satisfactory results [74].

Athletes’ BPNs frustration

The Greek version of the 12-item Psychological Need Thwarting Scale (PNTS; [54]) was administered to assess athletes’ perceptions of the degree to which they

experienced frustration of the three BPNs of autonomy (four items; e.g., “I feel forced to follow training decisions made for me”), competence (four items; e.g., “There are times when I am told things that make me feel incompetent”), and relatedness (four items; e.g., “I feel I am rejected by those around me”) within their sport environment. Athletes were instructed to consider their general experiences in the sport context, during the last four weeks, and indicate how much they agreed or disagreed with each statement on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Previous research has also used the Greek version PNTS with good psychometric properties [74].

Procedure

This research was conducted in accordance with international ethical guidelines that are consistent with the American Psychological Association guidelines, and with the Declaration of Helsinki. Prior to the beginning of data collection, ethical approval was sought and received from the first author’s university Ethics Committee (approval number: 1219, 5/4/2017). Subsequently sports clubs, administrators, and clubs coaches were contacted in order to explain the purpose and nature of the study, and to invite their athletes to participate. Similarly, all participants were informed regarding the purpose and nature of our research, their voluntary participation, their right to withdraw from the study at any time they wished to, and the anonymity and confidentiality of their responses. Coach and athlete consent were provided prior to participation, while, parental consent was obtained for every athlete under the age of 16. The primary researcher and a trained research assistant administered the questionnaires described above immediately after the end of a competition or a regular practice, and supervised their completion in all cases without the presence of coach. Instructions about how to complete the questionnaire were provided orally and in written format, while participants were repeatedly reminded that there were no right or wrong answers. Athletes needed approximately 20-25 to complete the questionnaires.

Data Analysis

After screening for outliers and normality, descriptive statistics, internal consistency coefficients (Cronbach's alphas), and Pearson's correlations for all study variables were calculated. The nomological validity of OSTQS was examined through Pearson's correlations between the OSTQS subscales, and the subscales of big five personality traits; BPNs satisfaction; and BPNs frustration. Finally, hierarchical multiple regressions were conducted for each OSTQS subscale in order to examine whether the big five personality traits, and athletes' BPNs satisfaction and frustration within their sport environment, could predict the four dimensions of athletes' spontaneous self-talk, as well as the seven functions of athletes' goal-directed self-talk,. In each of the analyses conducted, the big five personality traits subscales were entered in step 1, the three BPNs satisfaction subscales were entered in step 2, whereas the three BPNs frustration subscales were entered in step 3. We entered first the big five personality traits, as they are relatively stable; are considered to have a more general influence on thoughts and behavior; and we want to control for their effects in the two consecutive steps. In the second step, we entered the three BPNs satisfaction subscales, as we want to examine whether they could add to the prediction of the dependent variables after controlling for the big five personality traits. Finally, in the third and final step, we entered the three BPNs frustration subscales, as we want to examine whether they could add to the prediction of the dependent variables after controlling for the satisfaction of three basic psychological needs and the big five personality traits.

Results

Descriptive Statistics, Reliabilities, and Correlations

Descriptive statistics (means, standard deviations), Cronbach's alpha reliability coefficients, and correlations for all subscales are presented in Table 4.1. Examination of

Cronbach's alpha coefficients (ranging from 0.68 to 0.88), revealed adequate internal consistency ($\alpha > 0.70$) for almost all subscales, except for the competence need satisfaction subscale ($\alpha = 0.68$) and agreeableness subscale ($\alpha = 0.69$), whose reliability coefficients were marginally acceptable. The mean scores indicated that the athletes in this study scored moderately to high on the big five personality traits subscales; on the retrospective-positive and anticipatory-positive spontaneous self-talk subscales; on all goal-directed self-talk subscales with the exception of controlling cognitive reactions; as well as on the three BPNs satisfaction subscales. In contrast, the participants scored low to moderately in the retrospective-negative and anticipatory-negative spontaneous self-talk subscales; on the controlling cognitive reactions subscale of goal-directed self-talk; and on the three BPNs frustration subscales.

Nomological Validity of OSTQS

The nomological validity of OSTQS was tested via examination of Pearson's correlations between the OSTQS subscales, and the subscales of the big five personality traits, BPNs satisfaction, and BPNs frustration. The two positive dimensions of spontaneous self-talk, retrospective-positive and anticipatory-positive self-talk, showed low to moderate positive significant correlations with the big five personality traits, and low to large positive significant correlations with the three forms of BPNs satisfaction. In contrast, low negative significant correlations were found among the dimensions of retrospective-positive and anticipatory-positive self-talk with the three forms of BPNs frustration (with the exception of the correlations between competence need frustration and anticipatory-positive self-talk, and relatedness need frustration and retrospective-positive self-talk, which although negative, were not significant). On the other hand, low to moderate negative significant correlations were found among retrospective-negative and anticipatory-negative self-talk with the big five personality traits (with the exception of the correlations

among agreeableness with retrospective-negative and anticipatory-negative self-talk, and intellect/openness with anticipatory-negative self-talk, which were negative but not significant). Similarly, low negative significant correlations were found among retrospective-negative and anticipatory-negative self-talk with the three forms of BPNs satisfaction, apart from the correlation between anticipatory-negative self-talk and autonomy need satisfaction which was negative, and non statistically significant. In contrast, low to moderate positive significant correlations were found among retrospective-negative and anticipatory-negative self-talk with the three forms of BPNs frustration.

With regard to the goal-directed self-talk subscales, extraversion, agreeableness, consciousness, and intellect/openness had low positive significant correlations with all goal-directed self-talk functions, with the exception of the correlations among extraversion with controlling cognitive reactions and creating functional deactivated states functions of goal-directed self-talk, and also the correlation between consciousness and controlling cognitive reactions function of goal-directed self-talk, all of which were positive and non-significant. In contrast, emotional stability had low negative significant correlations with controlling cognitive reactions, controlling dysfunctional activated/deactivated states, creating functional deactivated states functions, and instruction functions of goal-directed self-talk, and negative non-significant correlations with creating functional activated states self-talk; up-regulating self-confidence, and promoting goals functions of goal-directed self-talk. All goal-directed self-talk functions had low to moderate positive significant correlations with the three forms of BPNs satisfaction. Low positive significant correlations were also found among the controlling cognitive reactions function with the three forms of BPNs frustration, between the controlling dysfunctional activated/deactivated states function with relatedness need frustration, and among creating functional deactivated states function with competence and relatedness needs frustration. Finally, low non-significant

correlations were found among the three forms of BPNs frustration with the creating functional deactivated states, instruction, up-regulating self-confidence, and promoting goals functions of goal-directed self-talk.

Overall, the above results provide support to the nomological validity of the OSTQS, by showing the relationships among spontaneous self-talk dimensions and goal-directed self-talk functions with their personal and social-environmental antecedents, based on the existing theoretical models of self-talk in sport [1,3,6,13], the BFM of personality trait [34,35], and SDT [46,47].

Hierarchical Regression Analyses for Predicting Athletes' Spontaneous Self-Talk

Dimensions

Four 3-step hierarchical regression analyses were conducted to examine whether the five personality traits, and athletes' BPNs satisfaction and frustration within their sport environment could predict the four dimensions of athletes' spontaneous self-talk. The results of the four hierarchical multiple regression analyses are displayed in Table 4.2.

For the retrospective-positive dimension of spontaneous self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.14$). Examination of the beta coefficients in Step 1 indicated that extraversion ($\beta = 0.24, p < 0.001$), intellect/openness ($\beta = 0.12, p = 0.002$), and conscientiousness ($\beta = 0.10, p = 0.008$), were the three significant (positive) predictors of athletes' retrospective-positive self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of athletes' retrospective-positive self-talk ($R^2 = 0.29, R^2$ change = 0.16) over and above that explained by five personality traits alone ($R^2 = 0.14$). Examination of the beta coefficients in Step 2 revealed that only competence need satisfaction ($\beta = 0.41, p < 0.001$), and extraversion ($\beta = 0.15, p < 0.001$) were the two significant (positive) predictors of athletes' retrospective-positive self-talk.

Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they did not significantly contribute to the prediction of athletes' retrospective-positive self-talk ($R^2 = 0.30$, R^2 change = 0.01; F change = 2.22, $p = 0.085$). Examination of the beta coefficients from the entire model revealed that the only significant (positive) predictors of athletes' retrospective-positive self-talk were competence need satisfaction ($\beta = 0.42$, $p < 0.001$), extraversion ($\beta = 0.15$, $p < 0.001$), and unexpectedly autonomy need frustration ($\beta = 0.10$, $p = 0.022$).

For the anticipatory-positive dimension of spontaneous self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.17$). Examination of the beta coefficients in Step 1 revealed that each of the five personality traits significantly and positively predicted athletes' anticipatory-positive self-talk. Particularly, extraversion ($\beta = 0.23$, $p < 0.001$) was the strongest significant predictor of athletes' anticipatory-positive self-talk, followed by conscientiousness ($\beta = 0.13$, $p < 0.001$), emotional stability ($\beta = 0.12$, $p = 0.001$), intellect/openness ($\beta = 0.11$, $p = 0.005$), and agreeableness ($\beta = 0.09$, $p = 0.011$). In Step 2, when the three BPNs satisfaction subscales were added as predictors, they significantly improved the prediction of athletes' anticipatory-positive self-talk ($R^2 = 0.22$, R^2 change = 0.05) over and above that explained by five personality traits alone. However, examination of the beta coefficients in Step 2 revealed that only competence need satisfaction ($\beta = 0.24$, $p < 0.001$), extraversion ($\beta = 0.18$, $p < 0.001$), emotional stability ($\beta = 0.12$, $p = 0.001$), and conscientiousness ($\beta = 0.11$, $p = 0.001$) were significant (positive) predictors of athletes' anticipatory-positive self-talk. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they did not significantly contribute to the prediction of athletes' anticipatory-positive self-talk ($R^2 = 0.22$, R^2 change = 0.00, F change = 0.3, $p = 0.773$). Examination of the beta coefficients from the full model revealed that, similarly to step 2, competence need

satisfaction ($\beta = 0.24, p < 0.001$), extraversion ($\beta = 0.18, p < 0.001$), emotional stability ($\beta = 0.12, p = 0.001$), and conscientiousness ($\beta = 0.12, p = 0.001$) were the only significant (positive) predictors of athletes' anticipatory-positive self-talk.

For the retrospective-negative dimension of spontaneous self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.19$). Examination of the beta coefficients at Step 1 indicated that only emotional stability ($\beta = -0.36, p < 0.001$) and extraversion ($\beta = -0.16, p < 0.001$), were significant (negative) predictors of athletes' retrospective-negative self-talk. At Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of athletes' retrospective-negative self-talk ($R^2 = 0.23, R^2 \text{ change} = 0.04$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 showed that emotional stability ($\beta = -0.37, p < 0.001$), competence need satisfaction ($\beta = -0.18, p < 0.001$), and extraversion ($\beta = -0.12, p = 0.001$), were the three significant (negative) predictors of athletes' retrospective-negative self-talk. In the final and third step, when the three BPNs frustration subscales were added as predictors, they significantly contributed to the prediction of athletes' retrospective-negative self-talk ($R^2 = 0.28, R^2 \text{ change} = 0.06$). Examination of the beta coefficients from the entire model revealed that emotional stability ($\beta = -0.30, p < 0.001$), extraversion ($\beta = -0.14, p < 0.001$), competence need satisfaction ($\beta = -0.24, p < 0.001$), and autonomy need satisfaction ($\beta = -0.08, p = 0.045$) were significant and negative predictors of athletes' retrospective-negative self-talk. Relatedness need satisfaction ($\beta = 0.18, p < 0.001$) emerged as a significant, but in contrast to our expectations, positive predictor of athletes' retrospective-negative self-talk. Finally, competence need frustration ($\beta = 0.23, p < 0.001$) was a significant and positive predictors of athletes' retrospective-negative self-talk.

For the anticipatory-negative dimension of spontaneous self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.12$). Examination of the beta coefficients in Step 1 indicated that emotional stability ($\beta = -0.30, p < 0.001$), extraversion ($\beta = -0.09, p = 0.032$), and conscientiousness ($\beta = -0.08, p = 0.038$), were the three significant and negative predictors of athletes' anticipatory-negative self-talk. At Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of athletes' anticipatory-negative self-talk ($R^2 = 0.18, R^2$ change = 0.06) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 showed that emotional stability ($\beta = -0.29, p < 0.001$), and competence need satisfaction ($\beta = -0.23, p < 0.001$), were significant and negative predictors of athletes' anticipatory-negative self-talk. However, and in contrast to our expectations, autonomy need satisfaction ($\beta = 0.12, p = 0.002$) emerged as a significant and positive predictor of athletes' anticipatory-negative self-talk. In the final and third step, when the three BPNs frustration subscales were added as predictors, they significantly contributed to the prediction of athletes' anticipatory-negative self-talk ($R^2 = 0.19, R^2$ change = 0.01). Likewise the step 2, examination of the beta coefficients from the entire model revealed that emotional stability ($\beta = -0.26, p < 0.001$), and competence need satisfaction ($\beta = -0.26, p < 0.001$), emerged as significant and negative predictors of athletes' anticipatory-negative self-talk, whereas autonomy need satisfaction ($\beta = 0.11, p = 0.004$) emerged in contrast to our expectations as a significant and positive predictor of athletes' anticipatory-negative self-talk.

Hierarchical Regression Analyses for Predicting Athletes' Goal-Directed Self-Talk

Functions

Seven 3-step hierarchical regression analyses were conducted to examine whether the five personality traits, and athletes' BPNs satisfaction and frustration within their sport

environment could predict the seven functions of athletes' goal-directed self-talk. The results of the seven hierarchical multiple regression analyses are displayed in Table 4.3.

For the controlling cognitive reactions function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.05$). Examination of the beta coefficients in Step 1 indicated that agreeableness ($\beta = 0.17, p < 0.001$) significantly and positively predicted the cognitive reactions function of goal-directed self-talk, whereas emotional stability ($\beta = -0.13, p = 0.001$) significantly and negatively predicted the cognitive reactions function of goal-directed self-talk. The other personality traits were not significant predictors of cognitive reactions function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the cognitive reactions function of goal-directed self-talk ($R^2 = 0.07, R^2 \text{ change} = 0.02$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 revealed that agreeableness ($\beta = 0.15, p < 0.001$) and autonomy need satisfaction ($\beta = 0.09, p = 0.042$) were the two positive significant predictors of the cognitive reactions function of goal-directed self-talk, whereas emotional stability ($\beta = -0.13, p = 0.001$) emerged again as a significant and negative predictor of this goal-directed self-talk function. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the cognitive reactions function of goal-directed self-talk ($R^2 = 0.10, R^2 \text{ change} = 0.03$). Examination of the beta coefficients from the entire model revealed that agreeableness ($\beta = 0.15, p < 0.001$), relatedness need satisfaction ($\beta = 0.15, p = 0.007$) and competence need frustration ($\beta = 0.11, p = 0.048$) were the only significant (positive) predictors of the cognitive reactions function of goal-directed self-talk.

