EXPLORING THE RELATIONSHIPS BETWEEN FLOW, MINDFULNESS, AND SELF-TALK: A CORRELATIONAL STUDY

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Master's Thesis in Sport and Exercise Psychology

Spring 2013

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ABSTRACT

Joachim Bervoets, 2013. Exploring the Relationships between Flow, Mindfulness, and Self-Talk: A Correlational Study. Master's Thesis in Sport and Exercise Psychology. Department of Sport Sciences, University of Jyväskylä. 45 p.

Flow (peak performance) and mindfulness (nonjudgemental present-moment awareness) appear to be conceptually closely related to one another (e.g., Gardner & Moore, 2004). Theoretically, self-talk can be reasoned to play a key role in influencing the afore mentioned constructs. The interconnectivity of these three key variables of interest is illustrated and explained in a proposed overarching theoretical framework.

Therefore, the main purpose of the current correlational study was to explore the relationships between flow, mindfulness, and self-talk, at the dispositional level. 212 international participants with experience in competitive sports completed an on-line questionnaire comprising the Dispositional Flow Scale 2 (DFS-2; Jackson & Eklund, 2004), the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), and the Automatic Self-Talk Questionnaire for Sports (ASTQS; Zourbanos et al., 2009).

Results confirmed the moderate, positive connection between flow and mindfulness (r = .44). Moreover, linear regression analysis indicated that mindfulness appeared to significantly predict flow (F = 50.395 [1, 211], p < .001). Furthermore, negative- and positive self-talk correlated moderately with both flow (r = -.52 and r = .59, respectively) and mindfulness (r = -.45 and r = .23, respectively). Additionally, self-talk (negative and positive combined) significantly predicted flow and mindfulness, accounting for 51% and 22% of the variance, respectively.

Investigating potential gender differences in terms of dispositional flow, mindfulness, and self-talk, was a secondary aim of the present study. Significant gender differences were found for every variable of interest; in this sample, men appeared to demonstrate higher levels of flow, mindfulness, and positive self-talk, and lower levels of negative self-talk, in comparison to women.

In sum, the examined triangle of concepts appeared to be considerably interconnected, illustrated by moderate to strong correlations and significant predictions. The findings of the present study suggest that these novel avenues of research merit further, closer attention in future studies; especially, making use of experimental designs (intervention-based), more homogenous groups, and deeper analysis of sub-scales.
Lastly, future research could benefit greatly from looking into the potential mediating influence mindfulness has on self-talk, and consequently how these two concepts affect athletic peak performance, flow.

Keywords: flow, mindfulness, self-talk, competitive sports

ACKNOWLEDGEMENTS

My most sincere gratefulness goes out to everyone who has helped me over the course of the last year;

My supervisor, Dr. Mary Hassandra, who has supported and encouraged me throughout the entire thesis-journey. Her guidance and research-expertise were indispensable to the successful end-result of this study.

My classmates, always eager to provide words of encouragement. Never hesitating to offer advice.

My friends, words fall short here. Often unknowingly, helping me find that essential spark of inspiration. Love and kindness are paramount.

My family, sending me truckloads of positive energy from back home. Sometimes out of sight, never out of heart.

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1 INTRODUCTION

"Everything was happening in slow motion for me, and you just really want to stay in that moment. You don't want to step outside of yourself and think about what is going on because then you are going to lose that rhythm. You just need to keep going, then at the end of the game, I really just felt numb. I couldn't really grasp what had just happened.
What it is, you start seeing where guys are going before they get there. It gives you the effect of the game being in slow motion. It's a combination of anticipation and visualization."
"I was just determined. I was just locked in, tuned into what was going on out there. These points tonight mattered. We needed them. The points I put in the basket were instrumental. It means a lot more."

- Kobe Bryant after his legendary 81 (!) points-game in 2006 (regarded by many as the greatest performance ever in the NBA): The sport psychological concept 'Flow' is described quite soundly by Kobe here: e.g., transformation of time (slow motion), loss of self-consciousness (don't step outside of yourself), action-awareness merging ((automatic) rhythm), clear goals (determined, needed points), and sense of control/concentration (anticipation, locked/tuned in).

The congruousness between Kobe's description of how he experienced his performance, and most of Csikszentmihalyi's dimensions of flow (which will be described in detail later), is remarkable. This illustrates the tangibility of flow in sports. Kobe's words are also reminiscent of Jackson and Delehanty's (1995) infamous insights regarding optimal performance in basketball: "selflessness is the soul of teamwork" (p. 6) relates to the flow-dimension loss of self-consciousness, furthermore, both are intricately tied to the downplaying of the ego in mindfulness, where the individual notices the unfolding moment nonjudgmentally by refraining from assigning personal values to the process, and so, lets go of personal ego and other self-conscious thoughts (Game, 2001). Kobe seemed to tap into a special spring well of vision, energy, when he 'saw where guys were going before they got there'. The illustrious basketball coach Phil Jackson (1995) described this "mindfulness connection" (p. 118) as "players need to connect with something larger than themselves" (p. 64), he called on everyone to be fully present during game situations, in order to let the players "develop an intuitive feel for

how their movements and those of everyone else on the floor are interconnected" (p. 91). Indeed, optimal performance has been linked to 'living in the here and now', 'focusing on the present moment' by several authors (Jackson & Csikszentmihalyi, 1999; Jackson & Delehanty, 1995; Kee & Wang, 2008; Ravizza, 2002). It is of additional interest, given the omnipresence of self-talk in sport psychology, what kind of verbalizations are going on in the athlete's mind when this peak performance occurs.

1.1 Conceptualization Key Variables: Flow, Mindfulness, and Self-Talk

1.1.1 Flow

Flow and mindfulness share a number of defining characteristics. Flow can perhaps best be described as an optimal psychological state of peak performance that can occur when there is a balance between perceived challenges and skills (Csikszentmihalyi, 1990). This deeply rewarding elusive state tends to involve intense concentration so focused that it amounts to absolute absorption in the specific activity, loss of self-consciousness, a harmonious sense of everything clicking into place, and so forth. Csikszentmihalyi (2000) divided the nine dimensions of flow into flow conditions (prerequisites): challenge-skills balance (i.e., accomplishment highly demanding situation by extending beyond normal capabilities), clear goals (inherent in activity to strive towards), unambiguous feedback (informs individual about progress towards goals or adjustments necessary to do so); and flow characteristics (experienced during): concentration on the task at hand (total focus, free from superfluous or distracting thoughts), action-awareness merging (i.e., total absorption, feeling one with the activity), loss of self-consciousness (i.e., decreased awareness of self- and social evaluation), sense of control (over performance or outcome), and transformation of time (i.e., perception of time either speeding up or slowing down). The result is an autotelic experience; enjoyable and intrinsically rewarding (Csikszentmihalyi, 1975). The peak experience of flow is strongly associated with peak performance (Jackson & Roberts, 1992). In Jackson's (1992) qualitative exploration of flow, athletes reported to find 'not actively trying to control' a controllable facilitator of flow, bearing close resemblance to the acceptance component of mindfulness, both being in accordance with Wegner's (1994) 'Ironic Process Theory'. This conceptual and theoretical affinity will be expanded on later in this introduction.

1.1.2 Mindfulness

At the core of mindfulness lies the nonjudgmental focus of one's attention on the experience that occurs in the present moment (Kabat-Zinn, 1994). Unpleasant thoughts are simply acknowledged and accepted, rather than suppressed or replaced by positive thoughts (Gardner & Moore, 2007). An open, receptive stance towards one's broad domain of conscious experience is adopted in mindfulness (Kabat-Zinn, 1990). One of the hallmarks of mindfulness is that attention is being extricated from being fixated on evaluative language, enabling nonjudgmental, metacognitive awareness of thoughts and feelings (Brown, Ryan, & Creswell, 2007). It is important to underline this element of evaluative language in mindfulness, or the absence thereof, in light of self-talk, the third main construct of interest in the current study. An operational definition of mindfulness has been proposed by Bishop et al. (2004) and consists of two components; self-regulation of attention towards the immediate present moment (regarded as a mental skill or state), and the adoption of an orientation that is marked by curiosity, openness, and acceptance (viewed as personality characteristics that underlie mindfulness tendencies). This regulation of attention is argued to be a trainable skill (e.g., Baer, 2003; Clark, 2002; Sun & Wu, 2011), examples through which this can be achieved, relevant to the current article, include; mindfulness (e.g., Gardner & Moore, 2004), and self-talk (e.g., Hatzigeorgiadis et al., 2004). In sum, "the capacity to flexibly allocate attention to any of several experiential domains (behavioral, physiological, cognitive) in a nonreactive, nonjudgmental manner is perhaps the most valuable potential characteristic of mindfulness" (Salmon, Hanneman, & Harwood, 2010, p. 151). The latter converges with Dormashev's (2010) notion that prolonged effortless concentration of attention is the principal characteristic of flow.

