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BE POSITIVE AND ENGAGE IN TRAINING: POSITIVE ORIENTATION AND MARATHON PERFORMANCE

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Psychological mechanisms explaining running performance have not been fully identified yet. One of the factors potentially important in running performance is positive orientation—a higher order construct capturing the core of self-esteem, life satisfaction, and optimism. The aim of the study was to investigate the role of positive orientation in explaining running performance of recreational runners. The study involved 204 recreational runners taking part in a marathon race. Before the race, they reported their positive orientation, training engagement, BMI, and previous marathon experience. Actual running performance was measured using runners' personal bib numbers and their objective time scores obtained from the official competitors' list after the race. Structural equation modelling results show that the higher is runners' positive orientation, the higher is also their training engagement before the marathon, which in turn predicts their actual running performance. The study extends the understanding of a role of personality in recreational sport performance. The findings broaden also evidence concerning the role of positive orientation in effective functioning.

Keywords: positive orientation; running performance; training engagement; marathon; mediation analysis.

As a big challenge, taking part in a marathon requires thorough preparation. Sports research has shown that not only physical but also psychological strengths are indispensable for successful running performance (Joyner, 2017; Waśkiewicz

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et al., 2019). Researchers have identified personality traits that have a vital effect on sports achievement; for example, recent research has shown that a personality disposition such as perfectionism is associated with performance in long distance running of 10 km and half marathons (Waleriańczyk & Stolarski, 2021). However there is limited evidence concerning psychological factors important for running performance in the case of recreational runners, who are a group distinct from elite marathon runners (Buman et al., 2008).

In recent mapping review Laborde et al. (2020) have developed 15 higher order themes of 64 personality traits crucial in sport and exercise research, of which anxiety, perfectionism, self-efficacy were the most popular, but some (e.g., optimism) did not map well to any one particular facet. It is therefore essential to extend exploration of the relationship between another personality traits possibly related to sports performance (Coulter et al., 2016). In an attempt to explore this gap in research we hypothesized positive orientation as one of the factors that might be important in recreational running performance (Caprara et al., 2009).

Thus, the main purpose of the study was to test a model explaining the role of positive orientation in training engagement and running performance. Moreover, a better understanding of the psychological dispositions stimulating training engagement and running performance may offer new insights into personality and individual differences in the case of sport psychology.

Positive Orientation and Marathon Performance

Baker and Horton (2004) claim that a high level of sports performance depends on numerous factors, which can be divided into those that have primary and secondary influence. The authors classify psychological, training, and genetic factors as primary influences on sports performance. From a psychological perspective, the achievement and manifestation of high performance requires specific characteristics. Obviously there are unique psychological requirements in different sports, but there are also common factors that predict high performance in any sport—for example, some personality traits (Piedmont et al., 1999). The identification of important psychological factors is needed especially in demanding disciplines, such as marathon, which depends on numerous training sessions and requires huge effort during the competition itself (Tanda, 2011). Researchers explain successful sports performance as stemming from positive attitudes and thoughts, strong determination, and engagement (Harmison, 2006). Based on earlier findings, we expected that high marathon performance would depend on personal resources important for optimal functioning.

Optimal functioning across different life domains (e.g., health, achievement, job performance) is associated with individual personal resources. Among a wide range of personal resources self-esteem, optimism, and life satisfaction are crucial for optimal functioning (Caprara et al., 2019). These three variables are related to each other and together make up a higher order latent dimension named positive orientation, also referred to as positivity (Caprara et al., 2009). Positive orientation is defined as a general tendency to interpret reality and experiences in a positive way (Caprara et al., 2010). This cognitive capacity refers to a general propensity to think positively about oneself, life, and the future (Caprara et al., 2019). Research findings show that positive orientation is moderately heritable, but it differs from other dispositions, being a basic disposition to cope with life's challenges (Caprara et al., 2009). For example Caprara et al. (2012) showed that positive orientation is a separate construct from the Big Five traits, whose role has been reviewed in the context of long distance running activity (Waleriańczyk & Stolarski, 2021).

Moreover, positive orientation influences team work performance (Livi et al., 2015) and is associated with personal goal realization (Laguna et al., 2016). Studies on the relationships between positive orientation and health shown that positivity increases healthy habits and counters the effect of stress (Caprara et al., 2019). Positive orientation has also been found to increase after successful marathon completion (Gorczyca et al., 2016), and recreational runners' participation in mass street races improves their well-being and reinforces positive emotions (Cypryańska & Nezlek, 2019). There is, however, no evidence on whether positive orientation is related to running performance. Based on all these research results, we expected that positive orientation might be important in predicting running performance of recreational runners participating in marathon race. We did not, however, expect a direct relationship but an indirect strengthening effect of positive orientation on running performance through training engagement.

