

1 You'll never run alone. Effect of 'cheering zones' on athlete performance in marathon races.

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Abstract

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12 **Introduction**

13 Although the emotion literature advocates for an influence of positive emotions on
14 sports performance (McCarthy, 2011; Vast, Young, & Thomas, 2010), quantifying this
15 influence remains a challenge. Among remarkable athletic performances, marathon races
16 are a relevant example of this influence. The establishment of "cheering zones" during
17 marathon races shows how positive emotions and social support are important for athletes
18 to enhance their performances (Buman, Omli, Giacobbi Jr, & Brewer, 2008). Even if
19 studies have identified the role of positive emotion on athletes' performance from self-report
20 (Shipway, Holloway, & Jones, 2013), our aim is to quantify the behavioural impact of these
21 cheering zones on athletes pace during marathon races.

22 **Methods**

23 **Participants**

24 In collaboration with Strava Inc. (athlete monitoring application) we analysed the
25 data of 1049 athletes who have finished the Dublin marathon in 2015. By analyzing their
26 GPS information the Strava app gives feedback to athletes about race distance, duration
27 and elevation in real time. From distance and duration time series, the Strava app is
28 calculating the evolution of athletes' pace (min/km) during the marathon. We compared
29 athletes' pace before, during and after the cheering zones in order to identify the influence
30 of positive emotion and social support on athletes' performance.

31 **Cheering zones**

32 Along the Dublin marathon 2015, eight cheering zones were created (Figure 1). for
33 the purpose of our analysis, athletes' pace were analysed 1000m before and 1000m after

each cheering zone. However because the two last cheering zones are separated by less than 1000m, the last cheering zone was not taken into account.

Results

Generalized Linear Models show not only an effect of cheering zones on athletes' pace ($t(5156697) = -2.79, p = .005$) but also an effect of the localisation of these cheering zones ($t(5156697) = -3.84, p < .001$) see Table (???) (tab:table_ischeering).

Athletes tend to increase their pace by 0.743% after each cheering zones on average but this effect tend to decrease along the marathon race ($R^2 = .06, F(1, 8381) = 535.23, p < .001$, Figure 2).

This last result is supported by the comparison athlete's pace comparison before and after the cheering zones which is significant overall ($t(5156695) = 33.44, p < .001$) and by taken into account their localisation ($t(5156695) = -35.18, p < .001$) Table (???) (tab:table_before_after).

Discussion

Our results are supporting the theory of individual zones of optimal functioning (IZOF) for which feeling the support of others in cheering zones would helps athletes to find the motivation to sublim their performance (Hagtvet & Hanin, 2007). Our results are supporting this idea rather than potential effect of social presence (Lombard & Ditton, 1997) which would have disappeared once the athletes are out of the cheering zones (Morgado, Muller, Gentaz, & Palluel-Germain, 2011).

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Table 1

Effect of Cheering Zones according to marathon's route on athletes pace.

Predictor	<i>b</i>	95% CI	<i>t</i> (5156697)	<i>p</i>
Intercept	5.15	[5.15, 5.16]	3,377.53	< .001
Is cheering1	-0.13	[-0.23, -0.04]	-2.79	.005
Distance	0.00	[0.00, 0.00]	481.06	< .001
Is cheering1 × Distance	0.00	[0.00, 0.00]	-3.84	< .001

Table 2

Difference before and after Cheering Zones according to marathon's route on athletes pace.

Predictor	<i>b</i>	95% CI	<i>t</i> (5156695)	<i>p</i>
Intercept	5.03	[5.02, 5.04]	1,148.40	< .001
Before after0	0.13	[0.12, 0.14]	27.03	< .001
Before after1	0.21	[0.20, 0.22]	33.44	< .001
Distance	0.00	[0.00, 0.00]	192.03	< .001
Before after0 \times Distance	0.00	[0.00, 0.00]	-5.39	< .001
Before after1 \times Distance	0.00	[0.00, 0.00]	-35.18	< .001