1.1.3 Self-Talk

An operational definition of self-talk should include: (a) verbalizations or statements addressed to the self; (b) multidimensional in nature (positive/negative, overt/covert, self-determined, frequency); (c) having interpretive elements association with the content of statements employed; (d) is somewhat dynamic; and (e) serving at least two functions; instructional and motivational (Hardy, 2006). Considering the correlational nature of, and the quantitative self-talk measure (Automatic Self-Talk Questionnaire for Sports (ASTQS); Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis, & Papaioannou, 2009) used in the present study, the operational definition of self-talk in this article is

limited to ‘positive or negative verbalizations or statements addressed to the self, while performing’. Moreover, while frequency of self-talk use is a major factor in the present investigation, due to the limited scope, functions (in the form of sub-scales) will not be included in the analyses.

1.2 Mindfulness in Sport Psychology

Mindfulness and ‘Acceptance and Commitment Therapy’ (ACT, said as one word, not as letters; Hayes, Strosahl, & Wilson, 1999) are rapidly gaining ground in almost every field of psychology: stress, depression, anxiety, psychosis, eating disorders, work performance, just to name a few (Baer, 2003; Birrer, Röthlin, & Morgan, 2012; Moore, 2009). Considering the sound theoretical underpinnings and ample empirical evidence put forward by these third wave approaches, the exponential boom in research and therapeutic applications, comes as no surprise (e.g., Cullen, 2008; Greeson, 2009).

As a rather logical next step, mindfulness and ACT are now also infiltrating sport psychology. A very first protocol, the ‘Mindfulness Acceptance and Commitment approach’ (MAC), a coalescence of mindfulness and ACT, was brought to the table by Gardner and Moore in 2004. Dozens of other researchers followed Gardner and Moore’s example, contributing to the knowledge-base of mindfulness in sport (e.g., Bernier, Thienot, Codron, & Fournier, 2009; Kaufman, Glass, & Arnkoff, 2009; Aherne, Moran, & Lonsdale, 2011). It should be noted that mindfulness and ACT are also rising in exercise psychology (e.g., Chatzisarantis & Hagger, 2007), however, the current study shall focus on sport psychology, and performance enhancement in particular.

Investigating mindfulness in sport psychology is compelling and makes sense for a number of theoretical reasons: (1) ‘Flow Theory’ (Csikszentmihalyi, 1990), the experience of peak performance and mindfulness are conceptually closely related (i.e., non-judgemental, present-moment awareness); (2) ‘Ironic Process Theory’ (Janelle, 1999; Wegner, 1994), attempts to control/ suppress/ change negative thoughts/ emotions, are at best inefficient, and a worst counterproductive (Gardner & Moore, 2004); (3) ‘Constrained Action Hypothesis’ (Wulf, McNevin, & Shea, 2001), which holds that an external focus promotes the use of more automatic control processes (in other words, let your automatic pilot thrive); and (4) ‘Reinvestment Theory’ (Masters &

Maxwell, 2008), which postulates that conscious attention to movement can disrupt automatic processes. Together, these theories form the overarching theoretical framework key to the current study, and shall be set out more elaborately later in this section. Additionally, what role these theories play in illustrating, and to some extent explaining, the interconnectivity between flow, mindfulness, and self-talk, shall also be described after the exposition of said overarching theoretical framework.

The concept of mindfulness and what it means in general psychology and daily life, in itself, is another argument for examining mindfulness in a sport context. Surely, athletes will benefit from decreased anxiety, stress, perfectionism (to some extent), worry, rumination, and increased concentration, mental toughness, attentional focus on the relevant task at hand, confidence, self-efficacy, –control and –regulation, general health and psychological well-being. These correlates have already been identified, mostly in other fields of psychology (see Baer (2003) for a review). Interestingly, mindfulness is also starting to gather support of a more neuroscientific nature (e.g., functional magnetic resonance imaging (fMRI) & electroencephalography (EEG)); potentially profound effects on neural functioning, including the electrical activity patterns of the brain, and the neuroanatomical activity (and even the relative size) of specific brain regions (Marks, 2008; Stein, Ives-Deliperi, & Thomas, 2008). Evidence of such kind, of which some traditional mental skills training techniques can be envious, with reason, substantiates the possibility of third wave approaches making a tangible difference in sport psychology.

Nevertheless, there still is a lot of work to be done. Even though preliminary results look promising, we are still faced with many challenges. Crystallized definitions of concepts (e.g., dispositional-/ state-mindfulness) to start with. Secondly, as is usually the case in young fields, there is a need for more studies, with more participants, longitudinal, cross-cultural, and so on. In the most recent research update on mindfulness in sport, Birrer et al. (2012) specifically recommend correlational studies with large numbers of subjects. Exactly this is the research design of the present study, in an attempt to contribute to the field.

1.3 Introduction Interconnectivity Key Variables: Flow, Mindfulness, and Self-Talk

1.3.1 Mindfulness and Flow

The relationship between flow and mindfulness is among the most widely investigated ones in the research-base of mindfulness in sport (e.g., Aherne et al., 2011; Kaufman et al., 2009; Kee & Wang, 2008; see Birrer et al. (2012) for a review). Optimal performance and mindfulness share many characteristics (e.g., non-judgemental (non-self-conscious), moment-to-moment awareness, concentration on the task at hand) and it is argued that through mindfulness enhancing interventions, it is possible to increase the likelihood of athletes experiencing the ever so elusive state of peak performance, flow (e.g., Gardner & Moore, 2007). The current study aims to contribute to this idea by further strengthening the link between flow and mindfulness, through a correlational design, confirming a strong and positive correlation between the two, as was hypothesized and found in previous research (e.g., Kee & Wang, 2008).

1.3.2 Why Include Self-Talk?

Besides flow and mindfulness, of which the relevance was discussed in the previous introductory paragraphs, the present study also aims to explore the relationships between afore mentioned variables, and self-talk. The case for self-talk is unique in this study, in that possible links between self-talk and mindfulness, and self-talk and flow, have not yet been explored. The fact that self-talk is such a widely used tool in sport psychology, accounts for a reason to dig into this uncharted territory, together with ACT's 'Cognitive Fusion', 'Experiental Avoidance', and 'Relational Frame Theory (RFT)' (Hayes, 2004), and Wegner's ironic processes of mental control (1994). In brief, large part of ACT's theoretical underpinnings stem from the notion that many mental problems have an important linguistic aspect to them. In other words, human language and cognition can give rise to, and are at the core of erroneous thinking patterns (e.g., depression, anxiety). On the other hand, regulation of attention, which is so vitally essential in flow and mindfulness, has been shown to be trainable through self-talk techniques (e.g., Hatzigeorgiadis et al., 2004). Insight into the relationships between self-talk, mindfulness, and flow, can have considerable consequences for not only performance enhancement, general psychology, also, can benefit greatly from advances in this regard. Moreover, contrary to popular belief, the empirical evidence for self-talk in sport psychology is not at all impressively massive, nor is there any sound theoretical explanation yet (Hardy, 2006; Tod, Hardy, & Oliver, 2011). In the same critical meta-

analysis of self-talk, Hardy (2006) states that we know, in fact, very little about self-talk. We know that it can sometimes enhance performance, and, more oftentimes, hinder optimal performance, but we are pretty clueless when it comes to why and how, the mechanisms remain rather vague and opaque. Progress towards a deeper understanding of self-talk is slowly being made, addressing second-generation questions concerning moderaters and mediators, however, we are still at the beginning of this journey (see Tod et al. (2011) for a review). Hardy (2006) also mentions that negative self-talk does not impede performance. This finding bears close resemblance to Hanin's research results that athletes can, and do, perform well with varying levels of internal experiences (1980). However, performance is not included in the present study, and there is no conclusive literature available to support a strong hypothesis in light of the possible links between mindfulness and self-talk, and flow and self-talk. Nonetheless, given the prominent overlapping position regulation of attention occupies in the conceptual triangle of self-talk, flow, and mindfulness, significant relations between these key variables are expected to be found in the present study.