Positive Orientation and Training Engagement

Preparation before a marathon should be systematic and start sufficiently early (Gordon et al., 2017). As Busseri et al. (2011) observed, training engagement may be assessed based on behavioral indicators such as training frequency and the amount of time invested. Multiple training sessions are necessary to improve performance by providing better endurance and improving physiological parameters (e.g., maximal oxygen uptake; Tanda, 2011). However, in contrast to competition, training does not lead to immediate reward after this activity (Ericsson, 2006), and training sessions are exhausting not only physically but also mentally. It is documented that

behavioral training indicators are highly interrelated with psychological factors, such as positive thoughts and feelings about the chosen activity (Busseri et al., 2011). This means that the maintenance of regular training engagement requires psychological resources, which foster engagement in regular and demanding training activity. We posited that positive orientation was this kind of psychological resource, associated with training frequency and that positive beliefs might support persistence and higher training frequency. Our hypothesis was based on research demonstrating that positive orientation and its components (Caprara et al., 2019) predicted work engagement (Laguna & Razmus, 2019). Behavioral training engagement is to some extent similar to psychological work engagement (Schaufeli et al., 2008), which is why we expected a similar effect. Thus, in our conceptual model we posited a link between positive orientation and training engagement:

Hypothesis 1: Positive orientation is positively related to training engagement.

Training Engagement and Marathon Performance

High performance is an outcome of an increasing number of training sessions (Smith, 2003). In our study we focus on training frequency as the key behavioral factor that leads to high marathon performance. It is well documented that running performance is an outcome of training engagement and preparations before the race (Gordon et al., 2017; Tanda & Knechtle, 2015). Research has shown robust positive correlations between the undertaking of training activities and performance (Baker & Horton, 2004). Taking part in regular running effort is correlated with average distance run per week. Training frequency has been treated as a predominant factor in the adaptive process of achieving race progression (Gordon et al., 2017). Similarly, engagement measurement conducted using the sport-specific version of the Utrecht Work Engagement Scale showed that vigor predicts positively performance in a half-marathon run (Stolarski et al., 2020). Therefore, we expected that training engagement—that is, engagement in workout estimated as the number of training sessions per week would be associated with subsequent marathon result. We formulated the following hypothesis:

Hypothesis 2: Training engagement is positively related to marathon performance.

Training Engagement as a Mediator Between Positive Orientation and Marathon Performance

Higher training frequency is known to be related to achieving better marathon results (Gordon et al., 2017), but the role of positive orientation in marathon performance has not been determined yet. We expected that positive orientation, as an important personal resource, would stimulate the workout process by stimulating training engagement and thus contribute to the final results achieved in running. In other words, rather than a simple direct effect, positive orientation was expected to have an indirect effect on sports results—namely, on running performance in a marathon competition—by increasing training engagement. Positive evaluations of oneself, life, and the future are important for optimal functioning in different life domains (Caprara et al., 2019; Laguna, 2019). Longitudinal research has demonstrated that positive orientation contributes to work engagement and thereby to organizational success (Laguna & Razmus, 2018), and that it is positively related to personal goal realization (Laguna et al., 2016). Similarly, Alessandri et al. (2015) found that positive orientation predicted work engagement and next job performance in an indirect way. In the light of these findings, positive orientation appears to play a crucial role in engagement in important activities and, consequently, in strengthening performance. We hypothesized that also training engagement depends on the positive beliefs one holds, and that in this indirect way positive orientation might finally modify sports performance level. In other words, we hypothesized that:

Hypothesis 3: Training engagement is a mediator between positive orientation and marathon performance.

Control Variables

Research findings show that anthropometric parameters are associated with running results. As a combination of body mass and height, BMI is a good indicator in predicting running performance. BMI plays a key role in running economy (mechanical efficiency; Morgan et al., 1989) and energy cost of running (Bourdin et al., 1993). It was found that the best long distance runners in the world had low BMI (Marc et al., 2014). Sedeaud et al. (2014) compared athletes' BMI level across different running distances and track and field disciplines. They found that the longer distance runners have lower BMI level. We therefore controlled for BMI, expecting that a lower level of BMI would predict better marathon performance.

