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## Subjective psychological experiences in leisure and competitive swimming

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Swimming is a popular sport and leisure activity worldwide, but its psychological effects may vary in different situations. The current *in situ* study compared swimmers' acute psychological responses in leisure swimming and athletic training. Fifty-four swimmers (27 in each group) were tested in their normal swimming environments. Measures obtained pre- and post-swimming included positive- and negative affect, the self-appraisal of the momentary physical- and mental well-being, and personal satisfaction with the completed swimming session. Leisure swimmers reported positive changes in all dependent measures ( $p \leq .001$ ), but this was not the case for the competitive swimmers ( $p > .05$ ). Further, leisure swimmers were more personally satisfied with the completed swimming session than competitive swimmers ( $p = .03$ ). Consequently, the psychological benefits of swimming emerged in leisure swimming, but not after athletic training. Therefore, the subjective experience stemming from swimming may be largely determined by the context in which the activity is performed.

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Swimming is a popular leisure activity and a competitive sport (Sports Marketing Surveys Inc. 2014). Apart from its long-established cardiorespiratory benefits (Beaudet 1984; Després 2016; Mohr et al. 2014), swimming positively affects the general somatic (Oja et al. 2015; Tanaka 2009) and mental health (Yfanti et al. 2014). Epidemiological research also suggests that the risk of all-cause mortality may be about 50% lower in swimmers compared to walkers, runners, and sedentary people even after adjusting for age, body-mass index, smoking, alcohol use, and family history of heart disease (Chase, Sui, and Blair 2008). Adherence to such an excellent physical activity, as based on the hedonic theory (Higgins 1997), is linked to the pleasure derived from it, which generates positive expectations. In line with the response expectancy theory (Kirsch 1997) and also the

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expected pleasure theory (Mellers, Schwartz, and Ritov 1999), maintenance of swimming (and other sports) is regulated by the expectation of positive affective benefits.

In a series of pioneering studies, Berger and colleagues were the first to reveal that a single bout of swimming has immediate positive affective/psychological benefits (Berger and Owen 1983, 1988, 1992a, 1992b; Berger, Owen, and Man 1993; Berger et al. 1997). In their early research, Berger and Owen (1983) found that 58 non-competitive college swimmers reported significantly less anger, confusion and depression, and more vigour after a single bout of swimming than before. In a later study with non-competitive college swimmers, the acute mood changes in four forms of exercise were determined on three different occasions; swimmers' tension and confusion decreased on the first assessment, whereas no changes were noticed on the second and the third instance (Berger and Owen 1988). The lack of measurable positive changes after the first swim was attributed to ceiling effects attributed to the elevated mood states at baseline (before the swim) in swimmers, which is consistent with the response expectancy theory (Kirsch 1997). In the next study, with 37 college students enrolled in two swimming classes, the affective benefits of swimming, simultaneously with those of yoga, were further demonstrated by these authors (Berger and Owen 1992a). The findings were replicated in a cross-cultural inquiry examining Czech and United States college swimmers (Berger, Owen, and Man 1993). However, in another research with 36 college swimmers, in which exercise intensity was also monitored in addition to affective measures, Berger and Owen (1992b) found that high-intensity swimming (i.e. 81% of age-adjusted heart rate) may negate the psychological benefits of the exercise.

A later study with 48 young competitive swimmers (Berger et al. 1997), yielded a new insight into the acute affective benefits of swimming by showing that a shorter duration training (abbreviated practice) is associated with positive changes in affect, whereas a longer duration of training (normal practice) yields no psychological benefits. Therefore, it has emerged that possibly both intensity and duration of the training may mediate the psychological benefits of swimming. Nevertheless, a competitive context is different from both leisure and educational (i.e. such as college swimming classes) situations. The literature is virtually void of studies comparing the acute affective responses to these different situations. One study compared non-competitive sport situations in college students and revealed that while circuit- and weight training triggered positive changes, no benefits were observed in racquetball (Rehor et al. 2001). The competitive aspect of racquetball was presented as one of the possible explanations for the differences (Rehor et al. 2001).