1.4 Overarching Theoretical Framework: 'The Automatic Pilot'

Why is it so important to carefully consider and explore the nexus between flow and mindfulness, and additionally, self-talk? A few core points were introduced briefly in the previous parts of this section (i.e., conceptual overlap and overarching theoretical framework), and shall be put forth in more detail here. Firstly, special attention shall be given to flow and mindfulness. Next, why and how self-talk joins the underlying rationale of the present study, will follow thereafter.

An exposition of the overarching theoretical framework in this study is set forth in the following paragraphs. As mentioned before, the main building blocks that form the rationale for this research include: (1) 'Ironic Process Theory' (Wegner, 1994), (2) 'Constrained Action Hypothesis' (Wulf et al., 2001), and (3) 'Reinvestment Theory' (Masters, 1992; Masters & Maxwell, 2008).

1.4.1 Ironic Process Theory

Wegner's 'Ironic Process Theory' (1994) is one of the strongest theories in modern psychology (N. Chatzisarantis, personal communication, May 24, 2012). Nevertheless, it appears that its essence is not completely widespread yet. Take for example the usage

of thought-stopping in applied sport psychology. Both theoretically and empirically, this technique makes little sense (e.g., Tod, Hardy, & Oliver, 2011). Theoretically speaking, ironic process theory might well be the strongest argument against thought-stopping, together with more solid arguments coming from the recently upcoming mindfulness camp: 'Constrained Action Hypothesis' (Wulf et al., 2001) and 'Theory of Reinvestment' (Masters, 1992; Masters & Maxwell, 2008). In short, these theories postulate that one should not waste (cognitive and emotional) energy on trying to control, manipulate, or fight human cognition that lies within our nature. Instead, one should rather thrive more on the automatic pilot that has learned a vast amount of techniques, movements, information, and such. And so, allocate one's resources in a far more efficient way, focusing on the relevant task at hand. Not only will this allow the individual to perform better, most importantly perhaps, it takes away a great deal of pitfalls. As Gardner and Moore (2004) put it, 'traditional approaches are at best inefficient, and at worst counterproductive' (thought-stopping belonging to the traditional family).

Seeing this in the light of Wegner's theory, this makes an awful lot of sense: given the presence of cognitive load or stress, which is all but uncommon in (elite) sports, it is highly likely for our mental control processes to fail, setting the gates wide open for all the negative thoughts to flow into our consciousness, which is exactly what we were trying to avoid so eagerly (e.g., catastrophic performance decline, choking under pressure). To illustrate this point further, some examples might help: think of the white bear paradigm (Wegner, Schneider, Carter, & White, 1987), 'forcing' yourself to fall asleep, golfers trying to avoid the water (guess where the ball ends up when the athlete fails once in a while), depressed people trying 'not to think of negative things', and so forth. Wegner's theory seems so obvious in our daily lives, and even (scientifically) empirically, it is rock solid (as opposed to many 'techniques' that are still popular, even though they seriously lack evidence and even sound theoretical underpinnings (e.g., Gardner & Moore, 2004).

We have the ability to reflect upon our own mental activities and influence their operation, which gives rise to a paramount function of human consciousness, mental control, at which people are quite adept at times. In Wegner's theory, it is crucial *when (or how)* this control fails, and when it does not, which brought him to a key variable:

mental capacity. This mental capacity, and how to use it efficiently, also plays a crucial role in athletic performance. When there is sufficient capacity, all functions will be up and running, doing their job like they are supposed to: (1) the conscious, intentional, and effortful operating system is searching for mental contents consistent with the intended state, and (2) the unconscious, autonomous, and less demanding monitoring system is scanning for mental contents inconsistent with the intended state, unwanted thoughts. These two *attentional* systems produce mental control by cooperative interaction. Note that regulation of *attention* is perhaps the most important element throughout this entire study, constituting an essential part of every key variable, and binding them all together, in other words, the common ground that interrelates them all. To continue, the monitoring process will reinitiate the operating system when needed. However, when capacity is reduced (e.g., cognitive load, stress, distraction, time pressure, etc.) and no longer adequate, the intended control does not merely decline to a zero level. Rather, exerting mental control without the capacity to fuel it, will result in ironic effects, which are exactly opposite of the intended states. The operating system becomes overwhelmed by the monitoring system, which is full of unwanted thoughts that it had been scanning to keep out of the consciousness. Another example hereof can be found in the pendulum illusion: when a person is explicitly not trying to move the pendulum, it will swing back and forth, this is an ironic process in such that not only is the behavior independent of will, it is also in opposition to that will (ironic, counter intentional error). Baudouin (1921) was one of the first to be well on his way to understanding precisely counter intentional errors when he wrote the following example:

This law of reversed effort is familiar in all its simplicity to everyone who has learned to ride a bicycle. When we are at length able to wobble painfully along, we see a big stone lying in the middle of the road, and we know that all our attempts to avoid it serve only to direct our steering wheel towards the obstacle, upon which it impinges with deadly precision… . This is something more than a quaint experience. It is an illustration of a law (‘law of reversed effort’) valid for all the obstacles we have to encounter in our path through life. (pp. 116–117)

The harder we try to think the good idea, the more violent will be the assaults of the bad idea. (pp. 122–123)

Next, the mechanisms of mental control will be explained briefly, building upon the introductory summary of the two mental processes. In Figure 1, the search ranges of the processes are depicted, as envisioned by Wegner (1994).

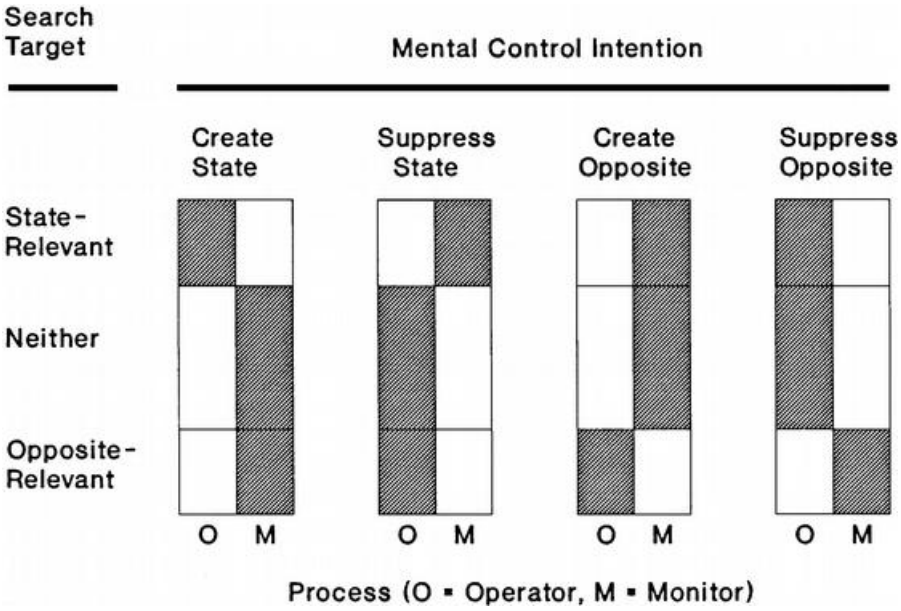

Figure 1. Search targets of the operating and monitoring processes as a function of different mental control intentions (Wegner, 1994).