Another factor that may be significant in explaining marathon performance is previous marathon experience, defined as participation in another marathon race before. Waśkiewicz et al. (2019) compared people who had already had at least one experience of running a marathon and those without such experience. The results showed that marathoners trained more frequently than inexperienced runners. Given this result, it seemed reasonable to control for previous marathon experience as potentially having a positive effect on training engagement.

METHOD

Procedure

The data were gathered during a marathon event with approximately 700 participants. We used a study design with two measurement times: Time 1 before the marathon race and Time 2 after the race. Race organizers gave permission for pollsters to collect data at the race office, which opened two days earlier. Before the race, runners who received a starter pack completed a paper-and-pencil questionnaire and reported their bib number (which is obligatory in this kind of event). Participants were informed that their time in the race would be used for analyses. Participation in the study was voluntary and no remuneration was given for it. Only those who agreed to complete the questionnaire and to provide their bib number took part in the study. The ethics approval was obtained from the Research Ethics Committee of the Institute of Psychology at the John Paul II Catholic University of Lublin, Poland to conduct the study.

Participants

The study included 204 runners (180 men, 88.2%), who completed the race. The participants' mean age was 36.87 years (SD = 9.97; range: 19 to 70 years). Their running experience was very diverse and ranged from 1 to 55 years (M = 6.98, SD = 7.41).

Measures

Positive Orientation

To measure positive orientation, we used the Positivity Scale (Caprara et al., 2012). The runners were asked before the race to rate eight statements (e.g., *I look forward to the future with hope and enthusiasm*) using a 5-point scale (from 1 = *strongly disagree* to 5 = *strongly agree*). For this scale a very good internal consistency was obtained, Cronbach's alpha = .89.

Training Engagement

Training engagement was measured by means of a question about the weekly training frequency (*How many times a week do you train?*). The indicator was the number of usual training sessions per week.

Marathon Performance

Marathon performance was measured by an objective marathon score. Using the bib number provided by each participant, we checked their finish time on the official results list after the marathon. We converted these time results into seconds. Next, to make the interpretation of results more straightforward, we reversed time values so that better (faster) results were represented by higher indicators.

Body Mass Index

BMI was evaluated based on the weight (in kilograms) and height (in meters) reported by the participants. The score was calculated as weight divided by square of height.

Previous Marathon

Previous marathon experience was determined before the race. The participants were asked *Have you ever run a marathon?* and answered *yes* = 1 or *no* = 0 to this question.

Data Analysis Strategy

We applied confirmatory factor analysis (CFA) and structural equation modelling using AMOS 27 for data analysis. According to Kline (2011), the typical sample size for studies using structural equation modelling is about 200 cases. The current sample is big enough for such analyses, considering that we tested a relatively simple model.

First, to examine the factorial structure of positive orientation as a latent factor loaded by eight observable indicators, we performed a CFA. Next, we analyzed descriptive statistics and correlations between variables. Then, we used structural equation modelling to test the postulated model of relationships between positive orientation, training engagement, and running performance (Figure 1). We controlled for BMI and previous marathon experience. Parameters were estimated using maximum likelihood estimation. Missing data were handled using the regression imputation method.

To assess model fit, we used the chi-square goodness of fit statistic, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). CFI values of .95 or higher indicate a good fit, values of .90 to .95 indicate a reasonable fit, and values below .90 indicate a poor fit (Hu & Bentler, 1998; MacCallum et al., 1996). RMSEA and SRMR values of .05 or less indicate a good fit, values of .06 to .08 show a reasonable fit, and values > .10 attest to a poor fit (Browne & Cudeck, 1993).

Finally, we performed a mediation analysis. Indirect effect was estimated using bias-corrected bootstrapping with 5,000 repetitions and a 95% confidence interval (CI). A statistically significant effect is the case when CI does not include zero.

RESULTS

Preliminary Analysis

We applied CFA to test the factorial structure of positive orientation. Analyses were performed for eight items of the Positivity scale. The results show that the model is reasonably fitted to the data ($\chi^2(20) = 52.835$, $p = .001$, CFI = .945, RMSEA = .090, SRMR = .053), with RMSEA lower than .10 but higher than .08. As RMSEA often falsely indicates poor fit for models with small degrees of freedom (*df*; Breivik & Olsson, 1993; Kenny et al., 2015), we based our decision on

CFI and SRMR indices. The absolute values of factor loadings of the eight items ranged from .29 to .85.