For the controlling dysfunctional activated/deactivated states function of goal-directed self-talk the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.12$). Examination of the beta coefficients in Step 1 indicated that agreeableness ($\beta = 0.18, p < 0.001$), conscientiousness ($\beta = 0.11, p = 0.003$), and intellect/openness ($\beta = 0.14, p < 0.001$), significantly and positively predicted the controlling dysfunctional activated/deactivated states function of goal-directed self-talk, whereas emotional stability ($\beta = -0.17, p < 0.001$) significantly and negatively predicted this function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the controlling dysfunctional activated/deactivated states function of goal-directed self-talk ($R^2 = 0.14, R^2$ change = 0.03) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 revealed that agreeableness ($\beta = 0.16, p < 0.001$), conscientiousness ($\beta = 0.10, p = 0.011$), intellect/openness ($\beta = 0.11, p = 0.008$), and competence need satisfaction ($\beta = 0.16, p < 0.001$) were the four positive significant predictors of the controlling dysfunctional activated/deactivated states function of goal-directed self-talk, whereas emotional stability ($\beta = -0.17, p < 0.001$) emerged again as a significant and negative predictor of this goal-directed self-talk function. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the controlling dysfunctional activated/deactivated states function of goal-directed self-talk ($R^2 = 0.17, R^2$ change = 0.02). Examination of the beta coefficients from the entire model revealed that agreeableness ($\beta = 0.16, p < 0.001$), conscientiousness ($\beta = 0.09, p = 0.012$), intellect/openness ($\beta = 0.09, p = 0.024$), competence need satisfaction ($\beta = 0.13, p = 0.003$), and relatedness need frustration ($\beta = 0.21, p < 0.001$), were the five positive significant predictors of the controlling dysfunctional activated/deactivated states function of goal-directed self-talk, whereas

emotional stability ($\beta = -0.12, p = 0.002$) emerged again as a significant, negative predictor of this goal-directed self-talk function.

For the creating functional deactivated states function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.14$). Examination of the beta coefficients in Step 1 indicated that, similarly to the controlling dysfunctional activated/deactivated states function of goal-directed self-talk above, agreeableness ($\beta = 0.17, p < 0.001$), intellect/openness ($\beta = 0.13, p = 0.001$) and conscientiousness ($\beta = 0.11, p = 0.003$), significantly and positively predicted the creating functional deactivated states function of goal-directed self-talk, whereas emotional stability ($\beta = -0.26, p < 0.001$) significantly and negatively predicted this function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they did not significantly contribute to the prediction of the creating functional deactivated states function of goal-directed self-talk ($R^2 = 0.15, R^2 \text{ change} = 0.01, F \text{ change} = 2.31, p = 0.076$) over and above that explained by five personality traits alone. Similarly to the controlling dysfunctional activated/deactivated states function of goal-directed self-talk above, examination of the beta coefficients in Step 2 indicated that agreeableness ($\beta = 0.17, p < 0.001$), intellect/openness ($\beta = 0.11, p = 0.008$) conscientiousness ($\beta = 0.10, p = 0.006$), and competence need satisfaction ($\beta = 0.09, p = 0.038$) were the four positive significant predictors of the creating functional deactivated states function of goal-directed self-talk, whereas emotional stability ($\beta = -0.26, p < 0.001$) emerged again as a significant and negative predictor. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the creating functional deactivated states function of goal-directed self-talk ($R^2 = 0.17, R^2 \text{ change} = 0.02$). Examination of the beta coefficients from the entire model revealed that agreeableness ($\beta = 0.16, p < 0.001$), conscientiousness ($\beta = 0.10, p = 0.008$), intellect/openness ($\beta = 0.09, p =$

0.019), and relatedness need frustration ($\beta = 0.17, p = 0.002$), were the four positive significant predictors of the creating functional deactivated states function of goal-directed self-talk, whereas emotional stability ($\beta = -0.22, p < 0.001$) emerged again as a significant, negative predictor of this goal-directed self-talk function.

For the creating functional activated states function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.10$). Examination of the beta coefficients in Step 1 revealed that extraversion ($\beta = 0.18, p < 0.001$), conscientiousness ($\beta = 0.16, p < 0.001$), and agreeableness ($\beta = 0.11, p = 0.005$), were the three significant (positive) predictors of the creating functional activated states function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the creating functional activated states function of goal-directed self-talk ($R^2 = 0.14, R^2 \text{ change} = 0.04$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 indicated that conscientiousness ($\beta = 0.14, p < 0.001$), extraversion ($\beta = 0.13, p = 0.001$), agreeableness ($\beta = 0.08, p = 0.032$), and competence need satisfaction ($\beta = 0.19, p < 0.001$), were the four significant (positive) predictors of the creating functional activated states function of goal-directed self-talk. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the creating functional activated states function of goal-directed self-talk ($R^2 = 0.15, R^2 \text{ change} = 0.01$). Examination of the beta coefficients from the entire model revealed that conscientiousness ($\beta = 0.15, p < 0.001$), extraversion ($\beta = 0.13, p = 0.002$), agreeableness ($\beta = 0.08, p = 0.029$), competence need satisfaction ($\beta = 0.17, p < 0.001$), relatedness need satisfaction ($\beta = 0.13, p = 0.016$) and relatedness need frustration ($\beta = 0.11, p = 0.044$) were the six significant and positive predictors of the creating functional activated states function of goal-directed self-talk.

For the instruction function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.12$). Examination of the beta coefficients in Step 1 revealed that conscientiousness ($\beta = 0.21, p < 0.001$), extraversion ($\beta = 0.12, p = 0.004$), agreeableness ($\beta = 0.10, p = 0.008$), and intellect/openness ($\beta = 0.09, p = 0.031$) significantly and positively predicted the instruction function of goal-directed self-talk, whereas emotional stability ($\beta = -0.15, p < 0.001$) significantly and negatively predicted this function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the instruction function of goal-directed self-talk ($R^2 = 0.14, R^2 \text{ change} = 0.03$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 revealed that conscientiousness ($\beta = 0.19, p < 0.001$), agreeableness ($\beta = 0.08, p = 0.040$) and competence need satisfaction ($\beta = 0.14, p = 0.001$) were the three significant (positive) predictors of the instruction function of goal-directed self-talk, whereas emotional stability ($\beta = -0.15, p < 0.001$) emerged again as a significant, and negative predictor. Finally, in step 3 when the three BPNs frustration subscales were added as predictors, they did not significantly contribute to the prediction of the instruction function of goal-directed self-talk ($R^2 = 0.15, R^2 \text{ change} = 0.01; F \text{ change} = 2.11, p = 0.098$). Examination of the beta coefficients from the full model revealed that conscientiousness ($\beta = 0.19, p < 0.001$), competence need satisfaction ($\beta = 0.13, p = 0.005$), and relatedness need satisfaction ($\beta = 0.12, p = 0.024$), were the three significant and positive predictors of the instruction function of goal-directed self-talk, whereas emotional stability ($\beta = -0.12, p = 0.002$) emerged again as a significant, and negative predictor.

For the up-regulating self-confidence function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.16$). Examination of the beta coefficients in Step 1 revealed that

conscientiousness ($\beta = 0.20, p < 0.001$), extraversion ($\beta = 0.20, p < 0.001$), intellect/openness ($\beta = 0.12, p = 0.002$), and agreeableness ($\beta = 0.09, p = 0.012$) significantly and positively predicted the up-regulating self-confidence function of goal-directed self-talk, whereas emotional stability ($\beta = -0.07, p = 0.045$) significantly and negatively predicted this function of goal-directed self-talk. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the up-regulating self-confidence function of goal-directed self-talk ($R^2 = 0.22, R^2 \text{ change} = 0.06$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 revealed that conscientiousness ($\beta = 0.18, p < 0.001$), extraversion ($\beta = 0.14, p < 0.001$), and competence need satisfaction ($\beta = 0.25, p < 0.001$) were the three significant and positive predictors of the up-regulating self-confidence function of goal-directed self-talk, whereas emotional stability ($\beta = -0.07, p = 0.045$) was again a significant and negative predictor. Lastly, in the third and final step, when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the up-regulating self-confidence function of goal-directed self-talk ($R^2 = 0.23, R^2 \text{ change} = 0.01$). Examination of the beta coefficients from the entire model revealed that conscientiousness ($\beta = 0.18, p < 0.001$), extraversion ($\beta = 0.14, p < 0.001$), competence need satisfaction ($\beta = 0.24, p < 0.001$), and relatedness need frustration ($\beta = 0.12, p = 0.020$) were the four significant and positive predictors of the up-regulating self-confidence function of goal-directed self-talk.

For the promoting goals function of goal-directed self-talk, the analyses revealed that in step 1 the five personality traits predicted a significant amount of variance ($R^2 = 0.13$). Examination of the beta coefficients in Step 1 revealed that conscientiousness ($\beta = 0.24, p < 0.001$), extraversion ($\beta = 0.20, p < 0.001$) were the two significant and positive predictors of the promoting goals function of goal-directed self-talk, whereas emotional

stability ($\beta = -0.07, p = 0.045$) was a significant and negative predictor. In Step 2, when the three BPNs satisfaction subscales were added as predictors, they contributed a significant amount to the prediction of the promoting goals function of goal-directed self-talk ($R^2 = 0.19, R^2 \text{ change} = 0.06$) over and above that explained by five personality traits alone. Examination of the beta coefficients in Step 2 revealed that conscientiousness ($\beta = 0.22, p < 0.001$), extraversion ($\beta = 0.14, p < 0.001$), and competence need satisfaction ($\beta = 0.25, p < 0.001$) were the three significant and positive predictors of the promoting goals function of goal-directed self-talk, whereas emotional stability ($\beta = -0.08, p = 0.034$) emerged again as a significant and negative predictor. Lastly, in the third and final step, when the three BPNs frustration subscales were added as predictors, they significantly improved the prediction of the promoting goals function of goal-directed self-talk ($R^2 = 0.21, R^2 \text{ change} = 0.02$). Examination of the beta coefficients from the entire model revealed that conscientiousness ($\beta = 0.22, p < 0.001$), extraversion ($\beta = 0.13, p = 0.001$), competence need satisfaction ($\beta = 0.22, p < 0.001$), and relatedness need satisfaction ($\beta = 0.17, p = 0.001$) were the four significant and positive predictors of the promoting goals function of goal-directed self-talk.

Discussion

Grounded in the BFM of personality traits [34,35] and SDT [46,47], and in line with SDG, the present study aimed, by using a quantitative research design and the OSTQS for the assessment of athletes' spontaneous and goal-directed self-talk, to:

1. Investigate the nomological validity of the OSTQS through a detailed examination of the Pearson's correlations between the OSTQS subscales, and the subscales of the big five personality traits, BPNs satisfaction, and BPNs frustration.
2. To examine three unexplored, potential antecedents of athletes' organic, spontaneous and goal-directed self-talk in a state level, and particularly: a) the big five

personality traits as personal antecedents, and b) athletes' BPNs satisfaction, and c) BPNs frustration within their sport environment, as social-environmental antecedents.

Nomological Validity of OSTQS

With regard to the first aim, the results of the present study provided support to the nomological validity of the OSTQS, by showing the relationships among organic, spontaneous self-talk dimensions and goal-directed self-talk functions with their personal (i.e., the big five personality traits) and social-environmental antecedents (i.e., BPNs satisfaction, and BPNs frustration), according to the existing theoretical models of self-talk in sport [1,3,6,13], the BFM of personality trait [34,35], and SDT [46,47]. Particularly, in line with theoretical predictions, the two positive spontaneous self-talk dimensions, retrospective-positive and anticipatory-positive self-talk, showed positive correlations with the big five personality traits and the three forms of BPNs satisfaction, and negative correlations with the three forms of BPNs frustration. Conversely, and in agreement with theoretical predictions, the two negative spontaneous self-talk dimensions, retrospective-negative and anticipatory-negative self-talk had negative correlations with the big five personality traits and the three forms of BPNs satisfaction, and positive correlations with the three forms of BPNs frustration. Regarding goal-directed subscales, in consistency with theoretical predictions, all goal-directed self-talk functions showed positive correlations with extraversion, agreeableness, consciousness, and intellect/openness, and the three forms of BPNs satisfaction, and negative correlations with emotional stability. Finally, with regard to the relationships among goal-directed self-talk functions with the three forms of BPNs frustration, low positive significant correlations were emerged only among the controlling cognitive reactions function with the three forms of BPNs frustration, between the controlling dysfunctional activated/deactivated states function with relatedness need frustration, and among creating functional deactivated states function with competence and

relatedness needs frustration, whereas all the other correlations were non-statistically significant.

Big Five Personality Traits as Antecedents of Athletes' Organic, Spontaneous and Goal-Directed Self-Talk

The big five personality traits have not been examined yet as antecedents of athletes' organic self-talk. In step one of our 3-step hierarchical regression analyses, all big five personality traits were found to some extent to be a significant predictor of athletes' organic, spontaneous self-talk dimensions and goal-directed self-talk functions, on a state level. Below we discuss the findings that emerged in step one of our hierarchical regression analyses, regarding the predictive effects of each of the big five personality traits on athletes' organic, spontaneous and goal-directed self-talk, at the state level.