The most interesting part of these mechanisms is in the 'suppress opposite' intention: When we are, for example, trying to not think sad thoughts, the operating system will be searching for anything that is not sad (both state-relevant and -irrelevant), while the monitoring system is full exclusively with sad thoughts (opposite-relevant). The risk of this intention is clear; as soon as mental capacity reaches inadequate levels (as a result of possibilities mentioned before; cognitive load, stress, time pressure, etc.), the operating system will collapse, and the monitoring system full of 'perverse' negative thoughts will submerge our consciousness in precisely those things that we intended to avoid so dearly. Note also that the search range of the operating system in afore mentioned example (suppressing opposite) is quite large due to the inclusion of the category 'neither' (i.e., irrelevant thoughts), as this puts more load on the already more effortful (intentional) operating system, capacity levels are vulnerable and the entire mental control system is more likely to crash, as compared to for example the 'create state' intention. From this figure, it becomes obvious that it is wiser to burden the effortless (unconscious) monitoring system with the heaviest task, not only because of the potential risk involved when the operating system fails, but also simply because it can take more. In fact, there are only two different possibilities, to create or to suppress,

since create state and create opposite (1st and 3rd in Figure 1), and suppress state and suppress opposite (2nd and 4th in Figure 1), are identical, in terms of processing functions (i.e., the cognitive workload put on operating and monitoring systems; in other words, including irrelevant thoughts (category 'neither') in the effortful, conscious operating system is a bad idea). Suppression is not the way to go, for reasons explained earlier in this section (i.e., too much workload for the weaker (effortful, conscious) operating system, which makes it more likely to collapse). The best suggestion is to 'create' something, focus on positive. That way, even when the entire system comes crashing down, one will be left alone with both negative *and* irrelevant thoughts (as opposed to exclusively negative thoughts). In addition, the operating system is less likely to fail simply because it's burden is lighter (as compared to the suppression intentions). For these reasons, questioning the applicability of 'ironic therapy' can be justified. For example, 'try to not think of happy events' (suppression), until the system collapses (given, which is likely due to overloading the operating process), one's head will be full of negative and irrelevant thoughts, which is rather inconvenient when performing, awaiting the collapse and consequent exclusively positive thoughts. Furthermore, after settling upon the fact that creating a state probably is more beneficial to the individual than trying to suppress a state, it is noteworthy to mention that creating a state works best when this intended state is 'rich'. 'Rich' to the person, relevant, extensive, surrounded by an entire meaningful context, making it easier for the person to maintain focus on said intended state.

1.4.2 Synopsis Affinity Ironic Process Theory with Key Variables

That being said, the advantage of mindfulness in light of ironic processes of mental control, concerns the mental capacity and thereto relating allocation of cognitive resources. When adopting a more mindful meta-cognitive attitude, one is much less concerned with labeling (judging) every thought and emotion that pops up into consciousness, fewer energy is 'wasted' on mental control/manipulation, which in turn, ironically, results in more mental *control*. Not only will a lower demand of cognitive resources to sustain mental control result in a decreased likelihood of the systems collapsing (which would mean ironic (counter intentional) effects), it also grants the athlete a surplus of cognitive (e.g., attentional) resources that he or she can then allocate to much more relevant domains, such as automatized attentional and motoric processes governed by the automatic pilot. The notion that 'choking under pressure' may occur

when people are influenced to make their otherwise automatic actions into intentional ones, and so they lose the resistance to irony that is normally conveyed by practice and automaticity, is beautifully in line with the 'constrained action hypothesis' and the 'theory of reinvestment', which shall be elaborated on in the following paragraphs. Ironic processes of mental control could provide insight in how, for example, incorrect use of self-talk strategies can stand in the way of an athlete's optimal experience and performance, flow. The essential fundaments of this theory are in accordance, and to some degree overlap, with mindfulness, and substantiate the potentially valuable role mindfulness can play in sport psychology. It also provides alternative ways of breaking or altering the sometimes vicious thought-cycle. It is not unthinkable for self-talk to be both a causal contributor to and manifestation of this detrimental cycle. There is reason to believe that mindfulness holds the potential to ameliorate self-talk strategies, with the attainment of flow as an eventual outcome-goal.

1.4.3 Constrained Action Hypothesis

The 'Constrained Action Hypothesis' (Wulf et al., 2001) proposes that an internal focus of attention (focus on movement effect) may be more facilitative for athletes to allow the motor system to more naturally self-organize, as opposed to an internal focus of attention (focus on movement), which may constrain of interfere with automatic control processes. From Wulf et al.'s (2001) experiments, it became apparent that an external focus of attention correlates with a higher confluence between voluntary and reflexive mechanisms, a higher degree of automaticity, and less conscious interference in the control processes that were needed to perform their balance task. An attentional shift to self-evaluation of performance was found to be a significant contributor to in-competition catastrophic performance decline in high performing athletes, in a study by Edwards, Kingston, Hardy, and Gould (2002). To some extent, parallels can be drawn from this hypothesis to the aspect of 'loss of self-consciousness' in flow, and the temporary suspension of one's ego in mindful attention (Brown & Ryan, 2003). Indeed, in traditional psychological skills training, the purpose is usually to self-regulate, to control, to manipulate. This is essentially different from the mindful attitude, which is 'a being state rather than a doing state'. Interestingly, golfers were found to demonstrate decreased levels of left-hemisphere cortical activity, indicative of lowered levels of verbal-linguistic activity, when performing at a high level (Crews & Landers, 1993), providing another argument favoring 'the automatic pilot'. This would suggest a lower

presence of self-talk when athletes are performing at a high level during competition. However, similar results have, to date, only been found in closed skill sports, how these results would compare to open skill sports, such as football and hockey, remains an open empirical question (Gardner & Moore, 2004).

1.4.4 Reinvestment Theory

The 'Reinvestment Theory' (Masters, 1992; Masters & Maxwell, 2008) also adds to this line of thought; "relatively automated motor processes can be disrupted if they are run using consciously accessed, task-relevant declarative knowledge to control the mechanics of the movements on-line" (Masters & Maxwell, 2008, p. 1). In other words, disrupting *flow*. The same authors describe rumination as being "a unique example of self-focus in which thoughts cycle continuously around a common theme even when the stimulus for the thoughts is not present" (Masters & Maxwell, 2008, p. 1). It is tempting to see analogies with self-talk, in such that this rumination might be partly reflected in negative self-talk. Hardy, Hall, and Hardy (2005) argue instructional self-talk to be similar to the use of explicit rules, and will lead to decrements in performance when used to help motor control under pressure situations. Additionally, they conclude that future research should focus on motivational self-talk (since instructional can be detrimental in certain circumstances). Following this line of reasoning, mindfulness would be inversely correlated to negative self-talk, however, in this regard, the exploratory nature of the present study remains dominant (i.e., no strong hypotheses for the relationship between self-talk and mindfulness (or flow for that matter) shall be postulated). The main reason countering a strong hypothesis regarding mindfulness and negative self-talk, consists of the possibility that some athletes perform well with, and perhaps even need, negative self-talk (Tod et al., 2011). Perhaps this venting of frustration allows the individual to let go, and carry on.

1.4.5 Concluding Remarks Theoretical Framework

The bottom line to which the overarching theoretical framework boils down to can be summarized as; a theoretical explanation as to why athletes cannot successfully control their cognitive processes despite investing mental effort. These three theories seem to set the stage quite nicely for third wave approaches, such as 'Acceptance and Commitment Therapy' (ACT; Hayes, 2004) and 'mindfulness', which are so essentially and fundamentally opposite to the traditional approaches, especially in sport

psychology, as described earlier. However, it is probably overly simplistic to stick to mere acceptance, as reappraisal strategies can sometimes be more successful in handling anxiety than acceptance; Hofmann, Heering, Sawyer, and Asnaani (2009) found reappraisal and acceptance to be more effective than suppression in moderating the physiological arousal of anxiety, yet, reappraisal appeared to be more effective than acceptance (and suppression) in moderating the subjective feeling of anxiety. Garland, Gaylord, and Park (2009) argue that "mindful decentering allows for the possibility of positive reappraisal" (p. 4). The meta mechanism of mindfulness is crucial here; by stepping back (disidentification from mental content; 'you are not the thought/emotion') and shifting cognitive sets, one can clear the way for reappraisal to occur, and so, getting back on the track of optimal performance.