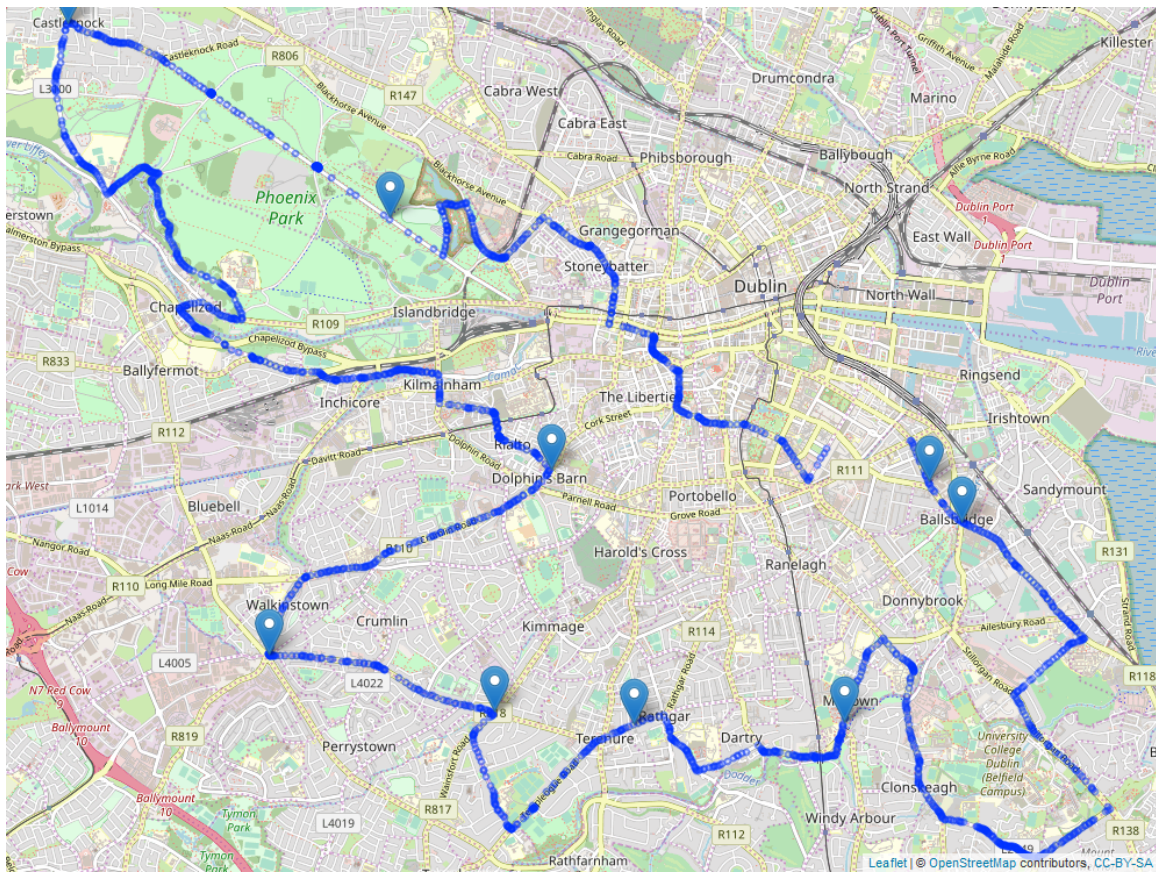


Figure 1. GPS localisation of Cheering Zones on the marathon route.

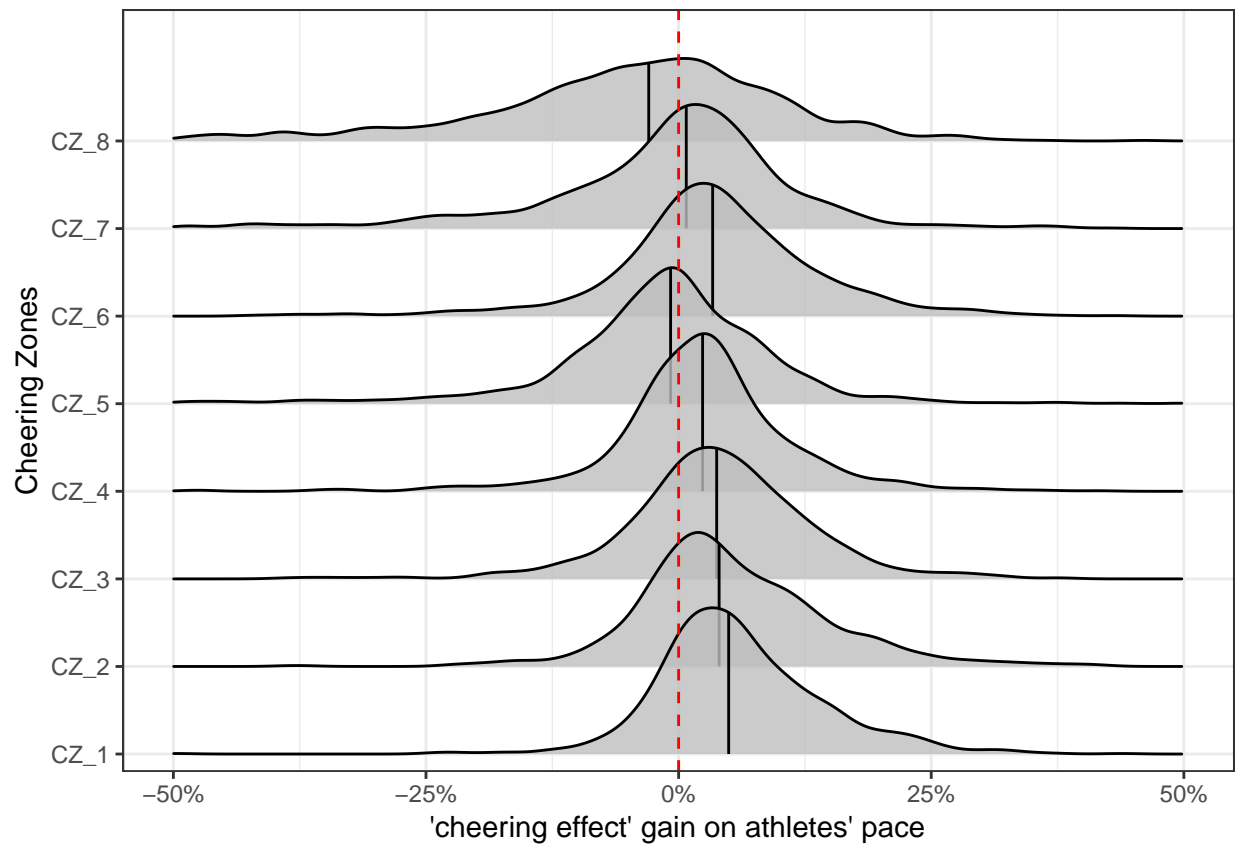


Figure 2. Density distribution of athletes's pace gain during the Cheering Zones.