Particularly, extraversion emerged as a significant and negative predictor of athletes' retrospective-negative (e.g., "I'm wrong again") and anticipatory-negative (e.g., "I can't take it anymore") spontaneous self-talk. Similar results were also reported by previous research conducted in athletic populations. Particularly, Čopec et al. [76] in a recent study among student athletes found that extraversion was negatively related to athletes' primary cognitive appraisal of loss and threat. Moreover, Kaiseler et al. [45] in another study with athletes reported that extraversion was negatively related to athletes' disengagement/resignation strategy of disengagement-oriented coping, which refers to a strategy used by athletes to disengage from the processes that could lead to their goal attainment (e.g., "I doubt my ability to attain my goal."). Conversely, our results showed that extraversion was a significant and positive predictor of athletes' retrospective-positive (e.g., "I have performed well"), and anticipatory-positive spontaneous self-talk (e.g., "I will succeed"). These results are in line with previous research findings in sport as well as in other areas of psychology. Specifically, Čopec et al. [76] in a study conducted in sport

setting found that extraversion significantly and positively predicted athletes' primary cognitive appraisal of challenge. Similarly, outside of sport, Semmer [42] reported that extraversion has been positively related to positive appraisal of coping resources. Finally, Zautra et al. [77] in a 30 days diary study among adults participants with rheumatoid arthritis reported that extraversion significantly and positively predicted participants' daily positive interpersonal experiences, as well as participants' relationship enjoyment appraisals. With respect to goal-directed self-talk functions, the results of this study indicated that extraversion was a significant and positive predictor of athletes' creating functional activated states, instruction, up-regulating self-confidence, and promoting goals functions of athletes' goal-directed self-talk. Similar results have also been reported in previous sport-specific research which examined the relationships between big five personality traits and athletes' coping. For instance, Allen et al. [43] found that extraversion significantly and positively predicted athletes' dispositional problem-focused coping in their sport (i.e., strategies used to actively change and remain in the sport-related stressful situation; e.g., "I did my best to change the situation"). Likewise, Kaiseler et al. [45] reported that extraversion significantly and positively predicted athletes' dispositional task-oriented coping in sport competitions, that is strategies used to manage the internal and external demands of sport competitions, such as control of thoughts, logical analysis, effort expenditure, mental imagery, and seeking support. Finally, Kaiseler et al. [39] found that extraversion significantly and positively predicted athletes' problem-focused coping strategies increasing effort (e.g., "I put more effort into my play"), and seeking informational social support (e.g., "I asked teammates what they did or would do.") during a specific stressful event in their sport (situational measure of coping).

In the present study, agreeableness significantly and positively predicted athletes' anticipatory-positive spontaneous self-talk; as well as controlling cognitive reactions,

controlling dysfunctional activated/deactivated states, creating functional activated and deactivated states, instruction, and up-regulating self-confidence functions of goal-directed self-talk. Similar research findings were also reported by Čopec et al. [76] in their study with student athletes, who found that agreeableness was positively related to athletes' primary cognitive appraisal of challenge. Moreover, our results are in consistency with previous research findings on the relationships between the big five personality traits and athletes' coping strategies. In particular, Kaiseler et al. [39] reported that agreeableness was a significant and positive predictor of athletes' problem-focused coping strategy active coping (e.g., "I took direct action to overcome the performance challenge.") in a specific stressful event in their sport (situational measure of coping). Finally, Kaiseler et al. [45] in a subsequent study examined athletes' coping during sport competitions from a dispositional perspective, and found that agreeableness, significantly and positively predicted task-oriented coping, which involves strategies used by athletes to manage the internal and external demands of sport competitions, such as thought control (e.g., "I try to interpret the situation in a positive manner"), logical analysis (e.g., "I analyze the weakness of my opponents"), effort expenditure (e.g., "I give my best effort."), mental imagery (e.g., "I visualize myself doing a good performance."), relaxation (e.g., "I relax my muscles."), and seeking support (e.g., "I talk to someone who is able to motivate me."). Finally, Barańczuk [78] in a recent meta-analysis of 132 studies (156 independent samples drawn from a variety of different populations), examined the relationships between the big five personality traits and emotion regulation strategies. The researcher found that agreeableness was positively modestly related to emotion regulation strategies reappraisal, problem solving, and mindfulness, which are generally assumed to be adaptive, as they are related to beneficial outcomes in the long-term.

In our study, conscientiousness significantly and negatively predicted athletes' anticipatory-negative spontaneous self-talk (e.g., "I want to give up"). Similar findings were also reported by Čopec et al. [76] in their study with collegiate athletes, who found that conscientiousness was negatively related to athletes' primary cognitive appraisal of threat. Moreover, in accordance with our finding, Kaiseler et al. [45] reported that conscientiousness significantly and negatively predicted athletes' dispositional disengagement-oriented coping in sport competitions. In contrast, we found that conscientiousness significantly and positively predicted athletes' retrospective-positive (e.g., "I have achieved it") and anticipatory-positive spontaneous self-talk (e.g., "I will win"). These results support the findings of previous relevant research conducted in athletic populations, which showed that conscientiousness significantly and positively predicted athletes' perceived stressor control [39] as well as athletes' primary cognitive appraisal of challenge [76]. With regard to goal-directed self-talk functions, the results of our study revealed that conscientiousness significantly and positively predicted athletes' controlling dysfunctional activated/deactivated states, creating functional activated and deactivated states, instruction, up-regulating self-confidence, and promoting goals functions of goal-directed self-talk. These results are in line with those of previous studies that investigated the relationships between the big five personality traits and athletes' sport-related coping. More specifically, Allen et al. [44] in a study on athletes' dispositional coping found that conscientiousness significantly and positively predicted athletes' problem-focused coping in their sport (i.e., strategies aimed to actively change and remain in the sport-related stressful situation; e.g., "I look for ways to solve the problem or change the situation."). Also, Allen et al. [43] in another study on athletes' dispositional coping reported that conscientiousness significantly and positively predicted athletes' emotion-focused coping in their sport (i.e., strategies aimed to control thoughts and emotions that arises from the sport-related stressful situation

while remaining in this; e.g., “I stayed in the situation and tried to control my emotions to better deal with the situation.”). Similarly, Kaiseler et al. [39] in a study on athletes’ situational coping found that consciousness significantly and positively predicted the problem-focused coping strategies planning and suppression of competing activities, and the emotion-focused coping strategy seeking emotional social support (e.g., “I talked about my feelings with someone.”). Finally, our results are in consistency with Barańczuk’s meta-analytic findings [78] which indicated that consciousness was modestly positively related to the typically adaptive emotion regulation strategies, problem solving, acceptance, and mindfulness, and modestly negatively related to the typically assumed maladaptive emotion regulation strategy of avoidance.

The present findings showed that emotional stability significantly and negatively predicted athletes’ retrospective-negative (e.g., “Today I have performed very poorly.”) and anticipatory-negative spontaneous self-talk (e.g., “I want to give up.”). These results are in accordance with previous relevant research findings in sport [39,43–45,76] and in non-sport settings [40,41]. For instance, Čopec et al. [76] in their study among student athletes reported that emotional stability significantly and negatively predicted athletes’ primary cognitive appraisal of loss and threat. Also, other researchers found that neuroticism (low emotional stability) significantly and positively predicted athletes’ avoidance coping in their sport both in dispositional [43,44] and situational level [39], as well as athletes’ dispositional disengagement-oriented coping during sport competitions [45]. In contrast, we found that emotional stability significantly and positively predicted athletes’ anticipatory-positive spontaneous self-talk. Analogous research finding was also reported by Čopec et al. [76] in their study with student athletes, who found that emotional stability was positively related to athletes’ primary cognitive appraisal of challenge. With regard to goal-directed self-talk functions, the results of this study revealed that emotional stability was a

significant and negative predictor of athletes' controlling cognitive reactions, controlling dysfunctional activated/deactivated states, creating functional deactivated states, instruction, up-regulating self-confidence, and promoting goals functions of goal-directed self-talk. These results suggest that athletes higher in emotional stability tend to use less goal-directed self-talk in order to reconstruct their cognitions, control their dysfunctional activated and deactivated affective states, create functional deactivated affective states, give themselves task instructions, and to create facilitative attitudes for the future mainly by up-regulating self-confidence, and promoting mastery and performance-approach goals. Individuals high in emotional stability are characterized by the experience of stable and positive emotional states (e.g., calm, secure, controlled, and even-tempered), rational and positive thoughts, and holding rational beliefs [34,35]. Thus, due to these specific characteristics, athletes higher in emotional stability may need less these goal-directed self-talk functions to self-regulate compared with athletes lower in this personality trait. Moreover, previous sport-related research has shown that athletes lower in neuroticism (higher in emotional stability) tend to use more the problem-focused coping strategies of planning (e.g., "I thought hard about what steps to take to manage this situation."), suppression of competing activities (e.g., "I stopped doing other things in order to concentrate on my performance."), and increasing effort (e.g., "I worked harder.") during a specific stressful event in their sport [39]. Similarly, Barańczuk's meta-analytic findings [78] revealed that individuals lower in neuroticism (higher in emotional stability) tend to use more the emotion regulation strategies of problem-focused (i.e., cognitive and behavioral actions aimed at changing the situation) and mindfulness (i.e., present-moment awareness and nonjudgmental acceptance of thoughts, emotions bodily sensations, and surrounding environment). Thus, it is possible that athletes high in emotional stability might rely more on other cognitive (e.g., mental imagery) and emotion-regulation skills (e.g.,

acceptance and mindfulness) to achieve their goals, rather on goal-directed self-talk functions examined in this study. At the present, however, this is only a hypothesis that should be explored in future research.

Finally, our results showed that intellect/openness significantly and positively predicted athletes' retrospective-positive and anticipatory-positive spontaneous self-talk. These findings are consistent with those reported by Čopec et al. [76] in their study with collegiate athletes, where intellect/openness was found to be positively related to athletes' primary cognitive appraisal of challenge. With respect to goal-directed self-talk functions, our results indicated that intellect/openness was a significant and positive predictor of controlling dysfunctional activated/deactivated states, creating functional deactivated states, instruction, and up-regulating self-confidence functions of goal-directed self-talk. These results align with those of previous studies that investigated the relationships between big five personality traits and athletes' sport-related coping. Particularly, Kaiseler et al. [39] reported that intellect/openness was a significant and positive predictor of athletes' problem-focused coping strategy of planning during a specific stressful event in their sport (situational assessment of coping). Moreover, Kaiseler et al. [45] in their study on athletes' dispositional coping during sport competitions, found that intellect/openness significantly and positively predicted task-oriented coping, that is strategies used by athletes to manage the internal and external demands of sport competitions, such as thought control (e.g., "I try to get rid of my doubts by thinking positively"), logical analysis (e.g., "I analyze the demands of the competition"), effort expenditure (e.g., "I give a relentless effort."), mental imagery (e.g., "I visualize my all-time best performance"), relaxation (e.g., "I try to relax my body."), and seeking support (e.g., "I ask other athletes for advice"). Finally, Barańczuk's meta-analytic findings [78] revealed that intellect/openness was modestly

positively related to the typically assumed adaptive emotion regulation strategies of problem solving and mindfulness.

BPNs Satisfaction and Frustration as Antecedents of Athletes' Organic, Spontaneous and Goal-Directed Self-Talk

Athletes' BPNs satisfaction and frustration within their sport environment have not been examined yet as antecedents of athletes' organic, spontaneous and goal-directed self-talk. Thus, the present study also aimed to examine whether athletes' BPNs satisfaction and frustration within their sport environment, as social-environmental antecedents, could predict athletes' organic, spontaneous and goal-directed self-talk. Specifically, we are interested to analyze whether athletes' BPNs satisfaction and frustration within their sport environment would predict additional variance in athletes' organic, spontaneous and goal-directed self-talk, over and above that accounted for by athletes' big five personality traits and BPNs satisfaction respectively.

The results of our 3-step hierarchical regression analyses, revealed that when the three BPNs satisfaction subscales were added as predictors in step 2, they contributed a significant amount to the prediction of all athletes' spontaneous self-talk dimensions and goal-directed self-talk functions (except for creating functional deactivated states) over and above personality traits. Importantly, athletes' big five personality traits explained the highest percentage of variance in all athletes' spontaneous self-talk dimensions and goal-directed self-talk functions, except for the retrospective-positive spontaneous self-talk dimension, where the three BPNs satisfaction subscales made the strongest contribution. Hence, these results demonstrate the incremental validity of BPNs satisfaction over and above personality traits in explaining athletes' retrospective-positive, suggesting that BPNs satisfaction matters more than big five personality traits to the experience of spontaneous retrospective-positive self-talk (e.g., "I have achieved it").

More specifically, competence need satisfaction emerged in our study as the only significant (positive) predictor of athletes' retrospective-positive and anticipatory-positive spontaneous self-talk, and a significant and negative predictor of athletes' anticipatory-negative spontaneous self-talk. These results support the findings of previous relevant research on the antecedents of athletes' organic self-talk, which has adopted the traditional distinction between organic positive and negative self-talk and their respective sub-dimensions, without considering the contemporary distinction between, organic, spontaneous and goal-directed self-talk. Particularly, Karamitrou et al. [10] in a trait examination of athletes' organic self-talk, found that competence need satisfaction was negatively related to the corresponding organic, negative self-talk dimension of disengagement of ASTQS, and positively related to the organic, positive self-talk dimension of confidence of ASTQS, which match with anticipatory-positive spontaneous self-talk dimension assessed by OSTQS. Likewise, Zourbanos et al. [79] assessed students' self-talk as a trait in the physical education context and reported that students' perceived competence was negatively related to organic, negative self-talk dimension of disengagement of ASTQS, and positively related to organic, positive self-talk dimension of confidence of ASTQS. In addition, our results come to add to the previous research literature on the antecedents of athletes' organic self-talk, by indicating the competence need satisfaction as an antecedent of athletes' retrospective-positive spontaneous self-talk, a new dimension which has not been assessed by ASTQS. However, this new dimension is related to internal-controlled attributions of success (e.g., "I have performed well") and emotional expression (e.g., "Perfectly"), and is directly linked to Attribution theory, a significant research area in sport psychology [6]. Thus, its quantitative examination has been considered worthwhile, as it will aid in understanding of its antecedents, its consequences, and also in design, implementation, and evaluation of appropriate organic

self-talk interventions [31]. Moreover, competence and autonomy needs satisfaction emerged in our study as significant and negative predictors of athletes' retrospective-negative spontaneous self-talk. Similar research findings were also reported by Karamitrou et al. [10] in their study with athletes, where competence and autonomy needs satisfaction were found to be negatively related to the similar negative self-talk dimension of worry assessed by ASTQS at the trait level.

Regarding the relationships between BPNs satisfaction and goal-directed self-talk functions, competence and autonomy needs satisfaction emerged in our study as significant and positive predictors of the controlling dysfunctional activated/deactivated states function of goal-directed self-talk. Analogous research findings were also reported by Karamitrou et al. [10] in a trait examination of athletes' organic self-talk, where athletes' competence need satisfaction was found to be positively related to the corresponding organic, positive self-talk dimension of anxiety control measured by ASTQS at the trait level. Likewise, Zourbanos et al. [79] in the context of physical education, reported that students' perceived competence was positively related to the respective positive self-talk dimension of anxiety control assessed by ASTQS at the trait level. Moreover, our results above contribute to the previous research literature on the antecedents of athletes' organic self-talk, by indicating competence and autonomy needs satisfaction as social-environmental antecedents of the controlling dysfunctional deactivated states function of goal-directed self-talk. Even though, this goal-directed self-talk function has not been previously considered in the organic self-talk paradigm and has not been assessed by ASTQS [31], it has been found [6–9] to be an important goal-directed self-talk function that athletes used to regulate their dysfunctional deactivated emotions such as disappointment (e.g., “Do not be disappointed”), resignation (e.g., “Do not quit”), and so forth. Therefore, the assessment and quantitative examination of controlling dysfunctional deactivated states function of

goal-directed self-talk are important, as they will aid us understand its antecedents, its consequences, and also to design, apply and evaluate the effectiveness of suitable organic self-talk interventions.