1.4.6 Fundamental Difference Traditional Psychological Skills Training

Attempting to promote flow, many athletes, coaches, and sport psychologists use techniques like goal setting, thought stopping, imagery, and self-talk, in order to minimize the impact of negative cognitions and improve athletic performance (Conroy & Metzler, 2004). However, a focus on controlling or eliminating maladaptive thoughts and emotions, may not be as beneficial as previously assumed, since it could paradoxically trigger a monitoring process that searches for negative or unwanted cognitions, bringing them to awareness (Purdon, 1999; Wegner, 1994). Such awareness may lead to self- and task-irrelevant focus, which can negatively impact performance (Gardner & Moore, 2004). Gardner and Moore (2004) stated that one fresh approach could be a mindfulness-based program, which emphasizes non-judgemental, present-moment awareness of both internal experiences and external stimuli, and thus appears to be more theoretically connected to conceptualizations of peak performance and flow than are traditional change-based cognitive-behavioural techniques. These authors proposed that the traditional, control-based approaches to sport performance enhancement may inadvertently result in excessively cognitive (verbal-semantic, self-focused) rather than meta-cognitive (in-the-moment, non-judgemental) activity, impairing the ability to automatically engage previously developed athletic skills, to appropriately respond to environmental cues, and to maintain task-relevant focus. The urge in sport psychology to go beyond the traditional psychological skills training, or, at least, to keep investigating these systematically, is illustrated once more by Gardner (2009): "So, in essence, while theory tells us that PST procedures *should* work, and in

some cases how they *might* work, the empirical support is equivocal at best and completely lacking at worst" (p. 140). There is ample literature supporting an inverse relationship between mindfulness and anxiety (Roemer et al., 2009), perfectionism (Argus & Thompson, 2008), and self-focused attention (Hindman et al., 2009), and strong interest in mindfulness as an effective treatment for reducing anxiety (Orsillo & Roemer, 2005). This reduction of anxiety is also inherent in mental toughness. Although they have not often referred to it as "mindfulness", sport psychologists and coaches have recognized the importance of the concepts underlying this construct to athletic performance. For instance, in a book by Blythe (2006), Dean Smith and Mike Krzyzewski, two legendary basketball coaches, separately spoke of the importance of being in the present moment, focusing on process rather than outcome, and letting go of the uncontrollable, all of which are key aspects of mindfulness. In addition, Bob Rotella, a sport psychologist for golfers, has discussed the significance of letting go of memories of shots, staying in the present, accepting whatever happens without judgment, and looking for rhythm in the game (Rotella & Cullen, 2004), each of which is part of behaving mindfully. In reality, these tasks are often easier for athletes to conceptualize than accomplish, but mindfulness training could provide guidance in building the skills necessary to complete them (Kaufman et al., 2009).

1.5 Research Base Junctions Triangle Key Variables

It is of great importance to note that the literature review of relevant aspects concerning flow, mindfulness, and self-talk, in light of the current study, has been built up throughout the entire introduction, wherever deemed most fitting. What follows here is a brief overview of studies most pertinent to the core hypotheses.

1.5.1 Nexus Flow and Mindfulness

Given the clear conceptual overlap, a number of studies (8) have been conducted at the intersection of flow and mindfulness (see Birrer et al. (2012) for a review). Birrer et al. (2012) conclude that "there is empirical evidence that dispositional mindfulness is a performance-relevant trait in sports and that mindfulness-based interventions may be helpful for athletes" (p. 9). Mindfulness has been shown to be trainable, both at the state- as well as at the dispositional level, through formal- and informal practice, and psycho-education (e.g., Baer 2003; Carmody & Baer, 2008). Promising results have been demonstrated in mindfulness-intervention studies that attempted to enhance flow

and performance (e.g., Aherne et al., 2011; Bernier et al., 2009; Kaufman et al., 2009); mindfulness appears to be related to more flow (and less fear, fewer task-irrelevant thoughts). It should be noted these results are still be to treated with caution, as more research is warranted. In the only previous correlational study exploring the relationship between flow and mindfulness, Kee and Wang (2008) found those individuals with the propensity to be more mindful to be more likely to experience flow. One of the aims in the present study is to replicate this finding.

1.5.2 The Case for Self-Talk

Even though the role self-talk can play in affecting athletic performance has been investigated and described both theoretically and empirically (e.g., Tod et al., 2011), its relation to flow and mindfulness remains, to date, unstudied. Self-talk is believed to play a mediating role in the cognitive mechanism of attention; specifically, concentration (Chroni, Perkos, & Theodorakis, 2007), and the alteration of attentional foci (Bell & Hardy, 2009), have been demonstrated to be at the potential influence of self-talk strategies in previous research. The importance of attention in sport is further illustrated by the strong theoretical and empirical links with performance (Wulf & Prinz, 2001). The ability to regulate attention is essential to flow and mindfulness (Kee & Wang, 2008), and can also be enhanced by means of self-talk (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004). A second mechanism through which self-talk could potentially influence performance is affect; cognitive content and affect are intertwined (e.g., Lazarus, 1991), and similarly, affect and performance are affiliated (e.g., Beedie, Terry, & Lane, 2000). Schwartz and Garamoni's (1986) model of optimal balance between positive and negative thoughts for well-being seems to agree with the empirical finding that negative self-talk does not impede performance (Hardy, 2006). This is also in line with mindfulness, where thoughts and emotions are observed and accepted regardless of what valence they hold. Nonetheless, mindfulness does seem to be associated with decreased rumination (Raes & Williams, 2010), perhaps hinting at a relation to less negative self-talk, though be it highly speculative. Emotional regulation is a well-documented correlate of mindfulness (e.g., Baer, 2003; Greeson, 2009). Thus, in sum, providing another angle and reason to look into the potential interplay between self-talk, mindfulness, and flow. The main purpose of the current study is to explore these relationships between flow, mindfulness, and self-talk.

1.6 Gender Differences

A secondary aim is to investigate possible gender differences with regard to the afore mentioned key variables. In terms of dispositional flow, three previous studies (Kee & Wang, 2008; Moreno, Cervelló, & González-Cutre, 2008; Russell, 2001) have looked into gender differences but none were found in any study. Moreno et al. (2008) only found boys (athletes were 12 to 16 years old) to have a higher 'sense of control' (flow-dimension). It is noteworthy to mention that Russell (2001) controlled for sport type (and found no gender differences). Similarly to flow, the literature on gender differences in mindfulness reveals no significant differences. Thus far, three studies (Carson, Carson, Gil, & Baucom, 2004; Jain et al., 2007; Kee & Wang, 2008) have looked into this question, all three found no gender differences. The case for self-talk is slightly different. Hardy, Hall, and Hardy (2005) hypothesized that females would have more negative self-talk, and less positive self-talk, stemming mainly from the notion that female athletes tend to have higher cognitive anxiety (e.g., Martens, Burton, Vealey, Bump, & Smith, 1990). However, their only significant finding was that males in their sample engaged more in negative self-talk (this result was possibly confounded by sports type). Hardy et al.'s (2005) original hypothesis is maintained in the current study. Concerning flow and mindfulness, no gender differences are expected to be found.

2 PURPOSE OF THE STUDY

The main purpose of the present study was to investigate the relationships between flow, mindfulness, and self-talk, at the dispositional level, making use of a correlational research design. It is reasoned that a deeper understanding of the interplay between these key variables of interest, will eventually lead to more effective performance enhancing interventions. The hypotheses can be summarized as follows:

a) Flow and mindfulness, at the dispositional level, are expected to be moderately to strongly, and positively correlated to one another. Additionally, mindfulness is hypothesized to significantly predict flow.
b) Exploratory investigation of the relationships between dispositional flow and positive- and negative self-talk.
c) Exploratory investigation of the relationships between dispositional mindfulness and positive- and negative self-talk.

Examining gender differences among the main variables of interest is a secondary aim of the current study.

a) No gender differences are expected to be found in terms of dispositional flow.
b) No gender differences are expected to be found in terms of dispositional mindfulness.
c) Women are hypothesized to display higher levels of negative self-talk, and lower levels of positive self-talk, as compared to men.