The above-reviewed studies used the Profile of Mood States Inventory (POMS – McNair, Lorr, and Droppleman 1971). Although the POMS has been used in hundreds of studies (Leunes and Burger 2000), it is not the most suitable for studying the positive mood/affective states after exercise because its original version contains only one positive item (vigour) and five negative items (anger, confusion, depression, fatigue, and tension). Based on the hedonic theory (Higgins 1997) and the expected pleasure theory (Mellers, Schwartz, and Ritov 1999), people exercise to derive pleasure from the activity. Therefore, engagement in exercise is likely paired with positive expectations and positive affect (McIntyre, Watson, and Cunningham 1990; Szabo 2013). Further, if the pre-exercise negative affect is low, there is little or no space for a further decrease (known as the floor effect) in response to exercise. Research evidence exists for elevated positive affect in exercise, with negative affect being unaffected (McIntyre, Watson, and Cunningham 1990). Indeed, based on several theories and research evidence, the acute psychological

effects of exercise should be studied with a focus on the anticipated (hypothesized) positive changes, while possible changes in negative affect should also be assessed since a notable decrease in it also reflects a positive change.

In competitions, where longer persistent mood is a result of the context of the situation, the use of POMS is appropriate. Díaz et al. (2013) used the POMS to determine the mood of competitive swimmers during a major competition and a recreated simulation of that two weeks later. By taking several measurements over two days during both events, the authors found that the POMS reflected a more positive mood profile during the simulated event in contrast to the competition. In addition to the context of the situation, the outcome evaluated against outcome expectancy (Iwanaga et al. 2017) may influence one's psychological state. In a swimming competition total mood disturbance, and several other indices of negative affect, increased in the 'failure' group, while few negative changes were seen in the 'success' group (Chennaoui et al. 2016). These studies with competitive swimmers illustrate how situational changes could affect the psychological outcomes.

It is anecdotal surmise, backed up by limited evidence from the literature, that swimming triggers positive changes in subjective well-being. However, this is an unfounded generalization since leisure and competitive swimming are performed in very different situational contexts. Consequently, it merits closer evaluation. We presume that not swimming per se, but one's level of *actual control* – influenced by numerous factors – determines the acute affective response to swimming. Some key differences (all linked to actual and perceived control) that could be expected to lead to different results with leisure and competitive swimmers are: the flexible versus inflexible scheduling of the training; self-selected versus prescribed exercise modes (frequency, intensity, and duration); lack of need to conform versus the expected compliance with attending training and performing at a normative level; the relaxed and intermittent progress/goal appraisal versus the continuous evaluation of training performance and goal monitoring; lack of feedback versus continuous feedback (not always positive) from others (i.e. coach and team-members); and the social context of the training (group cohesion) that could impact one's affect in either direction.

The contextual differences may seem to be obvious, but their impact on the subjective (i.e. felt, or perceived by the person) experience after swimming needs to be empirically tested to show that the mental benefits of swimming are not ubiquitous, but context specific. Competitive and leisure swimming are different in context and, therefore, are likely to trigger different mental feeling states. Based on the hedonic theory, suggesting that people seek pleasure and avoid pain (Higgins 1997), leisure swimming comprises control through which the individual can adjust the action to yield the most pleasurable outcome, which is generally absent in competitive and performance-oriented swimming. This principle also agrees with the pleasure-seeking theory (Mellers, Schwartz, and Ritov 1999), which suggests that people choose situations with greater subjective expected pleasure. Finally, these theories incorporate the response expectancy theory (Kirsch 1997), as well, because certain cues trigger the anticipation of specific subjective behavioural responses. Based on these theories, we hypothesized that a session of leisure or leisure swimming will result in positive subjective experiences which will be greater than those in competitive swimming. In the current work, we define 'positive subjective

experience' as an increase in positive affect, physical and psychological feeling states and a decrease in negative affect.