Competence and relatedness needs satisfaction were in our study significant and positive predictors of the creating functional activated states, instruction, and promoting goals functions of goal-directed self-talk. In accordance with these findings, Karamitrou et al. [10] also reported that athletes' competence and relatedness needs satisfaction were positively linked to the respective organic, positive self-talk dimensions of psych up and instruction, assessed by ASTQS at the trait level. Moreover, our results extend previous research findings on the antecedents of athletes' organic self-talk, by indicating competence and relatedness needs satisfaction as social-environmental antecedents of promoting goals function of goal-directed self-talk. Even though the promoting goals function of self-talk has been discussed in previous self-talk literature [28], has not been assessed by ASTQS [31]. However, this goal-directed self-talk function is directly linked to achievement goal theories and SDT, very significant research areas in sport and exercise psychology. Thus the assessment and quantitative examination of the promoting goals function of goal-directed self-talk are important, as they will help us to understand its antecedents, its consequences, and also to develop and implement appropriate organic self-talk interventions and evaluate their effectiveness [31]. Moreover, competence need satisfaction emerged in our study as a significant and positive predictor of the creating functional deactivated states and up-regulating self-confidence functions of goal-directed self-talk. These results are also in accordance with previous research findings. Karamitrou et al. [10] found that athletes' competence need satisfaction was positively related to the corresponding organic, positive self-talk dimensions of anxiety control and confidence, as measured by ASTQS at the trait level. Similarly, Zourbanos et al. [79] in the physical

education context found that students' perceived competence was positively related to the respective positive self-talk dimensions of anxiety control and confidence, as assessed by ASTQS at the dispositional level.

Finally, contributing further to the previous research literature on the antecedents of athletes' organic self-talk, our results showed that autonomy and relatedness needs satisfaction significantly and positively predicted the controlling cognitive reactions function of goal-directed self-talk. This cognitive reappraisal function of goal-directed self-talk has not been previously considered in the organic self-talk paradigm in sport [6], and has not been assessed by ASTQS [31]. However, in both general and sport psychology cognitive reappraisal has been deemed as an effective cognitive coping strategy [6]. Moreover, it constitutes a core element of the cognitive behavioral psychotherapeutic approaches, such as Rational-Emotive Behavior Therapy and Cognitive-Behavior Modification that have been previously applied effectively in the sport setting [31]. Hence, its quantitative examination is worthwhile, as it will help us to understand its antecedents, its consequences, and also to develop, implement, and evaluate the effectiveness of appropriate organic self-talk interventions [31].

Concerning athletes' BPNs frustration, the findings of our 3-step hierarchical regression analyses indicated that when the three BPNs frustration subscales were added as predictors in step 3, they significantly contributed to the prediction of two negative spontaneous self-talk dimensions and all goal-directed self-talk functions (except for instruction), over and above BPNs satisfaction. These results are in line with SDT propositions [52] and previous relevant research findings [54] which showed that need satisfaction and need frustration are distinct constructs, with need frustration predicting additional variance, over and above that accounted for by need satisfaction, of athletes' well/ill-being outcomes.

More specifically, compared to autonomy and relatedness needs frustration, competence need frustration emerged in our study as the only significant (positive) predictor of athletes' retrospective-negative self-talk (after the competence need satisfaction). This finding makes conceptual sense. Athletes who experience a high sense of inefficacy, or even failure and helplessness in their sport due to social-environmental influences (e.g., "There are times when I am told things that make me feel incompetent"), also report increased levels of retrospective-negative self-talk (e.g., Today I have performed very poorly). Further, this finding is in line with SDT propositions [52] and previous sport-related research [54] where competence need frustration was found to be a significant (positive) predictor of athletes' exhaustion. Moreover, compared to the frustration of the two other needs, competence need frustration emerged in our study as the only significant (positive) predictor of the controlling cognitive reactions function of goal-directed self-talk. This finding implies that when athletes experience high feelings of ineffectiveness, and failure due to the frustration of their competence need within a sport environment (e.g., "There are situations where I am made to feel inadequate"), also use increased levels of the controlling cognitive reactions function of goal-directed self-talk (e.g., "Everyone makes mistakes"; "Everyone can have a bad day"). Similarly, compared to autonomy and competence needs frustration, in this study relatedness need frustration emerged as the only significant (positive) predictor of the controlling dysfunctional activated/deactivated states, creating functional deactivated and activated states, and up-regulating self-confidence functions of goal-directed self-talk. These results suggest that athletes who feel isolated and excluded by significant others within their sport environment (e.g., "I feel I am rejected by those around me") also report increased use of goal-directed self-talk aimed to control their dysfunctional activated/deactivated states (e.g., "Do not worry"; "Do not be disappointed"), to create functional deactivated (e.g., Calm down) and activated states (e.g., "Give it all"),

and up-regulating their self-confidence (e.g., “Believe in yourself”). Cognitive reappraisal has been considered an adaptive cognitive copying [6] and emotion regulation strategy [78]. Also, goal-directed self-talk is a type of psychological skill, a rational mental process that helps athletes to regulate themselves [5]. Thus, all functions of goal-directed self-talk can be considered as athletes’ adaptive responses in front of a variety of challenges meeting in their sport. As a result, the above findings does not support SDT proposition [52,53] that BPNs frustration contributes to dysfunctional behavior and ill-being, and previous SDT-based empirical findings [52–57] showing the positive and negative relations between BPNs frustration with maladaptive and adaptive consequences respectively. A possible explanation for these results might be that athletes who feel ineffectiveness or as a failure, isolated and excluded within their sport environment, need more these functions of goal-directed self-talk to self-regulate, due to the additional psychological challenges facing because of the active frustration of these needs. Furthermore, according to SDT, although need frustration relates to ill-being and the development of maladaptive coping patterns, there are resilience factors that can protect against these negative consequences, such as the capacity to autonomously regulate behavior, even under threat or pressure [52]. According to Deci and Ryan [46], having a need supportive instead of a need thwarting history allows for the development of greater capacities for autonomy. This capacity for autonomy, in turn, is reinforced by awareness and/or mindfulness [52].

Unexpectedly, and in contrast to SDT and previous relevant research [52–55], autonomy and relatedness needs satisfaction emerged in our study as significant and positive predictors of athletes’ anticipatory-negative and retrospective-negative self-talk respectively. Similarly, autonomy need frustration emerged as a significant and positive predictor of athletes’ retrospective-positive self-talk. These unexpected findings could have been the result of a statistical artifact. More specifically, in order not to compromise the

ecological validity of the results, we examined the three BPNs together in a single hierarchical regression model, instead of three separate models for each of the three BPNs. But, in a single hierarchical regression model with multiple independent variables, the regression path coefficients represent the unique effect of each predictor to the dependent variable. Thus, keeping this in our mind, the unexpected positive relationships mentioned above may be the result of statistical suppressor effects, given the observed interrelationships among the three BPNs. However, when each BPN was modeled by itself the results revealed that: Autonomy need satisfaction emerged as a non-significant predictor of athletes' anticipatory-negative self-talk ($\beta = 0.20, p = 0.593$), whereas autonomy need frustration emerged as a significant and positive predictor of athletes' anticipatory-negative self-talk ($\beta = 0.11, p = 0.003$). Similarly, relatedness need satisfaction emerged as a non-significant predictor of athletes' retrospective-negative self-talk ($\beta = -0.3, p = 0.539$), whereas relatedness need frustration emerged as a significant and positive predictor of athletes' retrospective-negative self-talk ($\beta = 0.16, p < 0.001$). Conversely, autonomy need satisfaction emerged as a significant and positive predictor of athletes' retrospective-positive self-talk ($\beta = 0.14, p < 0.001$), whereas autonomy need frustration emerged as a non-significant predictor of athletes' retrospective-positive self-talk ($\beta = -0.00, p = 0.972$). Overall, the above findings are in line with those of previous SDT-based studies which showed that BPNs satisfaction constructs are often more pertinent in understanding the presence of well-being as opposed to the absence of ill-being [54,55,58,59,67]. Moreover, the above results are in consistency with previous SDT-based research findings indicating that ill-being is more related to the presence of need frustration than to the absence of need satisfaction [54–56].

Practical Implications, Limitations, and Future Research Directions

With regard to the predictive power of each BPN, importantly in the full models of our regression analysis, competence need satisfaction emerged as the most powerful predictor of athletes' retrospective-positive and anticipatory-positive spontaneous self-talk; as well as of creating functional activated and up-regulating self-confidence functions of goal-directed self-talk. Moreover, compared to the satisfaction of autonomy and relatedness needs, competence need satisfaction was in our study: (a) the strongest predictor of athletes' retrospective-negative and anticipatory-negative spontaneous self-talk; and controlling dysfunctional activated/deactivated states, instruction, and promoting goals functions of goal-directed self-talk, and (b) the only significant predictor of creating functional deactivated states function of goal-directed self-talk. Similarly, compared to the frustration of autonomy and relatedness needs, competence need frustration emerged in our study as the single significant predictor of athletes' retrospective-negative spontaneous self-talk. The frequency and strength with which competence need satisfaction and frustration predicting athletes spontaneous self-talk dimensions and goal-directed self-talk functions in thorough study support previous SDT-based research evidence regarding its salient role for the participants' optimal functioning in sport and related physical activity contexts [10,58,59,63,71]. Thus, from an applied perspective, the above findings suggest that for the decrease of athletes' retrospective-negative and anticipatory-negative spontaneous self-talk and the maximization of their retrospective-positive and anticipatory-positive spontaneous self-talk, and goal-directed self-talk, the satisfaction of competence need seems to be of the highest importance.

Overall, and from a practical perspective the results of this study stress the importance of the development of sport environments that not only support but also avoid to thwart athletes' BPNs, if it is desirable to enhance athletes' goal-directed self-talk and

retrospective-positive and anticipatory-positive spontaneous self-talk, while simultaneously diminishing athletes' retrospective-negative and anticipatory-negative spontaneous self-talk. Zinsser et al. [80] based on findings linking positive or negative thoughts to performance reported that "inappropriate thinking or misguided thinking usually leads to negative feelings and poor performance, just as appropriate or positive thinking leads to enabling feelings and good performance" (p. 284). In other words, goal-directed self-talk, and retrospective-positive and anticipatory-positive spontaneous self-talk can be considered more appropriate to athletes than retrospective-negative and anticipatory-negative spontaneous self-talk. Also in terms of SDG3, goal-directed self-talk, and retrospective-positive and anticipatory-positive spontaneous self-talk will foster athletes' physical and mental health and well-being; whereas retrospective-negative and anticipatory-negative spontaneous self-talk will decrease them. Previous SDT research in sport and related contexts has indicated that an empowering coach-created motivational climate (i.e., task-involving, autonomy-supportive and socially supportive) is linked to greater BPNs satisfaction [81–83], whereas a disempowering coach-created motivational climate is linked to greater BPNs frustration [81–83]. Moreover, previous research [30] on antecedents of athletes' organic self-talk as it assessed by ASTQS, indicated that an empowering coach-created motivational climate is positively linked to athletes' organic, positive-self-talk and negatively related to athletes' organic, negative- self-talk, whereas a disempowering coach-created motivational climate was positively linked to athletes' organic negative-self-talk. Thus, interventions that educate coaches how to create a more empowering and less disempowering motivational climate (e.g., Empowering Coaching™;[84]) have the potential to maximize athletes' goal-directed self-talk as well as retrospective-positive and anticipatory-positive spontaneous self-talk and diminish athletes' unproductive retrospective-negative and anticipatory-negative spontaneous self-talk. Along these types of

interventions, the implementation also of interventions aiming at significant others influencing athletes' BPNs satisfaction and frustration within their sport (e.g., parents, peers, sport clubs staff), are worthy of investigation.

Given the cross-sectional nature of the present study, it is important to notice that no causal links can be inferred from the current findings. It can only be speculated that athletes' big five personality traits and BPNs satisfaction and frustration within their sport influence their state organic self-talk, based on theoretical grounds and some experimental studies [17,49]; however, it is plausible that the identified links reflect bidirectional relationships. Moreover, it is very possible: (a) that athletes' big five personality traits influence also athletes' BPNs satisfaction and frustration within their sport, and their trait organic self-talk; and (b) the associations between athletes' big five personality traits and their state organic self-talk to be mediated by athletes' BPNs satisfaction and frustration, and their trait organic self-talk. Hence, future research could implement longitudinal and experimental designs that would allow investigation of potential bidirectional relationships and mediation processes, and causal inferences. Second, the retrospective self-report methodology that was utilized may have limited the information obtained. Particularly as self-reports rely on human memory, sometimes the information may have been forgotten or recalled inaccurately [85]. However, self-reports provide access to individuals' perceptions, motives, and cognitions that cannot be obtained through objective methods [86].

Conclusions

Despite the above limitations, the present findings provide valuable information regarding the predictive role of big five personality traits (as personal antecedents), and BPNs satisfaction and frustration within sport environment (as social-environmental antecedents), on athletes' organic, spontaneous and goal-directed self-talk at the state level. Moreover, our results indicate the incremental value of BPNs satisfaction and frustration to

the prediction of athletes' organic, spontaneous and goal-directed self-talk, over and above athletes' big five personality traits and BPNs satisfaction respectively. Finally, the present study provides evidence regarding the nomological validity of OSTQS by a detailed examination of the relations between athletes' spontaneous and goal-directed self-talk with the variables of the big five personality traits and BPNs satisfaction and frustration within their sport environment. Overall, the results of this study contribute to the achievement of SDG3 of 2030 Agenda for Sustainable Development, to the developing research areas that examine the antecedents of athletes' organic self-talk and athletes' big five personality traits; as well as to the considerable amount of previous SDT research, and may guide future research on the areas. Finally, from a theoretical perspective, the present study could contribute to further development of the theoretical frameworks of self-talk, by indicating for the first time the antecedents of athletes' organic, spontaneous and goal-directed self-talk at the state level.

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Table 4.1.

