

Follow-Up:

A quantitative analyses of Team Time Outs in Team Handball

Does the current application of Team Time Outs match the psychological theory of directly controlling activation of athletes?

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1. Introduction

It is advised to have read the initial study in order to familiarize oneself with the topic at hand. Specific details on how the data, both initial and newly found, came to be will not be given in this follow-up. The procedure and methodology of this follow-up remain unchanged in comparison to the initial study. Furthermore, the psychological background, which was elaborated on in the initial study will not be explained. All aforementioned details can be found in the initial study, published in 2018.

In 2018, Heinz and David Hausmann conducted an analytical study on Team Time Outs (*from now on referred to as „TTO“ in this follow-up*) in Team Handball with the title „A quantitative analysis of Team Time Outs in Team Handball – Does the current application of Team Time Outs match the psychological theory of directly controlling activation of athletes?“. In the course of the work at the time more than 3100 TTOs from over 750 games were analyzed in various competitions.

The statistical structure was based on a total of five intermediate results per TTO:

- Score 10 minutes before the TTO
- Score 5 minutes before the TTO
- Score, when TTO was taken
- Score 5 minutes after the TTO
- Score 10 minutes after the TTO

Two years have passed since the initial publication. In this time four major international events have taken place:

- EHF EURO Women 2018
- IHF WC Women 2019
- IHF WC Men 2019
- EHF EURO Men 2020

In addition to these events, the past season 2018/2019 of the spusu Liga (*formerly: HLA*) and the spusu Challenge (*formerly: BLM*) have also been analyzed in order to be able to present comparative values to the initially recorded data. In the course of this follow-up, the question whether the use of TTOs (or more specifically: when they are used) has changed based on the findings of the initial study back in 2018, should be answered.

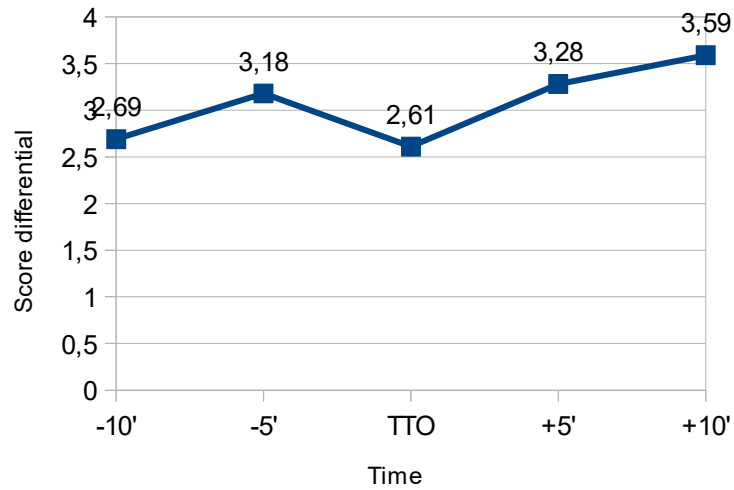
In general it is important to note, that both the initial study as well as the follow-up have only taken adult competitions into account, given the fact, that within these competitions winning is the ultimate goal. The findings of both the initial study as well as the follow-up can not be applied to youth sports, where coaching goals may vary, depending on age and level of athletes.

Within this follow-up the results of the aforementioned four major international events and the spusu Challenge and spusu Liga will be presented and analyzed separately. They will then be compared to the initial findings in order to see, whether tendencies by winning teams' and/or losing teams' coaches have changed. Initial findings will be marked with an asterisk (*).

2. Results

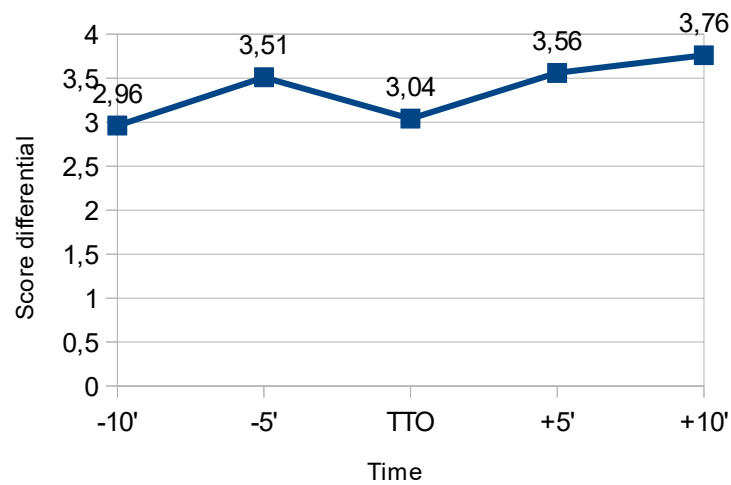
2.1. IHF MEN 2019 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	2,69	3,18	2,61	3,28	3,59
Ranked Score	4.	3.	5.	2.	1.
5' – TTO	-0,57				