3 METHODS

3.1 Research Design and Procedure

Participants were asked to complete an on-line survey, consisting of three questionnaires. The informed consent was integrated in the on-line survey, ensuring confidentiality. It was reasoned that with an on-line survey, a larger number of participants could be reached, trespassing geographical limitations. This suited the nature of the current study well, as it was an exploratory correlational research design, which inherently calls for a large sample size, regardless of ethnical or cultural background (this was controlled for in the analysis). Lonsdale, Hodge, and Rose (2006) have demonstrated the potential benefits of an on-line survey, in comparison to the traditional paper and pencil format; no significant differences in the results, higher response rate, and fewer missing responses.

The three main components of the questionnaire bundle were selected on established validity and reliability, and corresponded to the constructs of interest: (1) flow, (2) mindfulness, and (3) self-talk. These were preceded by a brief background questionnaire, which, aside from name, age, gender, and athletic history, also probed the individuals' experience with mindfulness. Two versions of the on-line survey were compiled: an English version for the international part of the sample, and a Dutch version for the native Dutch speakers. Translation processes from English to Dutch shall be discussed in sub-section '3.3 Measures' individually for each questionnaire.

3.2 Participants

212 international individuals (85 women and 127 men, M = 29.33 years old, Mdn = 25, SD = 12.2) familiar with sports (i.e. here, experience in competitive sports), and a basic level in English (concerning the international part of the sample who were asked to complete the English version of the on-line survey, similarly, a Dutch version of the questionnaire was compiled for the native Dutch speakers), were contacted personally, or through coaches and teachers. Participants had various athletic backgrounds, ranging from "former professional volleyball player, now engaged in recreational running and yoga" to "active elite soccer player". For the purpose of the current study, the most important characteristic was that every individual, at some point in their life, had

experience in sports at a competitive level.

3.3 Measures

3.3.1 Dispositional Flow Scale-2 (DFS-2)

The DFS-2 (Jackson & Eklund, 2002) measures the tendency to experience flow during physical activity, and is theoretically grounded in Csikszentmihalyi's (1990) concept of flow. It consists of 36 items, rated on a scale from 1 (*never*) to 5 (*always*), and contains nine sub-scales: challenge-skill balance (e.g., "My abilities match the high challenge of the situation"), action-awareness merging (e.g., "Things just seem to be happening automatically"), clear goals (e.g., "I have a strong sense of what I want to do"), unambiguous feedback (e.g. "I am aware of how well I am performing"), concentration on the task at hand (e.g., "It is no effort to keep my mind on what was happening"), sense of control (e.g., "I have a feeling of total control"), loss of self-consciousness (e.g., "I am not concerned with how others may be evaluating me"), time transformation (e.g., "I lose my normal awareness of time"), and autotelic experience (e.g., "I love the feeling of the performance and want to capture it again"). Reliability and validity have been established in previous research (e.g., Jackson & Eklund, 2004). In a more recent study by Kawabata and Mallett (2012), Cronbach's alphas between .77 and .90 were reported. In the same study, it was also concluded that the DFS-2 can successfully distinguish individuals who frequently experience flow characteristics in physical activity from those who do not. As with the ASTQS, the Dutch version of the DFS-2 was created using back-translation, as suggested by Maneesriwongul and Dixon (2004).

3.3.2 Five Facet Mindfulness Questionnaire (FFMQ)

The FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is based on a factor analytic study of five independently developed (daily life) mindfulness questionnaires. The five resulting factors appear to represent elements of mindfulness as it is currently conceptualized: observing (e.g., "I pay attention to how my emotions affect my thoughts and behavior."), describing (e.g., "I'm good at finding words to describe my feelings."), acting with awareness (e.g., "I rush through activities without being really attentive to them."), non-judging of inner experience (e.g., "I criticize myself for having irrational or inappropriate emotions."), and non-reactivity to inner experience (e.g., "I watch my feelings without getting lost in them."). The questionnaire consists of 39 items, which are rated on a scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always*

true). Internal consistency has been shown in several samples (Baer et al., 2008). The Dutch version of the FFMQ, used in the current study, was translated and validated by Muskens and Kamphuis in 2008.

3.3.3 Automatic Self-Talk Questionnaire for Sports (ASTQS)

The ASTQS (Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis, & Papaioannou, 2009) measures the content and structure of athletes' self-talk. 40 statements of negative and positive self-talk are rated on a scale from 1 (*never*) to 5 (*very often*), to the extent to which the athletes experience or intentionally use these self-talk statements during performance. The positive statements are categorized into four functions: psych-up (e.g., "Let's go"), anxiety control (e.g., "Calm down), confidence (e.g., "I can make it"), and instruction (e.g., "Focus on your technique). The negative contents contain: worry (e.g., "I am going to lose"), disengagement (e.g., "I want to get out of here"), somatic fatigue (e.g., "My body doesn't help me today"), and irrelevant thoughts (e.g., "What will I do later tonight"). Scores per item correspond directly with how frequent athletes experience or intentionally use the type of self-talk of which that item is an illustration. The ASTQS has been preliminary validated by its developers, Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis, and Papaoiannou, in 2009. In a previous study, making use of the ASTQS, Cronbach's alphas between .68 and .85 were reported, indicating acceptable internal consistency for all sub-scales (Zourbanos et al., 2011). The Dutch version of the ASTQS was developed following Maneesriwongul and Dixon's (2004) recommendations for back-translation.

3.4 Data Analyses

Given the exploratory nature of the present study, the first step in the analysis was to closely examine the bivariate correlations between the variables of interest. The strength and direction of these correlations served to guide the multiple regression modeling. One-way analyses of variance (ANOVA's) were conducted to test for differences between gender.

4 RESULTS

4.1 Descriptive and Internal Consistency Statistics

Table 1 shows the internal consistency coefficients, means, standard deviations, and correlations of the key variables. All main scales appeared to be highly reliable (lowest α being .87). Bivariate correlations between the selected variables of interest for the scope of this study were all significant at $p < .001$. Furthermore, all directions were as expected, in line with what was hypothesized, and in accordance with the theoretical framework. This shall be elaborated on further in this section, on the basis of regression analyses.

Table 1

Descriptive Statistics (N = 212), Internal Consistency Coefficients, and Zero-Order Correlations of Key Variables (2-Tailed)

	α	*M* (/5)	*SD*	1	2	3
1. Flow	.93	3.60	.47			
2. Mindfulness	.87	3.26	.41	.44**		
3. Negative ST	.88	2.31	.54	-.52**	-.45**	
4. Positive ST	.91	3.57	.62	.59**	.23**	-.22**

Note. ** $p < .001$

4.2 Gender Differences Flow, Mindfulness, and Self-Talk

One-way analysis of variance (ANOVA) revealed gender differences for all the variables of interest, as depicted in table 2. After exclusion of 4 cases of outliers, following Hoaglin's and Iglewicz' (1987) outlier labeling rule, assumptions of normality and homogeneity of variances were met. In this sample, men appeared to score significantly higher on the scales of dispositional flow, mindfulness, and positive self-talk, and lower on negative self-talk, as compared to women, and vice versa.

Table 2

One-Way ANOVA Gender Differences Key Variables

	M (/5)		*F*	η^2	*p*
	Women (*n* = 85)	Men (*n* = 127)			
1. Flow	3.40 (.42)	3.74 (.45)	31.15**	.13	.000
2. Mindfulness	3.15 (.41)	3.34 (.39)	11.69**	.03	.001
3. Negative ST	2.49 (.55)	2.18 (.49)	17.84**	.08	.000
4. Positive ST	3.41 (.63)	3.68 (.59)	9.89**	.05	.002

Note. ** $p < .01$; $df = 2$; Standard Deviations appear in parentheses below means.

4.3 Linear Regressions Key Variables

4.3.1 Self-Talk Predicting Flow

Multiple linear regression analyses were performed to examine the influence of self-talk on flow and mindfulness, and mindfulness on flow. Positive and negative self-talk appeared to significantly ($F = 108.77$ [2, 211], $p < .001$) predict the experience of flow, accounting for 51% of the variance in scores on the DFS-2, as displayed in Table 3. A stepwise regression revealed that positive self-talk ($R^2 = .35$, $F = 113.42$ [1, 211], $p < .001$) was a stronger predictor of flow than negative self-talk ($R^2 = .27$, $F = 78.02$ [1, 211], $p < .001$). However, these results demonstrate that both positive- and negative self-talk may have a substantial impact on the experience of flow; positive self-talk by means of enhancing flow, as opposed to negative self-talk, which seems to hinder flow.