Pearson's Correlations, Descriptive statistics, and Cronbach's Alpha Coefficients for All Subscales

Subscale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. E	-																					
2. A	0.18**	-																				
3. C	0.11**	0.20**	-																			
4. ES	0.15**	-0.05	0.16**	-																		
5. I	0.39**	0.24**	0.15**	0.04	-																	
6. RP	0.32**	0.16**	0.16**	0.08*	0.25**	-																
7. AP	0.32**	0.18**	0.21**	0.17**	0.25**	0.58**	-															
8. RN	-0.22**	-0.01	-0.14**	-0.40**	-0.09*	-0.30**	-0.33**	-														
9. AN	-0.14**	-0.01	-0.13**	-0.32**	-0.06	-0.23**	-0.25**	0.45**	-													
10. CCR	0.03	0.19**	0.05	-0.13**	0.08*	0.26**	0.08	0.13**	0.14**	-												
11. CDS	0.11**	0.25**	0.14**	-0.15**	0.21**	0.31**	0.29**	0.09*	0.08*	0.48**	-											
12. CFDS	0.05	0.24**	0.12**	-0.25**	0.17**	0.21**	0.26**	0.14**	0.11**	0.40**	0.67**	-										
13. CFAS	0.23**	0.19**	0.20**	-0.01	0.17**	0.41**	0.50**	-0.04	-0.06	0.24**	0.53**	0.48**	-									
14. I	0.17**	0.19**	0.23**	-0.10*	0.18**	0.34**	0.37**	0.02	-0.08*	0.34**	0.56**	0.52**	0.66**	-								
15. C	0.27**	0.20**	0.25**	-0.01	0.25**	0.50**	0.62**	-0.14**	-0.11**	0.33**	0.60**	0.46**	0.72**	0.62**	-							
16. PG	0.24**	0.13**	0.26**	-0.01	0.18**	0.42**	0.45**	-0.02	-0.17**	0.32**	0.46**	0.38**	0.60**	0.61**	0.64**	-						
17. AS	0.12**	0.13**	0.10**	0.01	0.17**	0.20**	0.13**	-0.14**	-0.01	0.13**	0.14**	0.10**	0.13**	0.13**	0.18**	0.10**	-					
18. CS	0.29**	0.19**	0.15**	0.03	0.30**	0.50**	0.35**	-0.24**	-0.24**	0.13**	0.24**	0.16**	0.29**	0.25**	0.37**	0.34**	0.37**	-				
19. RS	0.23**	0.23**	0.15**	0.13**	0.16**	0.31**	0.24**	-0.18**	-0.18**	0.09*	0.14**	0.08*	0.20**	0.18**	0.23**	0.22**	0.42**	0.49**	-			
20. AF	-0.07	-0.14**	-0.15**	-0.24**	-0.03	-0.08*	-0.10*	0.25**	0.18**	0.08*	0.02	0.03	-0.02	-0.04	-0.05	-0.01	-0.23**	-0.18**	-0.49**	-		
21. CF	-0.03	-0.01	-0.10**	-0.28**	0.01	-0.08*	-0.07	0.32**	0.20**	0.15**	0.06	0.13**	0.02	0.04	0.01	0.04	-0.10**	-0.05	-0.46**	0.62**	-	
22. RF	-0.03	-0.03	-0.07	-0.32**	0.07	-0.06	-0.08*	0.28**	0.21**	0.14**	0.16**	0.18**	0.06	0.07	0.06	0.07	-0.08*	-0.05	-0.47**	0.60**	0.69**	-
Mean	3.63	4.26	4.00	3.11	4.08	2.52	3.03	1.49	.88	1.78	2.12	2.52	3.04	2.81	2.88	2.66	4.72	5.18	5.34	2.82	3.58	2.79
SD	0.77	0.49	0.79	.83	.55	.75	.76	.75	.89	.97	1.03	.93	.86	.86	.92	.93	1.12	.95	1.12	1.34	1.10	1.41
<i>a</i>	0.83	0.69	0.87	.85	.75	.77	.79	.75	.82	.79	.79	.74	.81	.80	.82	.76	.74	.68	0.88	0.83	0.82	0.81

Note. E= Extraversion; A = Agreeableness; C = Conscientiousness; ES = Emotional stability; I = Intellect/openness; RP= Retrospective-positive self-talk; AP = Anticipatory-positive self-talk; RN = Retrospective-negative self-talk; AN = Anticipatory-negative self-talk; CCR = Controlling cognitive reactions self-talk; CDS = Controlling dysfunctional activated/deactivated states self-talk; CFDS = Creating functional deactivated states self-talk; CFAS = Creating functional activated states self-talk; I = Instruction self-talk; C = Up-regulating self-confidence self-talk; PG = Promoting goals self-talk; AS = Autonomy satisfaction; CS = Competence satisfaction; RS= Relatedness satisfaction; AF= Autonomy frustration; CF = Competence frustration; RF= Relatedness frustration.

Correlations were considered small (0.10), medium (0.30), or large (0.50) based on the criteria suggested by Cohen (1992). * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).

Table 4.2. (Continues on next pages)

Hierarchical Regression Analyses Summary for Predicting Athletes' Organic, Spontaneous Self-Talk Dimensions

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F	
Retrospective Positive	Step 1	Extraversion	0.23	0.04	0.24	6.09***					
		Agreeableness	0.11	0.06	0.07	1.85					
		Conscientiousness	0.09	0.04	0.10	2.66**					
		Emotional stability	0.02	0.03	0.02	0.60					
		Intellect/Openess	0.17	0.05	0.12	3.14**					
			All Predictors					0.14			21.38***
	Step 2	Extraversion	0.15	0.04	0.15	4.16***					
		Agreeableness	0.04	0.05	0.03	0.72					
		Conscientiousness	0.06	0.03	0.06	1.84					
		Emotional stability	0.02	0.03	0.03	0.74				-	
		Intellect/Openess	0.06	0.05	0.05	1.26					
		Autonomy satisfaction	-0.01	0.02	-0.01	-0.29					
		Competence satisfaction	0.32	0.03	0.41	10.42***					
		Relatedness satisfaction	0.03	0.03	0.05	1.19					
			All Predictors					0.29	0.16	50.98***	35.40***
Step 3	Extraversion	0.15	0.04	0.15	4.15***						
	Agreeableness	0.05	0.05	0.04	1.01						
	Conscientiousness	0.06	0.03	0.07	1.94						
	Emotional stability	0.02	0.03	0.02	0.70						
	Intellect/Openess	0.06	0.05	0.04	1.18						
	Autonomy satisfaction	0.00	0.03	0.00	0.00						
	Competence satisfaction	0.33	0.03	0.42	10.45***						
	Relatedness satisfaction	0.03	0.03	0.05	1.00						
	Autonomy frustration	0.06	0.03	0.10	2.30*						
	Competence frustration	-0.06	0.03	-0.09	-1.83						

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Relatedness frustration	0.00	0.03	0.00	0.06				
		All Predictors					0.30	0.01	2.22	26.49***
Anticipatory-positive	Step 1	Extraversion	0.23	0.04	0.23	5.99***				
		Agreeableness	0.15	0.06	0.09	2.56*				
		Conscientiousness	0.13	0.04	0.13	3.70***				
		Emotional stability	0.11	0.03	0.12	3.25**				
		Intellect/Openess	0.15	0.05	0.11	2.82**				
		All Predictors					0.17			27.61***
Anticipatory-positive	Step 2	Extraversion	0.18	0.04	0.18	4.70***				
		Agreeableness	0.11	0.06	0.07	1.90				
		Conscientiousness	0.11	0.03	0.11	3.22**				
		Emotional stability	0.11	0.03	0.12	3.34**				
		Intellect/Openess	0.09	0.05	0.07	1.72				
		Autonomy satisfaction	-0.02	0.03	-0.03	-0.73				
		Competence satisfaction	0.19	0.03	0.24	5.78***				
		Relatedness satisfaction	0.02	0.03	0.03	0.82				
		All Predictors					0.22	0.05	15.30***	24.07***
	Step 3	Extraversion	0.18	0.04	0.18	4.65***				
		Agreeableness	0.11	0.06	0.07	1.95				
		Conscientiousness	0.11	0.03	0.12	3.29**				
		Emotional stability	0.11	0.03	0.12	3.22**				
		Intellect/Openess	0.09	0.05	0.07	1.72				
		Autonomy satisfaction	-0.02	0.03	-0.02	-0.61				
		Competence satisfaction	0.19	0.03	0.24	5.65***				
		Relatedness satisfaction	0.03	0.03	0.04	0.88				
		Autonomy frustration	0.03	0.03	0.05	0.96				
		Competence frustration	0.00	0.04	0.01	0.11				
		Relatedness frustration	-0.02	0.03	-0.03	-0.52				
		All Predictors					0.22	0.00	0.37	17.56***
Retrospective-negative	Step 1	Extraversion	-0.16	0.04	-0.16	-4.22***				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Agreeableness	0.02	0.06	0.01	0.36				
		Conscientiousness	-0.06	0.03	-0.06	-1.78				
		Emotional stability	-0.33	0.03	-0.36	-10.31***				
		Intellect/Openess	-0.01	0.05	-0.01	-0.27				
		All Predictors					0.19			32.43***
	Step 2	Extraversion	-0.12	0.04	-0.12	-3.21**				
		Agreeableness	0.05	0.06	0.03	0.94				
		Conscientiousness	-0.04	0.03	-0.05	-1.29				
		Emotional stability	-0.33	0.03	-0.37	-10.53***				
		Intellect/Openess	0.04	0.05	0.03	0.78				
		Autonomy satisfaction	-0.04	0.03	-0.06	-1.45				
		Competence satisfaction	-0.14	0.03	-0.18	-4.34***				
		Relatedness satisfaction	0.00	0.03	0.00	-0.06				
		All Predictors					0.23	0.04	10.78***	25.18***
	Step 3	Extraversion	-0.14	0.04	-0.14	-3.79***				
		Agreeableness	0.03	0.05	0.02	0.55				
		Conscientiousness	-0.04	0.03	-0.04	-1.11				
		Emotional stability	-0.27	0.03	-0.30	-8.35***				
		Intellect/Openess	0.03	0.05	0.02	0.51				
		Autonomy satisfaction	-0.05	0.03	-0.08	-2.01*				
		Competence satisfaction	-0.19	0.03	-0.24	-5.81***				
		Relatedness satisfaction	0.12	0.03	0.18	3.73***				
		Autonomy frustration	0.00	0.03	0.01	0.15				
		Competence frustration	0.16	0.03	0.23	4.76***				
		Relatedness frustration	0.04	0.03	0.08	1.54				
		All Predictors					0.28	0.06	17.59***	24.45***
Anticipatory-negative	Step 1	Extraversion	-0.10	0.05	-0.09	-2.15*				
		Agreeableness	0.03	0.07	0.02	0.49				
		Conscientiousness	-0.09	0.04	-0.08	-2.08*				
		Emotional stability	-0.32	0.04	-0.30	-8.06***				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Intellect/Openness	-0.02	0.07	-0.01	-0.27				
		All Predictors					0.12			18.55***
	Step 2	Extraversion	-0.04	0.05	-0.03	-0.84				
		Agreeableness	0.08	0.07	0.04	1.15				
		Conscientiousness	-0.07	0.04	-0.06	-1.67				
		Emotional stability	-0.31	0.04	-0.29	-8.13***				
		Intellect/Openness	0.04	0.06	0.02	0.56				
		Autonomy satisfaction	0.10	0.03	0.12	3.07**				
		Competence satisfaction	-0.22	0.04	-0.23	-5.49***				
		Relatedness satisfaction	-0.06	0.03	-0.07	-1.73				
		All Predictors					0.18	0.06	15.31***	18.06***
	Step 3	Extraversion	-0.05	0.05	-0.04	-1.05				
		Agreeableness	0.07	0.07	0.04	1.06				
		Conscientiousness	-0.07	0.04	-0.06	-1.59				
		Emotional stability	-0.28	0.04	-0.26	-6.85***				
		Intellect/Openness	0.02	0.06	0.02	0.37				
		Autonomy satisfaction	0.09	0.03	0.11	2.85**				
		Competence satisfaction	-0.24	0.04	-0.26	-5.96***				
		Relatedness satisfaction	0.01	0.04	0.01	0.18				
		Autonomy frustration	0.01	0.03	0.02	0.42				
		Competence frustration	0.05	0.04	0.06	1.15				
		Relatedness frustration	0.04	0.03	0.07	1.28				
		All Predictors					0.19***	0.01	2.90*	14.04***

Note. B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient. *df* for Step 1= (5, 685); *df* for Step 2 = (3, 682); *df* for Step 3= (3, 679). * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.3. (Continues on next pages)

Hierarchical Regression Analyses Summary for Predicting Athletes' Organic Goal-Directed Self-Talk Functions

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
Controlling Cognitive Reactions	Step 1	Extraversion	-0.01	0.05	.00	-0.10				
		Agreeableness	0.33	0.08	0.17	4.24***				
		Conscientiousness	0.04	0.05	0.03	0.83				
		Emotional stability	-0.15	0.04	-0.13	-3.44**				
		Intellect/Openess	0.07	0.07	0.04	0.91				
		All Predictors					0.05			7.67***
	Step 2	Extraversion	-0.03	0.05	-0.02	-0.54				
		Agreeableness	0.30	0.08	0.15	3.84***				
		Conscientiousness	0.03	0.05	0.02	0.53				
		Emotional stability	-0.15	0.04	-0.13	-3.39**				
		Intellect/Openess	0.03	0.07	0.01	0.34				
		Autonomy satisfaction	0.07	0.04	0.09	2.04*				
		Competence satisfaction	0.07	0.05	0.07	1.57				
		Relatedness satisfaction	0.00	0.04	0.00	0.08				
		All Predictors					0.07	0.02	3.73*	6.25***
		Step 3	Extraversion	-0.05	0.05	-0.04	-0.89			
	Agreeableness		0.29	0.08	0.15	3.76***				
	Conscientiousness		0.03	0.05	0.03	0.72				
	Emotional stability		-0.08	0.05	-0.07	-1.83				
	Intellect/Openess		0.00	0.07	0.00	0.06				
	Autonomy satisfaction		0.07	0.04	0.08	1.81				
Competence satisfaction	0.03		0.05	0.03	0.70					
Relatedness satisfaction	0.13		0.05	0.15	2.72**					
Autonomy frustration	0.05		0.04	0.07	1.28					
Competence frustration	0.10		0.05	0.11	1.98*					
Relatedness frustration	0.06	0.04	0.09	1.54						