## Method

### Participants

The leisure swimmers were recruited by using systematic randomization (i.e. every third sport-consumer was approached in person by one of the experimenters and asked to take part in the study) in public swimming venues located in Budapest. Only swimmers with at least one year of continuous swimming experience were deemed eligible for participation in the study. Competitive swimmers were recruited at three Hungarian national training centres, using the same method, in Budapest metropolitan area. Systematic randomization was used because the random selection was not feasible, especially in recruiting competitive swimmers. The required sample size ( $n$ ) was calculated *a priori* by using the 'G\*Power' (version 3.1.9.2) software (Faul et al. 2007) for mixed model multivariate analysis of variance (MANOVA) and it was based on power  $(1-\beta) = 0.95$ , a medium effects size ( $f$ ) = 0.25, and  $\alpha = 0.05$ , with four dependent measures and two independent groups of participants. Based on this analysis, the calculated sample size was 54. Therefore, the recruitment continued until 27 fully completed records were obtained for each of the two groups. Participants' characteristics are illustrated in Table 1. The work was carried out with ethical approval from the Research Ethics Committee in the Faculty of Education and Psychology at ELTE Eötvös Loránd University in accordance with the principles of the Declaration of Helsinki (Harriss and Atkinson 2009). Further, the research protocol was in accordance with other international guidelines for research with human participants (i.e. The British Psychological Society 2010; World Medical Association 2013). All participants signed a written informed consent form before taking part in the study.

### Materials

The Positive Affect Negative Affect Scale (PANAS – Watson, Clark, and Tellegen 1988) was used for measuring affect before and after training and competition. We adopted the 10-item psychometrically validated version of the scale (Thompson 2007), which consists of five positive items (i.e. active) and five negative items (i.e. nervous). This tool was adopted for its brevity and convenience, which is especially important in competitive swimming. The items are rated on a 5-point Likert scale ranging from 1 (*very slightly or not at all*) to 5 (*very much*). An aggregate score was obtained for both positive and negative

**Table 1.** Participants' characteristics in the two groups.

	Leisure swimmers	Competitive swimmers
Men, women ( $n$ ) <sup>a</sup>	15, 12	19, 8
Age, mean years ( $\pm$ SD) <sup>b</sup>	54.11 (18.25)	19.89 (2.01)
Age (range)	22–86	18–25
Swimming history years ( $\pm$ SD) <sup>a</sup>	21.48 (23.06)	14.11 (3.19)
Swimming history (range)	1–74	8–21

<sup>a</sup>No statistical difference was found between two groups ( $p > .05$ ).

<sup>b</sup>A statistically significant difference was found between the two groups ( $p < .001$ ), therefore age was used as a covariate in the main analysis.

items. The PANAS comes with excellent psychometric properties (Thompson 2007; Watson, Clark, and Tellegen 1988). In the current study, we adopted the psychometrically validated Hungarian version of the scale (Gyollai et al. 2011). We also checked its internal reliability in the current study (Vitoratou and Pickles 2017). This was (Cronbach's alpha)  $\alpha = .83$  for positive affect items and  $\alpha = .76$  for negative affect, as based on the baseline (first completion of the scale) evaluation.

To complement the information obtained with the PANAS, we employed two single-item (Andrews and Withey 1976) 15-point Likert scales, ranging from 1 (*not at all*) to 15 (*very much*) to determine the level of the subjectively experienced momentary psychological and physical 'overall' feeling state of well-being, that was conceptualized as 'core affect' in light of Russell's (2003) work. Core affect may be best described as the basic process of one's conscious psychophysiological state available as the simple non-reflective feeling, such as feeling good or bad, feeling lethargic, or energised (Russell 2003). A third single-item 15-point Likert scale was used only after swimming to assess personal satisfaction with the completed swimming session.

### Procedure

After giving informed consent for taking part in the study, participants in both groups completed the questionnaires *in situ* within 10 min preceding the swim and once again within 10-min after training. *In situ*, or in real life-setting, studies have the best external validity in addition to convenience. All the questionnaires were completed in the presence of one of the investigators within a two-month period in 2017. Participants were asked to rate the items by considering their first impression, or intuition-based feelings, and to avoid thinking too much about item-rating because there are no right or wrong answers. After completing the study, the participants were debriefed, offered the opportunity to ask for a group-summary of the results, and thanked for their participation.