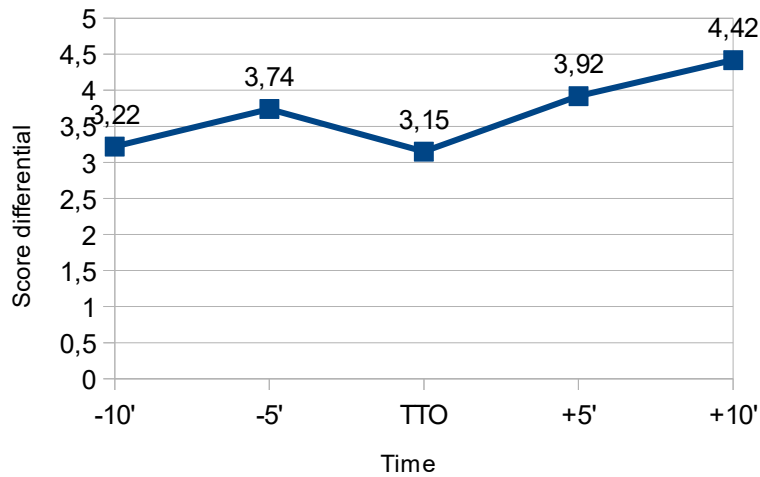
2.2. EHF EURO WOMEN 2018 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	2,96	3,51	3,04	3,56	3,76
Ranked Score	5.	3.	4.	2.	1.
5' – TTO	-0,47				



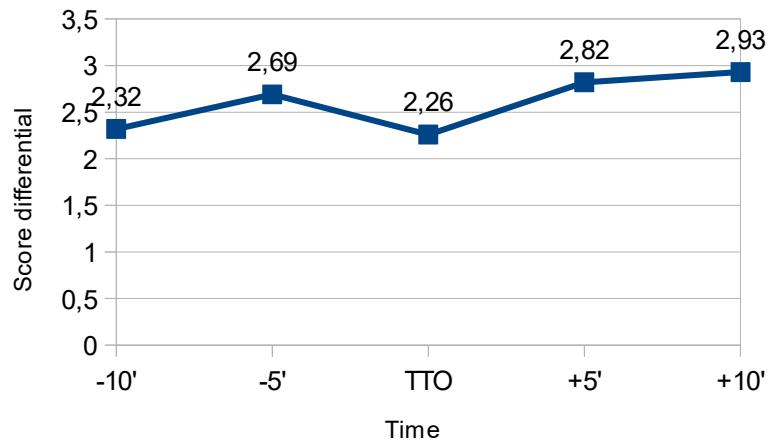
2.3. IHF WOMEN 2019 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	3,22	3,74	3,15	3,92	4,42
Ranked Score	4.	3.	5.	2.	1.
5' – TTO	-0,59				



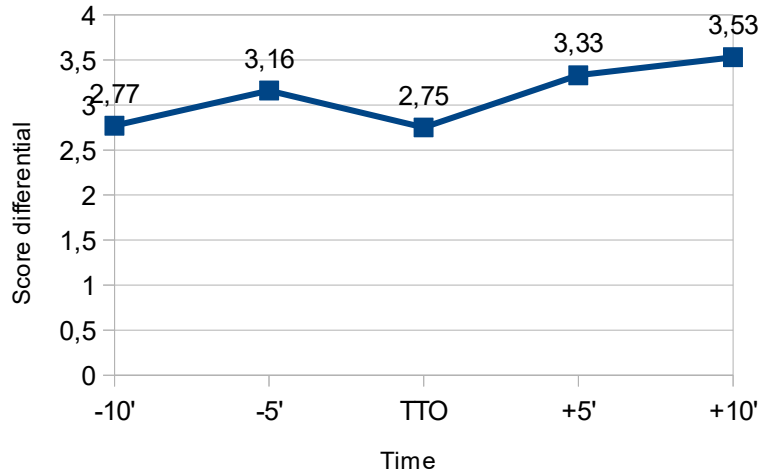
2.4. EHF EURO MEN 2020 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	2,32	2,69	2,26	2,82	2,93
Ranked Score	4.	3.	5.	2.	1.
5' – TTO	-0,43				