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		All Predictors					0.10	0.03	7.77***	6.80***
Controlling Dysfunctional Activated/Deactivated States	Step 1	Extraversion	0.04	0.05	0.03	0.83				
		Agreeableness	0.37	0.08	0.18	4.62***				
		Conscientiousness	0.14	0.05	0.11	2.96**				
		Emotional stability	-0.21	0.05	-0.17	4.60***				
		Intellect/Openness	0.26	0.08	0.14	3.54***				
			All Predictors				0.12			18.08***
	Step 2	Extraversion	0.00	0.05	0.00	-0.01				
		Agreeableness	0.33	0.08	0.16	4.13***				
		Conscientiousness	0.12	0.05	0.10	2.56*				
		Emotional stability	-0.21	0.05	-0.17	-4.55***				
		Intellect/Openness	0.20	0.08	0.11	2.68**				
		Autonomy satisfaction	0.03	0.04	0.03	0.86***				
Competence satisfaction		0.17	0.05	0.16	3.58***					
Relatedness satisfaction		0.01	0.04	0.01	0.17					
		All Predictors				0.14	0.03***	6.93***	14.19***	
Step 3	Extraversion	-0.01	0.05	-0.01	-0.24					
	Agreeableness	0.33	0.08	0.16	4.20***					
	Conscientiousness	0.12	0.05	0.09	2.51*					
	Emotional stability	-0.15	0.05	-0.12	-3.18**					
	Intellect/Openness	0.17	0.08	0.09	2.26*					
	Autonomy satisfaction	0.02	0.04	0.02	0.57					
	Competence satisfaction	0.14	0.05	0.13	3.03**					
	Relatedness satisfaction	0.09	0.05	0.10	1.96					
	Autonomy frustration	0.02	0.04	0.03	0.53					
	Competence frustration	-0.06	0.05	-0.07	-1.26					
	Relatedness frustration	0.15	0.04	0.21	3.93***					
		All Predictors				0.17	0.02***	6.61***	12.38***	
Creating Functional Deactivated States	Step 1	Extraversion	-0.01	0.05	-0.01	-0.16				
		Agreeableness	0.33	0.07	0.17	4.67***				
		Conscientiousness	0.13	0.04	0.11	3.01**				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Emotional stability	-0.30	0.04	-0.26	-7.23***				
		Intellect/Openess	0.21	0.07	0.13	3.21**				
		All Predictors					0.14			22.67***
	Step 2	Extraversion	-0.03	0.05	-0.02	-0.61				
		Agreeableness	0.32	0.07	0.17	4.36***				
		Conscientiousness	0.12	0.04	0.10	2.77**				
		Emotional stability	-0.29	0.04	-0.26	-7.12***				
		Intellect/Openess	0.18	0.07	0.11	2.66**				
		Autonomy satisfaction	0.02	0.03	0.03	0.70				
		Competence satisfaction	0.09	0.04	0.09	2.08*				
		Relatedness satisfaction	-0.01	0.04	-0.01	-0.16				
		All Predictors					0.15	0.01	2.31	15.12***
	Step 3	Extraversion	-0.04	0.05	-0.03	-0.82				
		Agreeableness	0.30	0.07	0.16	4.18***				
		Conscientiousness	0.12	0.04	0.10	2.70**				
		Emotional stability	-0.25	0.04	-0.22	-5.72***				
		Intellect/Openess	0.16	0.07	0.09	2.36*				
		Autonomy satisfaction	0.01	0.03	0.01	0.25				
		Competence satisfaction	0.06	0.04	0.06	1.40				
		Relatedness satisfaction	0.07	0.04	0.08	1.58				
		Autonomy frustration	-0.04	0.03	-0.05	-1.08				
		Competence frustration	0.03	0.05	0.03	0.61				
		Relatedness frustration	0.11	0.04	0.17	3.14**				
		All Predictors					0.17	0.02	4.99**	12.55***
Creating Functional Activated States	Step 1	Extraversion	0.20	0.05	0.18	4.44***				
		Agreeableness	0.19	0.07	0.11	2.80**				
		Conscientiousness	0.18	0.04	0.16	4.32***				
		Emotional stability	-0.06	0.04	-0.06	-1.55				
		Intellect/Openess	0.09	0.06	0.05	1.35				
		All Predictors					0.10			15.77***
	Step 2	Extraversion	0.15	0.05	0.13	3.32**				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Agreeableness	0.14	0.07	0.08	2.15*				
		Conscientiousness	0.16	0.04	0.14	3.89***				
		Emotional stability	-0.06	0.04	-0.06	-1.60				
		Intellect/Openness	0.03	0.06	0.02	0.44				
		Autonomy satisfaction	0.00	0.03	-0.01	-.13				
		Competence satisfaction	0.17	0.04	0.19	4.35***				
		Relatedness satisfaction	0.04	0.03	0.05	1.06				
		All Predictors					0.14	0.04	10.16***	14.06***
	Step 3	Extraversion	0.14	0.05	0.13	3.13**				
		Agreeableness	0.15	0.07	0.08	2.19*				
		Conscientiousness	0.16	0.04	0.15	3.94***				
		Emotional stability	-0.02	0.04	-0.02	-0.61				
		Intellect/Openness	0.01	0.06	0.01	0.17				
		Autonomy satisfaction	-0.01	0.03	-0.01	-0.26				
		Competence satisfaction	0.15	0.04	0.17	3.85***				
		Relatedness satisfaction	0.10	0.04	0.13	2.42*				
		Autonomy frustration	0.03	0.03	0.05	1.09				
		Competence frustration	-0.01	0.04	-0.01	-0.25				
		Relatedness frustration	0.07	0.03	0.11	2.02*				
		All Predictors					0.15	0.01	3.20*	11.20***
Instruction	Step 1	Extraversion	0.13	0.05	0.12	2.90**				
		Agreeableness	0.18	0.07	0.10	2.68**				
		Conscientiousness	0.22	0.04	0.21	5.49***				
		Emotional stability	-0.15	0.04	-0.15	-3.96***				
		Intellect/Openness	0.14	0.06	0.09	2.16*				
		All Predictors					0.12			17.87***
	Step 2	Extraversion	0.09	0.05	0.08	1.95				
		Agreeableness	0.14	0.07	0.08	2.06*				
		Conscientiousness	0.21	0.04	0.19	5.11 ***				
		Emotional stability	-0.15	0.04	-0.15	-4.06***				
		Intellect/Openness	0.09	0.06	0.06	1.41				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Autonomy satisfaction	0.00	0.03	0.00	0.07				
		Competence satisfaction	0.13	0.04	0.14	3.32 **				
		Relatedness satisfaction	0.04	0.03	0.05	1.25				
		All Predictors					0.14	0.03	7.09***	14.13***
	Step 3	Extraversion	0.08	0.05	0.07	1.80				
		Agreeableness	0.13	0.07	0.08	1.96				
		Conscientiousness	0.21	0.04	0.19	5.06 ***				
		Emotional stability	-0.12	0.04	-0.12	-3.10**				
		Intellect/Openness	0.08	0.06	0.05	1.19				
		Autonomy satisfaction	-0.01	0.03	-0.01	-0.18				
		Competence satisfaction	0.11	0.04	0.13	2.83 **				
		Relatedness satisfaction	0.09	0.04	0.12	2.26*				
		Autonomy frustration	-0.01	0.03	-0.01	-0.28				
		Competence frustration	0.01	0.04	0.02	0.35				
		Relatedness frustration	0.06	0.03	0.10	1.94				
		All Predictors					0.15	0.01	2.11	10.90***
Up-Regulating Self-Confidence	Step 1	Extraversion	0.24	0.05	0.20	5.08***				
		Agreeableness	0.17	0.07	0.09	2.51*				
		Conscientiousness	0.24	0.04	0.20	5.52 ***				
		Emotional stability	-0.08	0.04	-0.07	-2.01*				
		Intellect/Openness	0.21	0.07	0.12	3.16 **				
		All Predictors					0.16			25.10***
	Step 2	Extraversion	0.17	0.05	0.14	3.74 ***				
		Agreeableness	0.12	0.07	0.07	1.79				
		Conscientiousness	0.21	0.04	0.18	5.04***				
		Emotional stability	-0.08	0.04	-0.07	-1.98*				
		Intellect/Openness	0.12	0.06	0.07	1.88				
		Autonomy satisfaction	0.02	0.03	0.03	0.65				
		Competence satisfaction	0.25	0.04	0.25	6.14 ***				
		Relatedness satisfaction	0.01	0.03	0.02	0.43				
		All Predictors					0.22	0.06	18.58***	23.86***

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
	Step 3	Extraversion	0.16	0.05	0.14	3.58 ***				
		Agreeableness	0.12	0.07	0.06	1.75				
		Conscientiousness	0.21	0.04	0.18	5.00***				
		Emotional stability	-0.04	0.04	-0.04	-1.05				
		Intellect/Openess	0.10	0.06	0.06	1.61				
		Autonomy satisfaction	0.01	0.03	0.02	0.42				
		Competence satisfaction	0.23	0.04	0.24	5.61 ***				
		Relatedness satisfaction	0.07	0.04	0.08	1.69				
		Autonomy frustration	0.00	0.03	0.01	0.14				
		Competence frustration	-0.01	0.04	-0.01	-0.18				
		Relatedness frustration	0.08	0.03	0.12	2.34*				
		All Predictors					0.23	0.01	2.69*	18.21***
Promoting Goals	Step 1	Extraversion	0.24	0.05	0.20	4.93 ***				
		Agreeableness	0.05	0.07	0.03	0.65				
		Conscientiousness	0.28	0.04	0.24	6.46 ***				
		Emotional stability	-0.08	0.04	-0.07	-2.01*				
		Intellect/Openess	0.11	0.07	0.07	1.68				
		All Predictors					0.13			19.73***
	Step 2	Extraversion	0.17	0.05	0.14	3.53 ***				
		Agreeableness	-0.01	0.07	-0.01	-.14				
		Conscientiousness	0.26	0.04	0.22	6.06 ***				
		Emotional stability	-0.09	0.04	-0.08	-2.13*				
		Intellect/Openess	0.04	0.07	0.02	0.61				
		Autonomy satisfaction	-0.05	0.03	-0.06	-1.59				
		Competence satisfaction	0.25	0.04	0.25	5.93 ***				
		Relatedness satisfaction	0.06	0.04	0.07	1.57				
		All Predictors					0.19	0.06	17.34***	19.72***
	Step 3	Extraversion	0.15	0.05	0.13	3.28 **				
		Agreeableness	-0.01	0.07	-0.01	-.15				
		Conscientiousness	0.26	0.04	0.22	6.20***				
		Emotional stability	-0.04	0.04	-0.03	-0.85				

Dependent Variable	Step	Predictor(s) Entered	B	SE B	β	t	R ²	R ² change	F change	F
		Intellect/Openness	0.02	0.07	0.01	0.32				
		Autonomy satisfaction	-0.06	0.03	-0.07	-1.75				
		Competence satisfaction	0.22	0.04	0.22	5.23 ***				
		Relatedness satisfaction	0.14	0.04	0.17	3.43**				
		Autonomy frustration	0.04	0.03	0.06	1.33				
		Competence frustration	0.03	0.04	0.04	0.69				
		Relatedness frustration	0.06	0.03	0.10	1.87				
		All Predictors					0.21	0.02	5.09***	15.99***

Note. B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient. *df* for Step 1= (5, 685); *df* for Step 2 = (3, 682); *df* for Step 3= (3, 679). * $p < .05$. ** $p < .01$. *** $p < .001$.

General Discussion

Based on Latinjak, Hatzigeorgiadis, et al.'s (2019) contemporary conceptual framework of organic self-talk in sport, the main aim of this thesis was to develop and test the psychometrics properties of a theoretically-grounded instrument assessing the content and the structure of athlete' organic, spontaneous and goal-directed self-talk on a state level. A second aim of this thesis was to investigate the factors that shape the content and the structure of athlete' organic, spontaneous and goal-directed self-talk on a state level. Particularly, in chapter 2, a literature review on the antecedents of athletes' organic self-talk, attempted for the first time to classify and reinterpret previous research findings in terms of the contemporary distinctions between spontaneous and goal- directed self-talk. Chapter 3 described the development and initial validation of the OSTQS, a new, theory-grounded, self-report measure, designed to assess the content and the structure of athletes' organic self-talk spontaneous and goal-directed self-talk at the state level during sport participation. Two studies were conducted. In the first qualitative study, a prospective instrument was developed based upon (a) the operational definitions of athletes' spontaneous and goal-directed self-talk in sport (Latinjak, Torregrossa, et al., 2019; Latinjak et al., 2014), and (b) raw data collected from athletes in this study through open-ended questionnaires and semi-structured interviews. In the second quantitative study, the psychometric properties of the developed questionnaire were tested through examination of factorial validity, discriminant validity, and reliability. Moreover, another quantitative study in chapter 4 examined the nomological validity of OSTQS, and the predictive role of big five personality traits (as personal factors), and BPNs satisfaction and frustration within sport environment (as social-environmental antecedents), on athletes' organic, spontaneous and goal-directed self-talk at the state level. In this final chapter, the main findings of this PhD are discussed, and based on the overall findings, practical implications are suggested. Finally, main strengths and limitations of the studies are identified and directions for future research are provided.

Overview and Discussion of the Findings

The literature review in chapter 2, provided an attempt to classify post-hoc and interpret the available research evidence regarding the antecedents of athletes' organic self-talk, in terms of the contemporary, theory-based distinctions between organic, spontaneous and goal-directed self-talk. Concerning personal factors, our literature review indicated that negative self-concept (Perry & Marsh, 2000), trait performance anxiety (i.e., fear of failure, fear of success, and sport anxiety; Conroy & Metzler, 2004), and controlled motivation (e.g., Karamitrou et al., 2017) were positively related to athletes' negative-spontaneous self-talk, whereas task orientation (e.g., Hatzigeorgiadis, 2002; Hatzigeorgiadis & Biddle, 1999, 2002) and autonomous motivation (Karamitrou et al., 2017) were negatively related to athletes' negative-spontaneous self-talk. Conversely, task orientation (e.g., Hatzigeorgiadis, 2002; Hatzigeorgiadis & Biddle, 1999, 2002) and autonomous motivation (Karamitrou et al., 2017) were found to be positively related to athletes' positive-goal-directed self-talk, whereas trait performance anxiety (i.e., fear of failure, fear of success, and sport anxiety; Conroy & Metzler, 2004) and controlled motivation (Karamitrou et al., 2017) were found to be negatively related to athletes' positive-goal-directed self-talk.