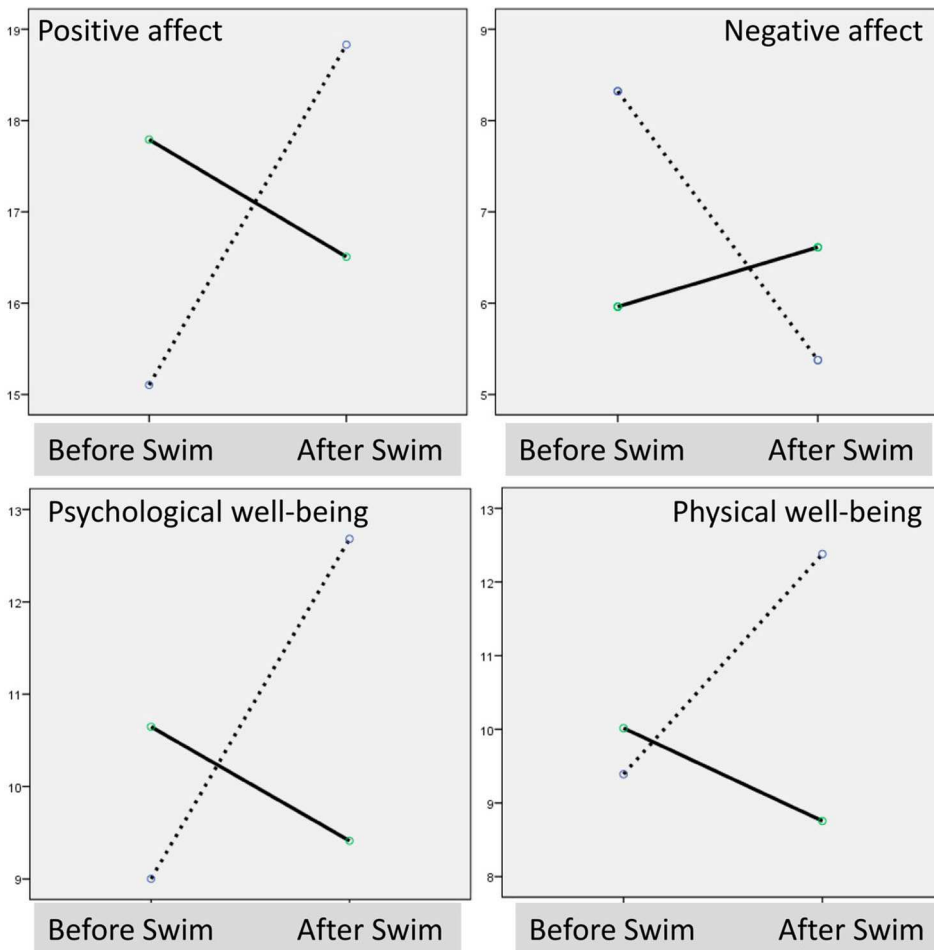
### Results

Data analyses were performed with the Statistical Package for Social Sciences (SPSS, v. 22) software (IBM Corporation 2013). Initial tests revealed that the proportion of men and women did not differ in the two groups (Chi-square ( $\chi^2_{(3)} = 1.27, p > .05$ )), but the two groups differed statistically significantly in their mean age ( $F_{1, 53} = 93.78, p < .001$ ). Therefore, age was included as a covariate in the main analysis, which consisted of a 2 (time)  $\times$  2 (group)  $\times$  2 (gender), mixed model repeated measures MANOVA. With the covariate being statistically not significant, the main analysis yielded a significant multivariate time main effect (Pillai's Trace = .207,  $F_{4, 46} = 3.00, p = .028$ , partial ETA squared ( $\eta_p^2$ ) = .207, power ( $1-\beta$ ) = 0.756) and also a group by time interaction (Pillai's Trace = .286,  $F_{4, 46} = 4.61, p < .003$ , partial ETA squared ( $\eta_p^2$ ) = .286,  $1-\beta = 0.923$ ). Due to the statistically significant interaction, the time main effects were not considered any further (Pedhazur and Schmelkin 2013). The multivariate interaction was followed up with the simultaneously calculated univariate ANOVA sub-tests, the results of which revealed statistically significant group by time interactions for all four dependent measures (Table 2). The univariate interactions showed different affective patterns of pre- and post-swimming in the two groups, which are illustrated graphically in Figure 1, as is generally recommended for the

**Table 2.** Results of the mixed model univariate repeated measures ANOVA tests reflecting the group by time interactions in four dependent measures.