Table 3

Summary Linear Regression Self-Talk Predicting Flow (N = 212)

	B	SE *B*	β
Positive ST	.38**	.04	.50**
Negative ST	-.36**	.04	-.41**
Constant	3.06		
R^2	.51**		

Note. B = unstandardized regression coefficient; β = standardized regression coefficient; ** $p < .01$

4.3.2 Mindfulness Predicting Flow

Mindfulness appeared to be a significant predictor or flow (F = 50.40 [1, 211], p < .001), as Table 4 illustrates. This result, in combination with the high correlation between mindfulness and flow (r = .44, p < .001), gives rise to the speculation of the importance mindfulness may have in affecting the experience of flow, as will be elaborated further in the discussion section of this article.

Table 4

Summary Linear Regression Mindfulness Predicting Flow (N = 212)

	B	SE *B*	β
Mindfulness	.50**	.07	.44**
Constant	1.96		
R^2	.19**		

Note. *B* = unstandardized regression coefficient; β = standardized regression coefficient; ** p < .01

4.3.3 Self-Talk Predicting Mindfulness

In predicting mindfulness, negative self-talk was identified as the stronger factor (R^2 = .20, F = 52.52 [1, 211], p < .001), as compared to positive self-talk (R^2 = .05, F = 11.73 [1, 211], p < .001), which showed little added value to the joint model (ΔR^2 = .02, F = 4.82 [1, 209], p = .03) that is summarized in Table 5. Negative self-talk may have a considerable, negative influence on mindfulness.

Table 5

Summary Linear Regression Self-Talk Predicting Mindfulness (N = 212)

	B	SE *B*	β
Negative ST	-.32**	.05	-.45**
Positive ST	.09*	.04	.14*
Constant	3.37		
R^2	.22**		

Note. *B* = unstandardized regression coefficient; β = standardized regression coefficient; ** p < .01, * p < .05

4.4 Linear Regressions Key Variables: Grouped by Gender

For the purpose of investigating the secondary aim of the present study, namely gender differences, the afore described main linear regression analyses were reran, grouped by gender. Results thereof are summarized and presented in Tables 6, 7, and 8. Note that these results are to be interpreted with great caution, as further analyses to test for actual statistical differences between regressions, were not conducted in the present study.

4.4.1 Self-Talk Predicting Flow: Grouped by Gender

Self-talk in general, seemed to play a bigger role in predicting flow for men (F = 79.44 [2, 126], $p < .001$), in comparison to women (F = 21.88 [2, 84], $p < .001$), as displayed in Table 6. Stepwise regressions indicated that the most notable difference was the predictive power of negative self-talk on flow, which seemed to be higher in men (R^2 = .32, F = 58.37 [1, 126], $p < .001$) than in women (R^2 = .11, F = 10.69 [1, 84], p = .002).

Table 6

Summary Linear Regressions Self-Talk Predicting Flow Grouped by Gender (N = 212)

	B	SE *B*	β
Women (*n* = 85)			
Positive ST	.33**	.06	.49**
Negative ST	-.20**	.07	-.27**
Constant	2.78		
R^2	.35		
Men (*n* = 127)			
Positive ST	.38**	.05	.50**
Negative ST	-.42**	.06	-.47**
Constant	3.25		
R^2	.56		

Note. *B* = unstandardized regression coefficient; β = standardized regression coefficient; ** $p < .01$

4.4.2 Mindfulness Predicting Flow: Grouped by Gender

Mindfulness appeared to be a significant predictor of flow for both men (F = 20.80 [2, 126], $p < .001$), and women (F = 17.65 [1, 84], $p < .001$), as depicted in Table 7. Mindfulness may be of greater importance in predicting flow for women, as compared

to men. However, this is merely a hunch of a statistical trend, and deserves to be regarded with great caution.

Table 7

Summary Linear Regressions Mindfulness Predicting Flow Grouped by Gender (N = 212)

	B	SE *B*	β
Women (*n* = 87)			
Mindfulness	.44**	.10	.42**
Constant	2.02		
R^2	.18		
Men (*n* = 129)			
Mindfulness	.43**	.09	.38**
Constant	2.31		
R^2	.14		

Note. B = unstandardized regression coefficient; β = standardized regression coefficient; ** $p < .01$

4.4.3 Self-Talk Predicting Mindfulness: Grouped by Gender

For both men and women, negative self-talk ($F = 9.85$ [2, 126], $p < .001$; and $F = 13.94$ [2, 84], $p < .001$; respectively) appeared to be a significant predictor of mindfulness, whereas positive self-talk was not, as is illustrated in Table 8. Negative self-talk seemed to have a greater potential influence on mindfulness in women, as compared to men.

Table 8

Summary Linear Regressions Self-Talk Predicting Mindfulness Grouped by Gender (N = 212)

	B	SE *B*	β
Women (*n* = 85)			
Negative ST	-.34**	.07	-.46**
Positive ST	.09	.06	.15
Constant	3.67		
R^2	.25		
Men (*n* = 127)			
Negative ST	-.27**	.07	-.33**
Positive ST	.07	.06	.11
Constant	3.65		
R^2	.14		

Note. B = unstandardized regression coefficient; β = standardized regression coefficient; ** $p < .01$

5 DISCUSSION

The main purpose of the present study was to explore the relationships between flow, mindfulness, and self-talk. Given (a) the crucial role the regulation of attention (concentration) plays in the experience of athletic peak performance (flow)(e.g., Jackson & Csikszentmihalyi, 1999), (b) how this is a key component of mindfulness (Kabat-Zinn, 1994), and (c) the notion that self-talk can enhance this ability (Hatzigeorgiadis et al., 2004); it was hypothesized that strong, positive (with the exception of negative self-talk) relationships between these (sport) psychological concepts would emerge in the current correlational study. Bivariate correlations and multiple linear regressions served as main tools for the exploration of these links; (1) flow – mindfulness, (2) self-talk – flow, (3) and self-talk – mindfulness.

5.1 Relation between Flow and Mindfulness

Results confirmed the first sub-hypothesis, indicating that higher levels of dispositional mindfulness correspond with higher levels of dispositional flow experience, this is in accordance with previous studies (e.g., Kee & Wang, 2008), and the formerly proposed overarching theoretical framework. More precisely; (1) the more mindful individual may be less susceptible to 'Ironic Processes of Mental Control' (Wegner, 1994) since he or she is better able to manage the cognitive resources, of which there are also more available because of the decreased urge to manipulate thoughts and emotions (as a result of an accepting, nonjudgmental attitude), which in turn leads to increased attention and focused concentration on the relevant task at hand, almost being a synonym of flow. The focus is where it is supposed to be, avoiding the pitfalls (distraction from flow, disruption automatic, smooth performance) of (2) the 'Constrained Action Hypothesis' (Wulf et al., 2001) and (3) the 'Reinvestment Theory' (Masters, 1992; Masters & Maxwell, 2008), since less conscious cognitive effort needs to be, or is, 'reinvested' on the control of mechanics of the movements on-line. Due to the nature of a correlational research design, it is impossible to infer causality. However, previous mindfulness-intervention studies aiming to enhance flow (e.g., Aherne et al., 2011) substantiate the claim that mindfulness may aid to increase the likelihood of flow occurrence (see Birrer et al., 2012, for a review). Interestingly, Kee and Wang (2008) state that "the link between mindfulness and flow appears to be symbiotic, and in the spirit of maintaining

purposelessness during mindfulness practice, perhaps flow and performance enhancement should be indeed considered as by-products rather than outcome goals" (p. 409).