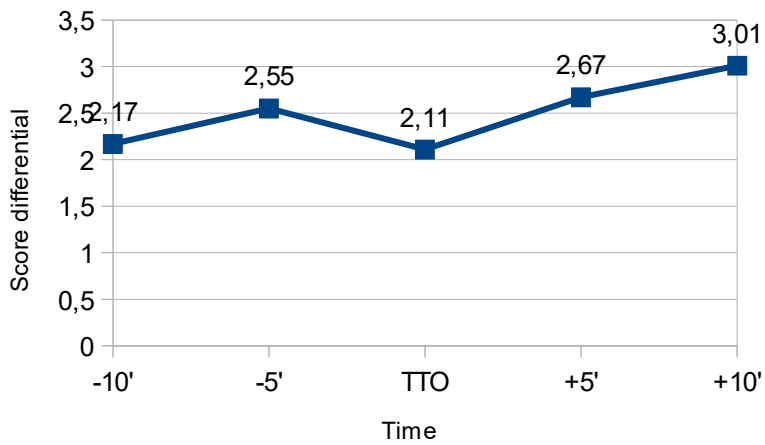
2.5. spusu Challenge 2018/2019 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	2,77	3,16	2,75	3,33	3,53
Ranked Score	4.	3.	5.	2.	1.
5' – TTO	-0,41				



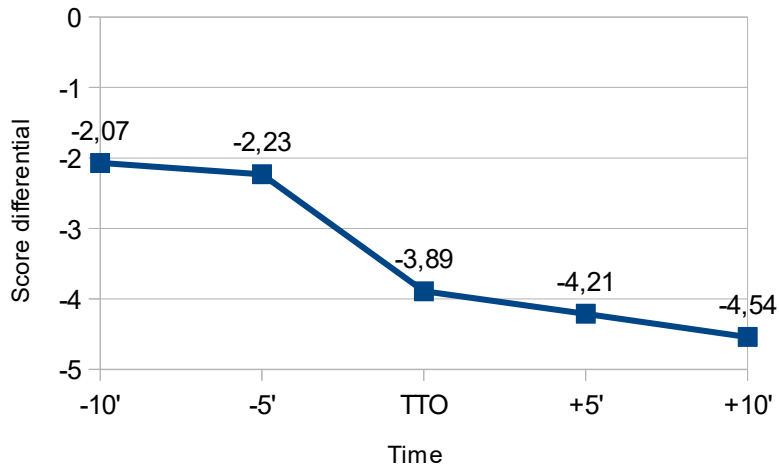
2.6. spusu Liga 2018/2019 winning teams

Time	-10'	-5'	TTO	+5'	+10'
Score	2,17	2,55	2,11	2,67	3,01
Ranked Score	4.	3.	5.	2.	1.
5' – TTO	-0,44				



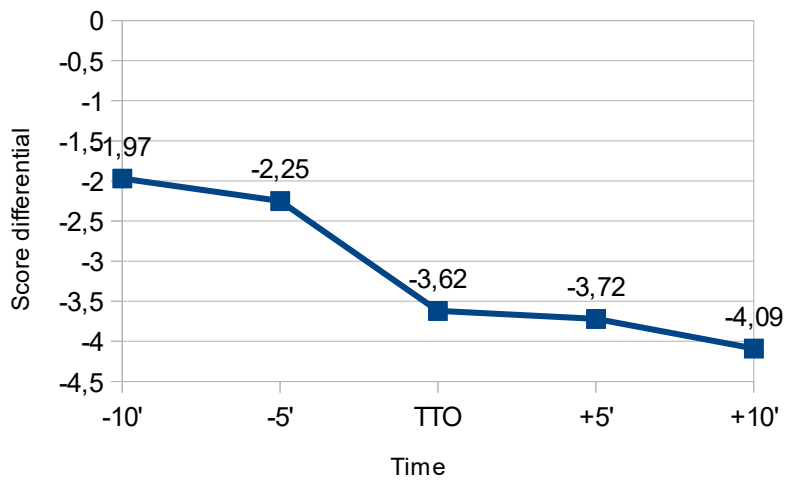
2.7. IHF MEN 2019 losing teams

Time	-10'	-5'	TTO	+5'	+10'
Score	-2,07	-2,23	-3,89	-4,21	-4,54
Ranked Score	1.	2.	3.	4.	5.
5' – TTO	-1,66				