Dependent measures	<i>F</i>	df	<i>p</i>	Effect size $\eta_p^2$	Observed power (1- $\beta$ )
Positive affect	9.32	1, 49	=.004	.160	0.85
Negative affect	6.77	1, 49	=.012	.121	0.72
Core affect: mental well-being	16.29	1, 49	<.001	.250	0.98
Core affect: physical well-being	10.59	1, 49	=.002	.178	0.89

presentation of statistically significant interaction effects (Stockburger 2016). To better understand the four interactions, Bonferroni corrected paired *t*-tests were performed in comparing pre- (baseline) and post-exercise dependent measures for each group as well as group differences before and after swimming. These analyses expanded the MANOVA results by revealing statistically significant changes, in the favourable directions, in the leisure swimming group, but not in the competitive swimming group (Table 3).



**Figure 1.** Changes in four dependent measures from before to after swimming in leisure swimmers (dotted line) and competitive swimmers (continuous line). The Y axes represent the means on a relative scale. For statistically significant differences between- and within groups refer to Table 3.

A *t*-test for independent samples was used to compare the two groups in their perceived satisfaction with their completed swimming sessions. This test yielded a statistically significant result ( $t_{(52)} = 2.24, p = .031$ , effect size (Cohen's *d*; Cohen 1988) = 0.61), showing that leisure swimmers were more satisfied with their exercise training (mean = 12.15 (SD = 2.67)) than competitive swimmers (mean = 10.26 (SD = 3.51)).

Finally, we calculated the relative change scores by expressing the difference between the pre- and post-swimming measures as per cent change from baseline. These difference scores were correlated separately for the two groups, using the split file function in SPSS, with the perceived satisfaction scores. While statistically no significant correlations were found for the leisure swimmers, the reported satisfaction scores of the competitive swimmers correlated significantly and positively with the changes in physical well-being and negatively with changes in negative affect (Table 4).

## Discussion

The current findings demonstrate that swimming in different contexts generates distinct subjectively experienced psychological outcomes. Significant positive changes, in all measures, were noted only in leisure swimmers, but none in competitive swimmers (refer to Table 3). Based on the calculated effect sizes these changes were large (Cohen 1988). The findings support our research hypothesis and are in agreement with both the hedonic theory (Higgins 1997) and the response expectancy theory (Kirsch 1997), but perhaps also with placebo's role in the acute psychological effects of exercise (Szabo 2013). Indeed, a leisurely swim is undertaken for a (expected) positive physiological and psychological result, which is somewhat in contrast with training for competition in which the circumstances of the workout are tailored for improving athletes' skills and

**Table 3.** Bonferroni corrected ( $\alpha = .05/16$  tests = .003125 new adjusted alpha) independent and dependent *t*-tests comparing between- and within group means at two times of assessment.

Dependent measures	<i>t</i>	df	<i>p</i>	Effect size (Cohen's <i>d</i> ) <sup>a</sup>
<i>Between groups comparisons (leisure vs. competitive swimmers)</i>				
Positive affect before swim	-3.83	52	<.001	-1.04
Negative affect before swim	0.47	52	=.963	NS <sup>b</sup>
Mental well-being before swim	-0.286	52	=.776	NS
Physical well-being before swim	-0.942	52	=.350	NS
Positive affect after swim	0.479	52	=.634	NS
Negative affect after swim	-3.02	52	=.004 <sup>c</sup>	NS
Mental well-being after swim	4.15	52	<.001	0.95
Physical well-being after swim	4.37	52	<.001	0.90
<i>Within groups comparisons (pre-post-tests)</i>				
Positive affect leisure swimmers	-4.32	26	<.001	-0.83
Negative affect leisure swimmers	3.62	26	=.001	1.06
Mental well-being leisure swimmers	-5.15	26	<.001	-1.07
Physical well-being leisure swimmers	-6.97	26	<.001	-1.34
Positive affect competitive swimmers	2.27	26	=.076	NS
Negative affect competitive swimmers	0.787	26	=.438	NS
Mental well-being competitive swimmers	0.223	26	=.825	NS
Physical well-being competitive swimmers	1.58	26	=.128	NS

<sup>a</sup>In case of the paired, or dependent, *t*-tests (lower half of the table) it was corrected for the dependence between the means by using Morris and DeShon's (2002) equation No. 8.