5.2 Relationships between Self-Talk and Flow

Regarding the second sub-hypothesis, examining the link between self-talk and flow, results revealed that, as was expected, a high amount and frequency of positive self-talk went along with higher levels of dispositional flow, whereas the relationship between negative self-talk and flow was inverse. It is noteworthy at this point to mention that positive self-talk seemed to have a greater potential influence on flow than negative self-talk. It has been suggested in previous research that positive self-talk can have a beneficial effect on performance over no self-talk, however, the effects of negative self-talk on performance remain, to date, unequivocal (Tod, Hardy, & Oliver, 2011). Nevertheless, in the current study, positive and negative self-talk combined appeared to explain more than half the variance in dispositional flow, raising the question once more of what undeniable, vital role self-talk embodies in the entire flow experience story. A possible mechanism to explain this further, could be the use of verbal cues to increase focus as well as direct and redirect performers' attention (Landin, 1994). Higher dispositional levels of flow could possibly reflect a higher use of positive (productive) self-talk, and a lower use of negative (un- or counterproductive) self-talk. However, this question demands closer attention in future experimental research, ideally, bringing the more specific types of self-talk (specific, general; instructional, motivational) into the equation. If appropriate use of self-talk is indeed able to act as a vehicle towards flow (e.g., through regulation of attention), it is especially crucial to determine *when* exactly *what* kind of self-talk surfaces into the consciousness of the athlete before and during flow, since the theoretical framework seems to suggest a lower presence of self-talk when the athlete is surfing the peak wave of flow, because then, the core focus of attention seems to lie within the realms of the automatic pilot, leaving less room for (voluntary) self-talk, or at least a lower presence of certain specific forms of self-talk (e.g., evaluative language).

5.3 Links between Mindfulness and Self-Talk

Thirdly, the relationship between self-talk and mindfulness was investigated. Results seemed to indicate that a more mindful disposition translates to a lower frequency of

negative self-talk (and more positive self-talk). Theoretically, this is sound (i.e., perhaps less vulnerable to paradoxical ironic effects, resulting in a 'healthier' balance of the self-talk stream), and empirical manifestations thereof have been shown in previous studies in the form of decreased rumination as a result of increased mindfulness (e.g., Baer, 2003; Raes & Williams, 2010). However, in how far rumination resembles self-talk is another question. Furthermore, the present study is the first to investigate this seemingly interesting link between self-talk and mindfulness in an athletic, non-clinical population. The true potential may very well lie within the mediating role of mindfulness on the effects of self-talk on flow, as suggested by Birrer et al. (2012). A more mindful attitude may result in a more effective use of mental skills, such as self-talk. Another possible explanation may be found in the 'no identification' and 'no reactivity' principles of mindfulness; when an individual realizes that he or she 'is not the thought or emotion', that these are naturally occurring, and that they do not need to be labeled, judged, or manipulated, this negative (or irrelevant) self-talk might simply ebb away over time. Performance enhancement sport psychology is very likely to merit greatly from future closer attention to the interplay between self-talk, mindfulness, and consequently, flow.

5.4 Gender Differences

Exploring gender differences within the same conceptual framework of flow, mindfulness, and self-talk, was a secondary aim of the present research. As mentioned before, any interpretation relies solely on observable statistical trends (with the exception of ANOVA), since no further analyses to determine the actual statistical differences between linear regressions were conducted, and therefore requires to be considered with care. Males in the present study scored higher on dispositional mindfulness and flow, used more positive, and less negative self-talk, as compared to females. Gender differences in flow and mindfulness had not yet been found in previous research, and it is fair to state that further examination is warranted before firm conclusions can be drawn. In the one previous study looking into gender differences in self-talk, conducted by Hardy, Hall, and Hardy in 2005, males were found to report greater use of negative self-talk than females, whereas in the present study, males appeared to have lower levels of negative self-talk than females. Although the literature seems to suggest that women can be expected, and in the present study were indeed found, to use more negative self-talk than men, considering the overlap between

negative self-talk, cognitive anxiety, and self-efficacy perceptions (Hardy et al., 2005), future research is needed to substantiate this finding, ideally taking into account potentially confounding factors such as sport type (individual/team, open/closed), skill level, specific time (before/during/after practice/competition), and age. The overall observed gender differences can add to our understanding of the concepts of interest, and may ultimately lead to more effectively tailored mental skills interventions, with special attention to gender differences. The ideal center of gravity of focus in an intervention may be different for men than for women; for example, women might benefit from more attention to motivational self-talk through mindfulness, while men could spend that time on other aspects of self-talk (e.g., instructional), or different techniques even (e.g., imagery).

5.5 Limitations

Although the present findings can contribute to our understanding of the relations between flow, mindfulness, and self-talk, several limitations are to be mentioned. First of all, the sample examined in this study may not have been ideal for an investigation of a correlational nature. The rather small size of the sample did not allow for deeper statistical analyses, such as the testing for mediating and moderating roles of the key variables. Furthermore, the heterogeneity of the sample could pose potential problems in terms of generalization of the interpretations. Participants were characterized by various cultural- and athletic backgrounds (e.g., sports type, skill level, age, mindfulness experience). Although it is of great essence that these individual differences are to be accounted for in future research for the sake of a deeper understanding of the interplays in the current theoretical framework, these independent factors should ideally be investigated in a more focused fashion, making use of more homogenous groups. Even though statistical tests for reliability and validity allowed meaningful analysis of the merged data pools (English and Dutch), this linguistic difference of the on-line questionnaires should be noted.

Secondly, there are a few things to be said about the measurements used in the current study. The traditional limitations concerning the measurement of flow experience, also apply to the present study. It is difficult to measure an experience as subjective as flow, with objective (qualitative) tools (Swann et al., 2012). In addition, these authors argued, participants' reportage of their flow experiences are vulnerable to memory effects (e.g.,

'rose-tinted glasses effect'), which may have further attenuated the accuracy of the flow data in this study. Flow would ideally be measured closer to competition, depending largely on in-depth qualitative methods, with mere vague directions about the concept as to not steer the interview too much. Although the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) has been proven to be a valid measure of dispositional mindfulness, future studies in a clearly determined sport context, could benefit from a mindfulness measure more adjusted to said sport setting. As mentioned before, a deeper understanding of self-talk (and its relation to flow and mindfulness) could be gained by going beyond mere positive- and negative self-talk categorization, as was used in the present investigation.

Additionally, due to the scope of the present article, analyses were run at the total scale-score level, it is acknowledged, however, that a closer examination involving the sub-scales is inevitably essential. Furthermore, performance should preferably be included as an outcome variable of interest (Birrer & Morgan, 2010). Finally, it should be underlined once more that it is impossible to infer causality in a correlational study, clearly, experimental research is imperative.

5.6 Conclusions

Perhaps one of the most important conclusions to be drawn from the present findings, is the strong indication to scrutinize the potential mediating role mindfulness can have on self-talk, in achieving optimal performance, as has also been suggested by Birrer et al. (2012). It is suggested, as it has been before by Hardy et al. (2005), that self-talk can guide mental preparation (e.g., relaxation, arousal control, entering the zone), serving as a vehicle to flow (i.e., facilitate the flow conditions), in other words, setting the stage for optimal performance. To explore how this notion fits into the overarching theoretical framework proposed in the present study, it is of pivotal importance to investigate exactly *when* certain types of self-talk arise, in relation to the experience of flow. The mediating role of mindfulness in sport contexts is further illustrated by Hardy, Jones, and Gould's (1996) findings: "early recognition and control of anxiety symptoms were associated with superior performance in elite athletes" (p. 171). Mindfulness is hypothesized to have an impact on several psychological skills; arousal regulation, attentional skills, volitional skills, personal development, and life skills (Birrer & Morgan, 2010). Clearly, the vast potential that may lie within mindfulness is not to be

overlooked, the story it has to tell in sport psychology is far from being told entirely. The suggested symbiotic relation mindfulness has with flow is unlikely to be exclusive. The empirical evidence and theories unmistakably hint at the fact that mindfulness is probably connected to many aspects of athletic performance in one way or another. This study brings a long suspected new player to the equation in the form of self-talk, the often omnipresent linguistic manifestation of consciousness, from which paying closer attention to in relation to mindfulness in future research, sport psychology could benefit greatly. Nevertheless, although of considerable importance, self-talk is but one potential partner suitable to prosper in an integration with mindfulness. Mindfulness' knowledge-base will continue to expand and truly grow synergistically along with other applications in sport psychology, given that interconnectivity is appreciated. In other words, exploration and investigation of alternative models and possibilities should never cease. We are at the beginning of an exciting journey, one in which the research possibilities are seemingly endless.

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