Descriptive Statistics and Correlations

Descriptive statistics and correlations for all variables are reported in Table 1. For positive orientation, the values of the latent construct are reported (raw scores ranged between 15 and 40; $M = 32.07$, $SD = 4.48$). Training engagement varied from 0 to 9 workout sessions per week ($M = 3.44$, $SD = 1.48$). Table 1 shows marathon performance results converted into seconds; presented in the standard format, the best time was 2:42:17 and the worst one was 6:07:35 ($M = 4{:}10{:}51$, $SD = 34{:}59$). Of all runners, 55 ran their first marathon (27%), and 149 had run a marathon before (73%). The lowest BMI was 13.71 and the highest was 30.86.

Table 1

Descriptive Statistics and Correlations Between Variables

	Variables	*M*	*SD*	1	2	3	4	5
1	Positive orientation	0.00	0.68	–				
2	Training engagement	3.44	1.48	.22***	–			
3	Marathon performance[a]	15,051.25	2,099.35	.05	.48***	–		
4	Previous marathon[b]	0.27	0.44	.05	–.06	–.10	–	
5	Body Mass Index	23.52	2.39	–.03	–.07	–.19**	.06	–

Note. [a] Higher marathon performance indicators (in seconds) represent better (faster) results; [b] previous marathon was coded: 1 = yes, 0 = no.
**$p < .01$, ***$p < .001$ (two-tailed).

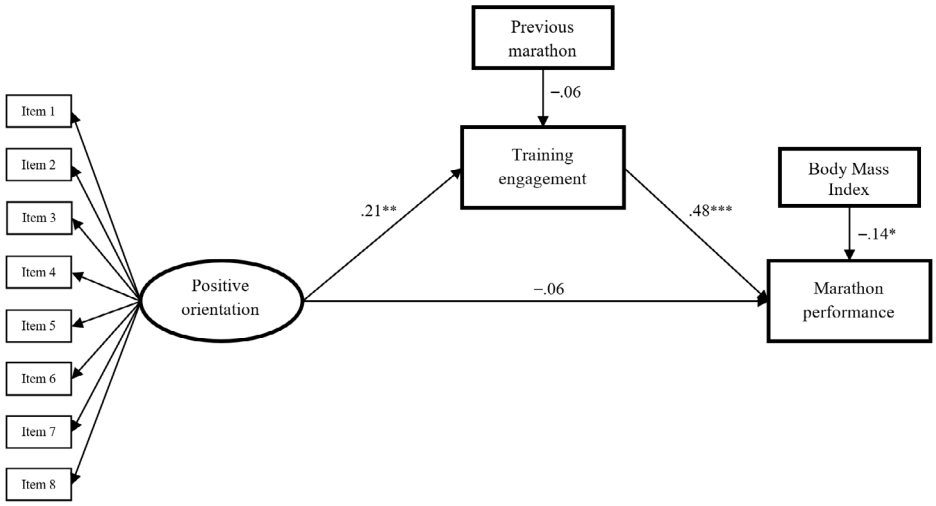
As expected, training engagement was significantly and positively correlated with positive orientation ($r = .22$) and even more strongly correlated with marathon performance ($r = .48$). Previous marathon experience was not correlated with marathon performance, which was negatively correlated with BMI ($r = -.19$).

Hypotheses Testing

We performed structural equation modelling to test the model with latent factor of positive orientation as a predictor, training engagement as a mediator, and marathon performance as a dependent variable (Figure 1).

Figure 1

Mediation Model of Positive Orientation, Training Engagement and Marathon Performance



Note. Standardized path coefficient are reported.
*p < .05, **p < .01, ***p < .001.

Additionally, we controlled for the effect of previous marathon experience on training engagement and for the effect of BMI on marathon performance. This model had a good fit to the data ($\chi^2(53) = 84.217$, $p = .004$, CFI = .952, RMSEA = .054, SRMR = .052).

The results showed that positive orientation did not directly predict marathon performance (path estimate = −.06, SE = 213.65, $p = .395$), but it was a statistically significant predictor of training engagement (path estimate = .21, SE = .15, $p = .004$). Moreover, there was a statistically significant path between training engagement and marathon performance (path estimate = .48, SE = 98.28, $p = .001$).

Results concerning control variables showed that only BMI was significantly and negatively related to marathon performance (path estimate = −.15, SE = 59.38, $p = .011$), whereas first marathon did not predict training engagement (path estimate = −.07, SE = .23, $p = .326$).