<sup>b</sup>NS = Not Significant

<sup>c</sup>Although  $p = .004$  would normally be statistically significant, the Bonferroni-method corrected new alpha ( $\alpha$ ) was lower .003 and, thus, at conservative level the statistical significance could not be established.



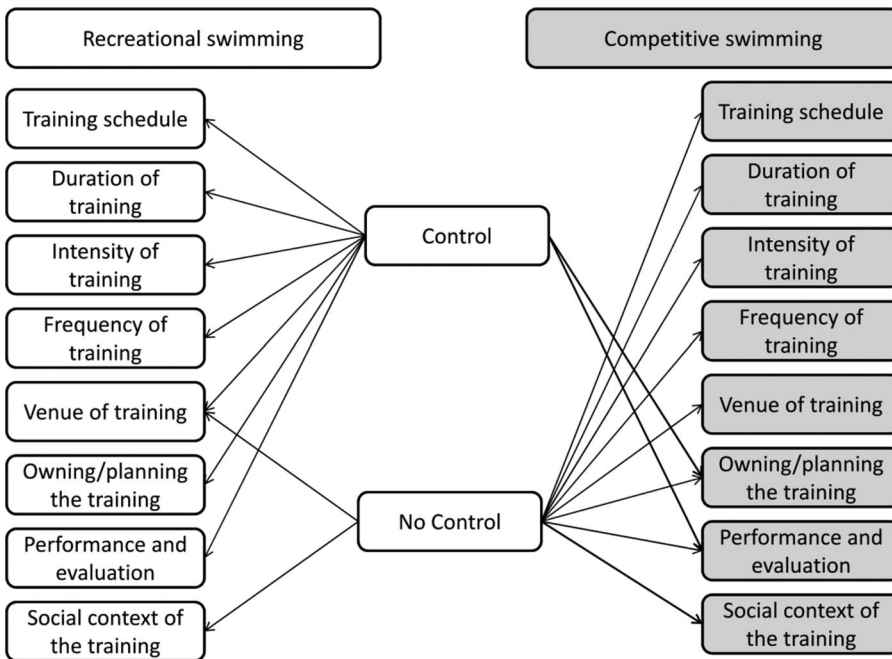
**Table 4.** Correlation values (Pearson *r*) between relative changes scores ((post-measure – pre-measure)/pre-measure) indicated as delta (%Δ) in four dependent measures and personal satisfaction with the completed swimming session in leisure- and competitive swimmers.

Dependent measures	Satisfaction with the swim	
	Leisure swimmers	Competitive swimmers
%Δ Positive affect	.14 (NS)	.34 (NS)
%Δ Negative affect	.31 (NS)	-.42 ( <i>p</i> = .03)
%Δ Core affect: mental well-being	.24 (NS)	.18 (NS)
%Δ Core affect: physical well-being	.01 (NS)	.41 ( <i>p</i> = .03)

Note: NS = Not significant.

are largely dictated by the coach. While athletic training also encompasses positive expectations and, therefore, it is in accord with the response expectancy theory (Kirsch 1997), a regular swimming training session, and its acute psychological consequences, can hardly be fitted with the hedonic (Higgins 1997), or the pleasure-seeking theory (Mellers, Schwartz, and Ritov 1999). The most tangible difference between leisure and competitive swimming contexts is control. As already mentioned earlier in the Introduction section and presented in Figure 2, there are several differences between leisure and competitive swimming, largely linked to the actual level of control, which – unsurprisingly – result in different psychological outcomes.

The exercise psychology literature has already shown that control over exercise intensity (i.e. self-selected intensity) is better for psychological benefits than prescribed exercise (Lattari et al. 2016; Sheppard and Parfitt 2008). A study in which a previously performed self-selected exercise was re-administered to the participants as prescribed exercise – at the same workload – resulted in lesser affective benefits and higher ratings of perceived



**Figure 2.** Presence or absence of control in the various aspects of swimming in leisure- and competitive swimmers. Items served by two arrows show that control may or may not be present.

exertion in the prescribed condition (Hamlyn-Williams, Freeman, and Parfitt 2014). In line with our proposal, the authors concluded that the differences were due to the perceived autonomy (control) over the exercise.