Regarding situational factors, previous research revealed that failure (Van Raalte et al., 2000)'and goal-performance discrepancies (Hatzigeorgiadis, 2006; Hatzigeorgiadis & Biddle, 2008) were positively associated to athletes' negative-spontaneous self-talk during competitions. Moreover, athletes use also goal-directed self-talk to cope with success and failure both in practice (Latinjak, Masó, et al., 2019; Latinjak et al., 2018) and competition (Latinjak, Masó, et al., 2019; Latinjak, Torregrossa et al., 2019), and to manage the various psychological demands experienced in different competitive situations (Latinjak, Masó, et al., 2019; Latinjak, Torregrossa et al., 2019). With respect to social-environmental factors, the literature review indicated that supportive coaching behaviors (e.g., Zourbanos et al., 2010,

2011; De Muynck et al., 2017), an empowering coach-created motivational climate (Zourbanos et al., 2016) and a need supportive sport environment (Karamitrou et al., 2017) were positively related to athletes' positive-goal-directed self-talk and negatively related to athletes' negative-spontaneous self-talk. In contrast, negative coaching behaviors (e.g., Zourbanos et al., 2010, 2011; De Muynck et al., 2017), and a disempowering coach-created motivational climate (Zourbanos et al., 2016) were found to be positively related to athletes' negative-spontaneous self-talk and negatively related to athletes' positive-goal-directed self-talk. Finally, our literature review in chapter 2 highlighted the measurement limitations in the assessment of athletes' organic self-talk and the need for the development of a sport-specific scale assessing the content and the structure of athletes' organic, spontaneous and goal-directed self-talk. Such a scale will give us the opportunity to examine quantitatively the contemporary distinctions of athletes' organic, spontaneous and goal-directed self-talk, and thus better understand the organic self-talk phenomenon in sport, its antecedents and its consequences related to sport performance.

Chapter 3 presents the development and initial validation of a new, theory-grounded, self-report measure, the OSTQS, designed to assess the content and the structure of athletes' organic self-talk spontaneous and goal-directed self-talk at the state level during sport participation. Two studies were conducted. In study 1, we explored the content and the structure of athletes' undirected and goal-directed self-talk during training and competition, and we developed a 20-item scale assessing athletes' state spontaneous self-talk, the S-STSS; and a 40-item scale assessing athletes' state goal-directed self-talk, the GD-STSS. The S-STSS includes four subscales (five items per subscale) that assess four dimensions of athletes' state spontaneous self-talk, namely: Retrospective-Positive, Retrospective-Negative, Anticipatory-Negative, and Anticipatory-Positive Self-Talk. On the other hand, the GD-STSS contains seven subscales assessing seven functions of athletes' state goal-directed self-talk, namely:

Controlling Cognitive Reactions (5 items); Controlling Dysfunctional Activated/Deactivated States (10 items); Creating Functional Activated States (5 items); Creating Functional Deactivated States (5 items); Up-Regulating Self-Confidence (5 items); Instruction (5 items); and Promoting Goals and Intrinsic Motivation (5 items). Item development was based upon the operational definitions of athletes' spontaneous and goal-directed self-talk in sport and their respective subcategories (Latinjak, Torregrossa, et. al, 2019; Latinjak et al., 2014), and raw data collected from athletes in our study via open-ended self-report questionnaires and semi-structured interviews.

The purpose of Study 2 was to examine aspects of validity and the reliability of the two scales developed in study 1. Concerning the factorial validity of the two scales, our CFAs indicated satisfactory fit indices for the revised 17-item four-factor correlated model of S-STS, and the revised 28-item seven-factor correlated model of GD-STS. The factorial validity of the two scales were accompanied also by evidence regarding their convergent validity, indicating the statistical superiority of the revised 17-item four-factor correlated model of S-STS, and the revised 28-item seven-factor correlated model of GD-STS, compared to their respective single-factor and hierarchical models. Moreover, discriminant validity analyses supported the separability of the four factors for the revised S-STS responses, and the separability of the seven factors for the revised GD-STS responses, indicating that the items operate as indicator of distinct constructs. Finally, reliability analyses provided support for the internal consistency of the S-STS and GD-STS. Overall, the results of this study supports previous research evidence regarding the multidimensionality of athletes' self-talk (Zourbanos et al, 2009), indicating that OSTQS is a valid and reliable theory-driven scale that could help us further advancing our understanding regarding athletes' organic self-talk, its antecedents, and its consequences.

Therefore, using the OSTQS for the assessment of athletes' spontaneous and goal-directed self-talk, the quantitative study outlined in chapter 4 aimed:

1. To provide evidence regarding the nomological validity of OSTQS by a detailed examination of the relations between athletes' spontaneous and goal-directed self-talk with their antecedents, and particularly the variables of the big five personality traits, BPNs satisfaction, and BPNs frustration.
2. To examine whether a) the big five personality traits as personal antecedents, and b) athletes' BPNs satisfaction and frustration within their sport environment, as social-environmental antecedents would predict athletes' spontaneous and goal-directed self-talk.

Concerning the first aim, our results provide support to the nomological validity of OSTQS, by showing the relationships among spontaneous self-talk dimensions and goal-directed self-talk functions with their personal and contextual antecedents, which were in line, in high degree, with the existing theoretical models of self-talk in sport (BFM) of personality traits, personality model, and SDT. With regard to the second aim, our three-step hierarchical regression analyses revealed that in Step 1: Extraversion, conscientiousness, and intellect/openness significantly predicted (positively) both athletes' retrospective-positive and anticipatory-positive spontaneous self-talk, whereas agreeableness and emotional stability significantly predicted (positively) only athletes' anticipatory-positive spontaneous self-talk. Only extraversion, conscientiousness, and emotional stability significantly predicted (negatively) athletes' anticipatory-negative spontaneous self-talk, and only extraversion, and emotional stability significantly predicted (negatively) athletes' retrospective-negative spontaneous self-talk. All personality traits were significant predictors of instruction, and up-regulating self-confidence functions of goal-directed self-talk, and all personality traits, except for

extraversion, significantly predicted the controlling dysfunctional activated/deactivated states, and the creating functional deactivated states functions of goal-directed self-talk. Extraversion, agreeableness, and conscientiousness significantly predicted the creating functional activated states function of goal-directed self-talk. Finally, only extraversion, conscientiousness, and emotional stability significantly predicted the promoting goals function of goal-directed self-talk and only agreeableness and emotional stability significantly predicted the cognitive reappraisal function of goal-directed self-talk. For all goal-directed self-talk functions, all personality traits emerged constantly as positive predictors, whereas emotional stability was repeatedly a negative predictor. Overall, our results above are consistent in a high degree with previous research findings on big five personality traits in sport (e.g., Allen et al., 2011, 2012; Čopec et al., 2022; Kaiseler, 2012, 2019) and non sport settings (e.g., Barańczuk, 2019).

In step 2 of hierarchical regression analyses, need satisfaction significantly contributed to all spontaneous self-talk dimensions and to all goal-directed self-talk functions (except for creating functional deactivated states) over and above personality. Finally, in step 3 need frustration significantly contributed to negative spontaneous self-talk dimensions, and to all goal-directed self-talk functions (except for instruction) over and above personality and need satisfaction. These results supports SDT propositions (Vansteenkiste & Ryan, 2013) and previous relevant research findings (Bartholomew et al., 2011) which indicated that need satisfaction and need frustration are distinct constructs, with need frustration predicting additional variance, over and above that accounted for by need satisfaction, of athletes' well/ill-being outcomes. Athletes' big five personality traits explained the highest percentage of variance in all athletes' spontaneous self-talk dimensions and goal-directed self-talk functions, except for the retrospective-positive spontaneous self-talk dimension, where the three BPNs satisfaction subscales

made the strongest contribution. Overall, the results of this study suggest that although big five personality traits play a major role in shaping athletes' organic self-talk, the fulfillment and the frustration of the needs for autonomy, competence, and relatedness is of additional importance.

Practical Implications

The findings of the current thesis have a number of important practical implications. First, the OSTQS can help sport psychologists, athletes, and coaches to assess more precisely athletes' organic, spontaneous and goal-directed self-talk, and also to identify and modify athletes' maladaptive spontaneous or goal-directed self-talk. Second, from an applied perspective, the results of our study in chapter 4, highlighted the importance of the creation of sport environments that not only satisfy but also avoid to thwart athletes' BPNs, if it is desirable to enhance athletes' goal-directed self-talk and retrospective-positive and anticipatory-positive spontaneous self-talk, while simultaneously minimizing athletes' retrospective-negative and anticipatory-negative spontaneous self-talk. Grounded in Duda's (2013) hierarchical conceptualization of the coach-created motivational climate, previous research in sport and related contexts has indicated that an empowering coach-created motivational climate (i.e., task-involving, autonomy-supportive and socially supportive) is linked to greater BPNs satisfaction (e.g., Castillo-Jiménez et al., 2022; Hancox et al., 2017), whereas a disempowering coach-created motivational climate is linked to greater BPNs frustration (e.g., Castillo-Jiménez et al., 2022; Hancox et al., 2017). Moreover, previous research on antecedents of athletes' organic self-talk as it assessed by ASTQS, revealed that an empowering coach-created motivational climate is positively linked to athletes' organic, positive-self-talk and negatively related to athletes' organic, negative-self-talk, whereas a disempowering coach-created motivational climate was positively linked to athletes' organic negative-self-talk (Zourbanos et al., 2016). Therefore, the implementation of interventions

that educate coaches how to create a more empowering and less disempowering motivational climate (e.g., Empowering Coaching™; Duda, 2013) have the potential to maximize athletes' goal-directed self-talk as well as retrospective-positive and anticipatory-positive spontaneous self-talk and reduce athletes' unproductive retrospective-negative and anticipatory-negative spontaneous self-talk. Alongside these types of interventions, the implementation also of interventions aiming at remaining significant others (e.g., parents, peers, sport clubs staff) influencing athletes' BPNs satisfaction and frustration within their sport, and their organic self-talk, are worthy of examination. Finally, in our literature review in chapter 2, based on the existing research evidence, we presented different interventions that could be implemented at three levels of organic self-talk antecedents (personal, situational, and social-environmental) and have the potential to change athletes' organic self-talk in effective directions.

Limitations and Future Directions

As it has already been mentioned in the previous chapters, one methodological limitation of the studies presented in this thesis is the use of self-reports. Particularly, verbal reports may include cognitive processes that sometimes may be beyond meta-conscious control, and thus cannot be described by the individuals (Zourbanos et al., 2009). Moreover, as self-reports are relied on one's memory, sometimes the information may have been forgotten or recalled inaccurately (Nisbett & Wilson, 1977). However, self-reports provide access to individuals' perceptions, motives, and cognitions that cannot be obtained through objective methods (Guerrero, 2005). Second, concerning the psychometric properties of OSTQS, it is not possible to test all types of validity in a single research. Thus, future researchers could examine the concurrent, predictive, and incremental validity of the current scale. Also, the development and the examination of psychometric properties of OSTQS were achieved in the current investigation using samples of Greek-speaking individuals. Thus,

future researchers could translate the OSTQS into different languages, and examine the psychometric properties of these translated versions using participants from different nations and sociolinguistic groups. Additionally, these translated versions of the OSTQS will further allow us to test in future research the measurement invariance of the OSTQS scores across cultures. Finally, the validation of the OSTQS was based on a state approach. However, the scale could be potentially used also as a trait measure of athletes' organic self-talk. Thus, future research could examine the validity of the scale in assessing athletes' trait organic self-talk.

Third, given the cross-sectional nature of the study presented in chapter 4, it is important to notice that no causal links can be inferred from its findings. Therefore, future longitudinal and experimental research would allow us for investigation of potential bidirectional relationships, mediation processes, and causal inferences. In addition, several other antecedents of organic spontaneous and goal-directed need further investigation using quantitative research designs. According to Theodorakis et al. (2012) future research should give priority to organic self-talk antecedents, susceptible to change by interventions. Some of these include the motivational climate created by significant others (i.e., coach, peers, parents, leadership factors, behavioral regulations, goal-orientations, and interpretation of competitive situations).

Contribution to the Scientific literature and Conclusion

Despite the above limitations, this PhD contributes to the existing literature in the following ways:

1. The development of a theory-grounded, multidimensional, valid and reliable measure of athletes' organic self-talk, that captures according to the contemporary conceptualization of organic self-talk in sport (Latinjak, Hatzigeorgiadis, et al., 2019) the two major types of athletes' organic self-talk: spontaneous

(uncontrolled) self-talk, via the assessment of four spontaneous self-talk dimensions; and goal-directed (controlled) self-talk via the assessment of seven goal-directed dimensions/function.

2. Provide valuable information regarding the predictive role of big five personality traits (as personal antecedents), and BPNs satisfaction and frustration within sport environment (as social-environmental antecedents), on athletes' organic, spontaneous and goal-directed self-talk at the state level.
3. Contributes to the developing research areas that examine the antecedents of athletes' organic self-talk and athletes' big five personality traits; as well as to the considerable amount of previous SDT research, and may guide future research on the areas.
4. Finally from a theoretical perspective, the present PhD contribute to the advancement of self-talk theory in sport, by providing a valid and reliable measure of athletes' organic , spontaneous and goal-directed self-talk, and evidence regarding the predictive role of big five personality traits and BPNs satisfaction and frustration within sport environment on athletes' organic, spontaneous and goal-directed self-talk.

Future researchers could take advantage of the OSTQS for a more theory-based study of athletes' organic self-talk, its antecedents, its consequences; as well as for the development and application of effective organic self-talk interventions.

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Appendices

Questionnaires Used in Chapter 4

The Greek Version of Organic Self-Talk Questionnaire for Sport (OSTQS)

Αυτο-ομιλία είναι οτιδήποτε λένε οι αθλητές-τριες στον εαυτό τους κατά τη διάρκεια της προπόνησης ή του αγώνα, σιωπηρά ή φωναχτά, και μπορεί να συμβαίνει αυθόρμητα ή με πρόθεση προκειμένου να ενισχύσουν την απόδοσή τους ή να επιτύχουν κάποιο στόχο τους.

Παρακάτω υπάρχει μια λίστα από διάφορες δηλώσεις που συνήθως οι αθλητές απευθύνουν στον εαυτό τους κατά την διάρκεια της **προπόνησης και του αγώνα**. Σας παρακαλώ να διαβάσετε κάθε δήλωση και να προσδιορίσετε **πόσο συχνά** είπατε την καθεμία στον εαυτό σας, **κατά τη διάρκεια της προπόνησης ή του αγώνα που μόλις πήρατε μέρος, με βάση την παρακάτω κλίμακα**.