Mediation analysis revealed an indirect effect of positive orientation on marathon performance via training engagement (path estimate = .10, 95% CI [.02, .20]). The 95% CI does not include zero, which confirms the mediation effect.

DISCUSSION

To sum up, the results confirm all of our hypotheses. They clearly show that positive orientation is positively related to training engagement (Hypothesis 1), which predicts marathon performance (Hypothesis 2). Mediation analysis indicates that training engagement mediates the relationship between positive orientation and marathon performance, thereby confirming Hypothesis 3. The results also demonstrate that BMI is negatively related to marathon performance, although prior participation in a marathon is unrelated to engagement in training.

Our study provided empirical support that positive orientation is a disposition important for training engagement and, in consequence, for marathon performance. Previous studies focused on positive orientation in predicting job performance (Laguna & Razmus, 2019) and health behaviors (Caprara et al., 2019), but not on sports performance or training activity. Our study demonstrates that runners with a higher level of positive orientation engage more frequently in workout before the marathon competition and have better race results, even when BMI and previous experience in marathon competition is controlled for. This result suggests that positive beliefs give runners more energy which they may use to face the difficulties involved in training and in competing during the race.

Moreover, our results demonstrate that positive orientation is related not only to the evaluation of the results achieved in first marathon (Gorczyca et al., 2016) but also to the training process before running a race. Viewed from a broader perspective, our results extend the findings reported by Cypryańska and Nezlek (2019), who found that running in mass road races induces positive emotions and thinking in participants. We have demonstrated that such positive beliefs have an effect also on running performance in such races.

Our research offers also theoretical implications for personality psychology. The results show the important role of dispositional positive orientation in predicting the frequency of training activities and, through this variable, its significance for sport (marathon) results. We have identified psychological predictors of marathon performance, extending knowledge about personality traits in sport and exercise (Laborde et al., 2020; Piedmont et al., 1999). Positive orientation, in addition to perfectionism (Waleriańczyk & Stolarski, 2021), is related to long-distance running

performance; however, our results suggest an indirect rather than direct relationship. Positive beliefs give runners energy to persist in action, to continue demanding trainings. Their actual sports performance depends on training parameters (Tanda & Knechtle, 2015), which are obtained thanks to persistent actions, stimulated and maintained due to positive personality characteristics.

The study affords a new insight into the role of personal characteristics of recreational marathon runners, which may be different than those of elite performers and still not explored enough (Buman et al., 2008). Moreover, our findings extend the positive orientation theory (Caprara et al., 2019), demonstrating that it may be applied also in sports psychology.

Limitations and Directions for Future Studies

As any research, our study has some limitations. We focused on marathon runners. The results may not be generalizable to all runners (e.g., those running shorter distances) and to other sports disciplines, because marathon runners have specific characteristics and motivations (Buman et al., 2008). In addition, the purpose of our study was to collect data from recreational runners, meaning that it may not be generalizable to elite athletes who participate in professional preparation prior to competition (Nikolaidis et al., 2018). Analyses revealed an indirect association of positive orientation with marathon performance; however, it is not the only factor, so further research on predictors of sport engagement and performance is needed.

As a relatively stable trait, positive orientation was included in the model as an independent variable, but its measurement took place at the same time point as the measurement of a mediator (i.e., training engagement). Due to this, it is not possible to test causal effects. Further research with three separate time points is needed to fully investigate the mediation mechanism. Moreover, reciprocal relationships between variables may be tested—even if positive orientation is considered a trait-like disposition (Caprara et al., 2009), engagement in sports activity may with time change its level, similarly to reinforcing positive emotions and well-being (Cypryańska & Nezlek, 2019). Future longitudinal studies are needed to uncover such potential dynamic mechanisms.

Implications for Practice

In spite of these limitations, our study extends the understanding of psychological mechanisms important in marathon performance. The results suggest recommendations for runners and trainers, identifying the factors related to maintaining effort

and coping with fatigue during training (Baker & Horton, 2004). Runners with more personal resources, i.e., with higher positive orientation, are more ready to engage in training and, thanks to that, perform better in marathon. Thus, an optimal level of positivity should be maintained during the training sessions before the competition and immediately before the marathon.

CRediT Author Statement

Michał Kędra (70%): conceptualization, methodology, formal analysis, investigation, resources, writing (original draft), visualization, project administration.

Mariola Łaguna (30%): supervision, writing (review and editing), methodology, formal analysis.

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