However, swimming, and exercise in general, has several components (refer to Figure 2) apart from the intensity, which could mediate the affective outcome. It is the task of future research to determine the extent to which control over the various aspects of swimming and other sport, or exercise activity, influences the psychological outcomes.

Competitive swimmers reported lower satisfaction than leisure swimmers. It is notable that perceived satisfaction with the completed swim was uncorrelated with the changes in the psychological measures in leisure swimmers. In contrast, the satisfaction scores were inversely related to negative affect and directly related to physical well-being in competitive swimmers. Albeit speculative, these differences suggest that satisfaction may be associated with self-evaluation of the *performance*, and the associated psychological states, in competitive swimmers, but not in leisure swimmers. Indeed, the characteristics of training influence the subjective well-being of competitive athletes (Saw, Main, and Gustin 2015).

Although a statistically significant difference at baseline (pre-swimming measures, refer to Figure 1) was only observed in positive affect, competitive swimmers reported slightly more positive psychological profiles than leisure swimmers, but after the training, the changes in these profiles were in the opposite direction. Following training, core affect, as evidenced by both psychological and physical well-being, was significantly higher in leisure swimmers than in competitive swimmers. Ceiling and floor effects could be ruled out in these measures since we have adopted a 15-point Likert scale and the scores fitted in the middle-upper range of the scale. However, negative affect was low at the beginning of training in the athlete group, but as seen in Figure 1, it tended to increase rather than decrease, so floor effects could not be implicated.

These findings with the competitive swimmers may possibly be interpreted in light of eudaimonic theories. Waterman (1993) proposed that eudaimonic experiences occur when life events are in harmony with deeply held personal values in which the person is fully engaged. It is a form of personal expressiveness, which may rise above the hedonic experiences. Regrettably, we did not incorporate eudaimonic measures in the current work, but its examination in relation to personal expressiveness in leisure and competitive swimming merits future research attention.

## Conclusions

The results of this cross-sectional observational study, in agreement with several theories of pleasure seeking and response expectancy, suggest that taking part in leisure swimming triggers large acute positive psychological changes. These changes might reinforce response expectancy and, in agreement with the hedonic and pleasure-seeking theories, further motivate interest in the behaviour. Disregarding motives for the training, leisure and competitive swimming are performed in different situational contexts in which real control over one's training is an obvious distinguishing factor that in accord with empirical evidence from the extant literature affects the psychological outcome. It appears that the acute mental/psychological benefits of swimming are restricted to a leisure context in which – based on expectancy and also placebo theories – the sought (anticipated/expected) result is achieved by the mere completion of the activity. They may be

reinforced by the swimming-induced physiological changes, including a self-selected optimal level of arousal, which together generate higher reported satisfaction after leisure swimming than training for competition. While satisfaction after completion of the swim appears to be uncorrelated with the relative changes in psychological measures in leisure swimmers, it is positively linked to changes in physical well-being and negatively to changes in negative affect in competitive swimmers.

## Perspectives

Further studies are needed to examine the differences between leisure- and competitive swimming in light of the eudaimonic theories. Future work also needs to establish the impact of the *actual* control over various elements of swimming. Actual (objective) control is different from perceived control (which in the theory of planned behaviour acts as a subjective index), because in expectations the degree of *certainty* (increased by known, or objective facts) is associated with different emotional, physiological and behavioural outcomes (Ploghaus et al. 2003). These issues deserve specific research attention. At this stage, however, we can still conclude that the acute affective benefits of swimming surface clearly in a leisure, but not competitive context. Leisure swimmers reap the acute (immediate) psychological benefits of this exercise. These are hedonic experiences that could augment adherence to swimming, motivation, and possibly personal expressiveness. Swimming coaches should re-think their current strategies of coaching to make swimming a more pleasurable experience in the competitive world. This could generate greater motivation, passion, and perhaps even better performance.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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