0 = “ποτέ”, 1 = “σπάνια”, 2 = “μερικές φορές”, 3 = “συχνά”, 4 = “πολύ συχνά”

Υποδείξτε πόσο συχνά κατά τη διάρκεια του αγώνα/προπόνησης που μόλις ολοκληρώθηκε, είχατε αυθόρμητες σκέψεις, δηλαδή σκέψεις που μας έρχονται στο μυαλό από μόνες τους, σαν τις παρακάτω:		Ποτέ	Σπάνια	Μερικές φορές	Συχνά	Πολύ συχνά
1.	Τα πήγα καλά	0	1	2	3	4
2.	Πάλι λάθος έκανα	0	1	2	3	4
3.	Θα τα πάω καλά	0	1	2	3	4
4.	Θέλω να τα παρατήσω	0	1	2	3	4
5.	Τα κατάφερα	0	1	2	3	4
6.	Απέτυχα	0	1	2	3	4
7.	Θα κερδίσω	0	1	2	3	4
8.	Θα σταματήσω	0	1	2	3	4
9.	Τέλεια	0	1	2	3	4
10	Τα πήγα χάλια σήμερα	0	1	2	3	4
11	Μπορώ	0	1	2	3	4
12	Δεν αντέχω άλλο	0	1	2	3	4
13	Οι κόποι μου έχουν ανταμειφθεί	0	1	2	3	4
14	Είμαι άχρηστος	0	1	2	3	4
15	Θα τα καταφέρω	0	1	2	3	4
16	Έχω γίνει καλύτερος	0	1	2	3	4
17	Τι θα νομίζουν/πουν οι άλλοι για την κακή μου απόδοση	0	1	2	3	4

Υποδείξτε πόσο συχνά κατά τη διάρκεια του αγώνα/προπόνησης που μόλις ολοκληρώθηκε, είπατε στον εαυτό σας πράγματα σαν τα παρακάτω με σκοπό να πετύχετε κάποιο στόχο ...		Ποτέ	Σπάνια	Μερικές φορές	Συχνά	Πολύ συχνά
1.	Δεν πειράζει. Κανένας δεν είναι τέλειος	0	1	2	3	4
2.	Μη φοβάσαι	0	1	2	3	4
3.	Μην απογοητεύεσαι	0	1	2	3	4
4.	Ηρέμησε	0	1	2	3	4
5.	Πάμε γερά	0	1	2	3	4
6.	Συγκεντρώσου στην τακτική/τεχνική σου	0	1	2	3	4
7.	Θα τα πας καλά	0	1	2	3	4
8.	Σκοπός είναι να αποδώσω καλά	0	1	2	3	4
9.	Είναι μόνο ένα παιχνίδι/ένας αγώνας/μια προπόνηση	0	1	2	3	4
10.	Μην ανησυχείς	0	1	2	3	4
11.	Μην εγκαταλείπεις	0	1	2	3	4
12.	Κάνε υπομονή	0	1	2	3	4
13.	Δώστα όλα	0	1	2	3	4
14.	Συγκεντρώσου στο στόχο σου	0	1	2	3	4
15.	Μπορείς	0	1	2	3	4
16.	Σκοπός είναι να βελτιώνομαι	0	1	2	3	4
17.	Όλοι μπορεί να έχουν μια κακή μέρα	0	1	2	3	4
18.	Ψυχραιμία	0	1	2	3	4
19.	Συνέχισε	0	1	2	3	4
20.	Συγκεντρώσου στο τι πρέπει να κάνεις τώρα	0	1	2	3	4
21.	Είσαι δυνατός	0	1	2	3	4
22.	Σκοπός είναι να νικήσω/ουμε	0	1	2	3	4
23.	Όλοι κάνουν λάθη	0	1	2	3	4
24.	Πάρε βαθιά ανάσα	0	1	2	3	4
25.	Δυνατά	0	1	2	3	4
26.	Δώσε προσοχή	0	1	2	3	4
27.	Πίστεψε στον εαυτό σου	0	1	2	3	4
28.	Σκοπός είναι να πετύχω το στόχο μου	0	1	2	3	4

The Greek Version of the 50-item International Personality Item Pool (IPIP)

Παρακάτω παρουσιάζονται φράσεις, που περιγράφουν διάφορες συμπεριφορές ανθρώπων. Παρακαλώ χρησιμοποιήστε την παρακάτω κλίμακα απαντήσεων για να περιγράψετε με ακρίβεια κατά πόσο σας αντιπροσωπεύει η κάθε δήλωση. Περιγράψτε **τον εαυτό σας, όπως είστε τώρα** και όχι όπως θα ευχόσασταν να είστε μελλοντικά. Περιγράψτε **τον εαυτό σας με ειλικρίνεια**, σε σύγκριση με άλλα γνωστά σας πρόσωπα του ίδιου φύλου και πάνω κάτω της ίδιας ηλικίας.

1 = Διαφωνώ	2 = Λίγο Διαφωνώ	3= Ούτε διαφωνώ ούτε συμφωνώ	4 = Λίγο συμφωνώ	5 = Συμφωνώ
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		Διαφωνώ	Λίγο διαφωνώ	Ούτε διαφωνώ ούτε συμφωνώ	Λίγο συμφωνώ	Συμφωνώ
1.	Είμαι η ψυχή της παρέας.	1	2	3	4	5
2.	Δεν αισθάνομαι συμπόνια για τους άλλους.	1	2	3	4	5
3.	Είμαι ακατάστατος/η.	1	2	3	4	5
4.	Αγχώνομαι εύκολα.	1	2	3	4	5
5.	Έχω πλούσιο λεξιλόγιο.	1	2	3	4	5
6.	Γενικά μιλάω λίγο.	1	2	3	4	5
7.	Είμαι αδιάφορος για τα αισθήματα των άλλων.	1	2	3	4	5
8.	Αφήνω τα πράγματα μου όπου να' ναι.	1	2	3	4	5
9.	Παρεξηγούμαι εύκολα.	1	2	3	4	5
10.	Έχω δυσκολία στο να φαντάζομαι πράγματα.	1	2	3	4	5
11.	Αισθάνομαι άνετα ανάμεσα σε κόσμο.	1	2	3	4	5
12.	Προσβάλλω τους ανθρώπους.	1	2	3	4	5
13.	Ασχολούμαι με κάτι μέχρι να γίνει τέλειο.	1	2	3	4	5
14.	Γενικά ανησυχώ για τα πράγματα.	1	2	3	4	5
15.	Έχω ζωνρή φαντασία.	1	2	3	4	5
16.	Συνήθως μένω στο παρασκήνιο.	1	2	3	4	5
17.	Μου αρέσει να βοηθάω τους ανθρώπους	1	2	3	4	5
18.	Δημιουργώ ακαταστασία.	1	2	3	4	5
19.	Παρασύρομαι από τα συναισθήματά μου.	1	2	3	4	5
20.	Μου αρέσει να δοκιμάζω νέες εμπειρίες.	1	2	3	4	5
21.	Ξεκινώ τις συζητήσεις.	1	2	3	4	5
22.	Ενδιαφέρομαι για τα προβλήματα των άλλων.	1	2	3	4	5
23.	Κάνω σχέδια και τα ακολουθώ με συνέπεια.	1	2	3	4	5
24.	Εκνευρίζομαι εύκολα.	1	2	3	4	5
25.	Έχω πολύ καλές ιδέες.	1	2	3	4	5

		Διαφωνώ	Λίγο διαφωνώ	Ούτε διαφωνώ ούτε συμφωνώ	Λίγο συμφωνώ	Συμφωνώ
26.	Συχνά αισθάνομαι αμηχανία όταν είμαι με άλλους ανθρώπους.	1	2	3	4	5
27.	Είμαι ευαίσθητος/η.	1	2	3	4	5
28.	Συχνά, ξεχνάω να βάζω τα πράγματα πίσω στη σωστή τους θέση.	1	2	3	4	5
29.	Αναστατώνομαι εύκολα.	1	2	3	4	5
30.	Είμαι καλός/η σε πολλά πράγματα.	1	2	3	4	5
31.	Κάνω φίλους εύκολα.	1	2	3	4	5
32.	Γενικά αδιαφορώ για τους άλλους.	1	2	3	4	5
33.	Μου αρέσει η τάξη.	1	2	3	4	5
34.	Πανικοβάλλομαι εύκολα.	1	2	3	4	5
35.	Καταλαβαίνω γρήγορα διάφορα πράγματα.	1	2	3	4	5
36.	Ξέρω πώς να τραβάω το ενδιαφέρον των άλλων.	1	2	3	4	5
37.	Αφιερώνω χρόνο για άλλους ανθρώπους.	1	2	3	4	5
38.	Αφήνω τις δουλειές μου μισοτελειωμένες.	1	2	3	4	5
39.	Χάνω τον έλεγχό μου.	1	2	3	4	5
40.	Μπορώ να επεξεργάζομαι πολλές πληροφορίες ταυτόχρονα.	1	2	3	4	5
41.	Δεν με πειράζει να είμαι το κέντρο της προσοχής.	1	2	3	4	5
42.	Καταλαβαίνω τα συναισθήματα των άλλων.	1	2	3	4	5
43.	Έχω πρόγραμμα.	1	2	3	4	5
44.	Ενοχλούμαι εύκολα από καταστάσεις.	1	2	3	4	5
45.	Μου αρέσει να βρίσκω νέους τρόπους να κάνω πράγματα.	1	2	3	4	5
46.	Το βρίσκω δύσκολο να πλησιάζω άλλους ανθρώπους.	1	2	3	4	5
47.	Τα έχω καλά με όλον τον κόσμο.	1	2	3	4	5
48.	Μου αρέσει να συμμαζεύω τα πράγματά μου.	1	2	3	4	5
49.	Θυμώνω εύκολα.	1	2	3	4	5
50.	Μπορώ να διατυπώνω ξεκάθαρα τις ιδέες μου.	1	2	3	4	5

The Greek Version of the 15 Items Used To Assess Athletes' Basic Psychological Needs Satisfaction

Οι παρακάτω δηλώσεις αφορούν τις εμπειρία που έχεις τις τελευταίες 4 εβδομάδες με την ομάδα που βρίσκεσαι τώρα. Σημείωσε πόσο συμφωνείς ή διαφωνείς με κάθε δήλωση βάζοντας σε κύκλο έναν αριθμό σε κάθε μία.

Κατά την διάρκεια των τελευταίων 4 εβδομάδων ...	Διαφωνώ απόλυτα	Διαφωνώ	Διαφωνώ λίγο	Ουδέτερο	Συμφωνώ λίγο	Συμφωνώ	Συμφωνώ απόλυτα
1. ... αισθάνθηκα πως προπονούμε επειδή το θέλω.	1	2	3	4	5	6	7
2. ... είμαι ικανοποιημένος/η με αυτά που κατάφερα.	1	2	3	4	5	6	7
3. ... αισθάνθηκα να με υποστηρίζουν.	1	2	3	4	5	6	7
4. ... μπορούσα να επιλέξω ως ένα βαθμό τι θα κάνω.	1	2	3	4	5	6	7
5. ... αισθάνθηκα αρκετά ανταγωνιστικός/η.	1	2	3	4	5	6	7
6. ... αισθάνθηκα ότι με καταλαβαίνουν.	1	2	3	4	5	6	7
7. ... είχα λόγο στην επιλογή του τι (ποια δεξιότητα) θα προπονήσουμε.	1	2	3	4	5	6	7
8. ... η επίδοσή μου ήταν πολύ καλή.	1	2	3	4	5	6	7
9. ... αισθάνθηκα πως ακούν τη γνώμη μου.	1	2	3	4	5	6	7
10. ... είχα την ελευθερία να κάνω επιλογές.	1	2	3	4	5	6	7
11. ... σκεφτόμουν πως «Είμαι αρκετά καλός/ή στο άθλημα μου».	1	2	3	4	5	6	7
12. ... αισθάνθηκα ότι με εκτιμούν.	1	2	3	4	5	6	7
13. ... μπορούσα να αποφασίσω για το ποιες ασκήσεις ήθελα να κάνω.	1	2	3	4	5	6	7
14. ... έμαθα πολλά καινούργια πράγματα.	1	2	3	4	5	6	7
15. ... αισθάνθηκα να με αποδέχονται	1	2	3	4	5	6	7

The Greek Version of the 12-item Psychological Need Thwarting Scale (PNTS)

Οι παρακάτω δηλώσεις αφορούν τις εμπειρίες που έχεις τις τελευταίες 4 εβδομάδες με την ομάδα που βρίσκεσαι τώρα. Σημείωσε πόσο συμφωνείς ή διαφωνείς με κάθε δήλωση βάζοντας σε κύκλο έναν αριθμό σε κάθε μία.

Κατά την διάρκεια των τελευταίων 4 εβδομάδων ...	Διαφωνώ απόλυτα	Διαφωνώ	Διαφωνώ λίγο	Ουδέτερο	Συμφωνώ λίγο	Συμφωνώ	Συμφωνώ απόλυτα
1. ... αισθάνθηκα να με περιορίζουν στο να επιλέξω το πώς θα προπονηθώ.	1	2	3	4	5	6	7
2. ... υπήρξαν περιπτώσεις όπου με έκαναν να αισθανθώ πως δεν είμαι αρκετά καλός/ή	1	2	3	4	5	6	7
3. ... αισθάνθηκα να με πιέζουν ώστε να συμπεριφέρομαι με έναν συγκεκριμένο τρόπο.	1	2	3	4	5	6	7
4. ... αισθάνθηκα να με απορρίπτουν.	1	2	3	4	5	6	7
5. ... αισθάνθηκα εξαναγκασμένος/η να ακολουθώ αποφάσεις που παίρνουν άλλοι για μένα στην προπόνηση.	1	2	3	4	5	6	7
6. ... δεν αισθάνθηκα καλός/ή, γιατί δεν μου δόθηκαν οι ευκαιρίες να αξιοποιήσω τις δυνατότητές μου.	1	2	3	4	5	6	7
7. ... αισθάνθηκα να με πιέζουν να συμφωνώ με το προπονητικό πρόγραμμα.	1	2	3	4	5	6	7
8. ... αισθάνθηκα ότι με απορρίπτουν.	1	2	3	4	5	6	7
9. ... υπήρξαν περιπτώσεις στις οποίες κάποιος με έκανε να νιώσω ανίκανος/η.	1	2	3	4	5	6	7
10. ... αισθάνθηκα ότι κάποιος/ες με αντιπαθούν.	1	2	3	4	5	6	7
11. ... υπήρξαν στιγμές που άκουσα πράγματα, τα οποία με έκαναν να αισθάνομαι ανίκανος/η.	1	2	3	4	5	6	7
12. ... αισθάνθηκα ότι οι άλλοι/ες με ζήλευαν όταν τα κατάφερα.	1	2	3	4	5	6	7