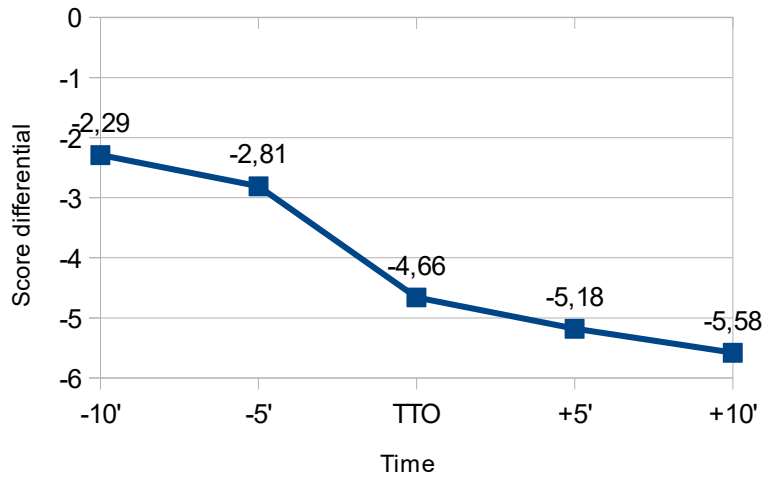
2.8. EHF EURO WOMEN 2018 losing teams

Time	-10'	-5'	TTO	+5'	+10'
Score	-1,97	-2,25	-3,62	-3,72	-4,09
Ranked Score	1.	2.	3.	4.	5.
5' – TTO	-1,37				



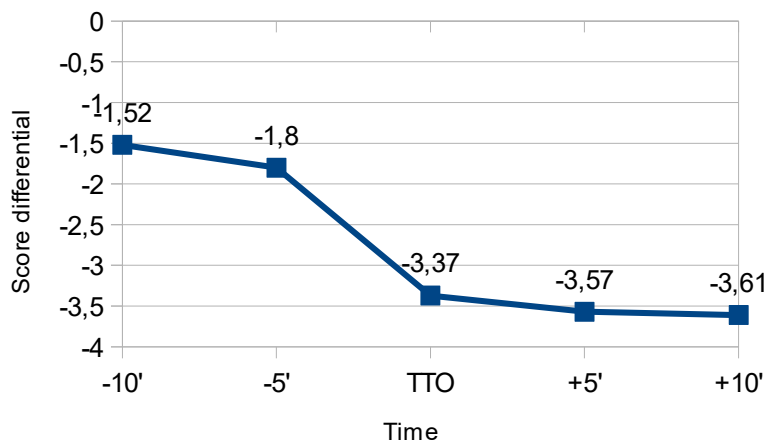
2.9. IHF WOMEN 2019 losing teams

Time	-10'	-5'	TTO	+5'	+10'
Score	-2,29	-2,81	-4,66	-5,18	-5,58
Ranked Score	1.	2.	3.	4.	5.
5' – TTO	-1,85				



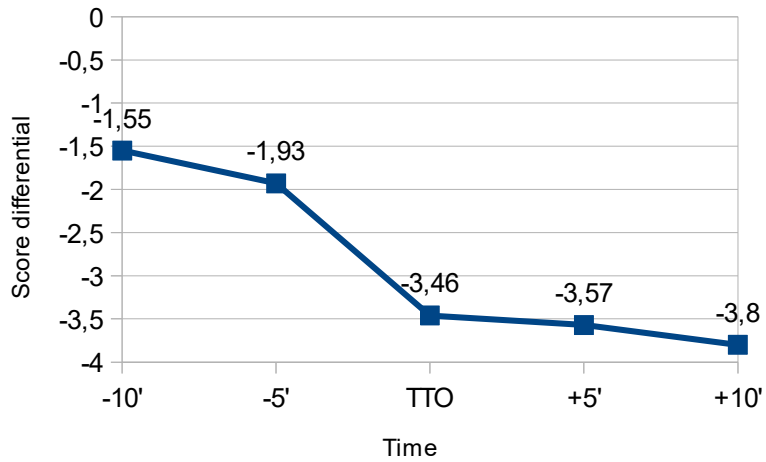
2.10. EHF EURO MEN 2020 losing teams

Time	-10'	-5'	TTO	+5'	+10'
Score	-1,52	-1,8	-3,37	-3,57	-3,61
Ranked Score	1.	2.	3.	4.	5.
5' – TTO	-1,57				



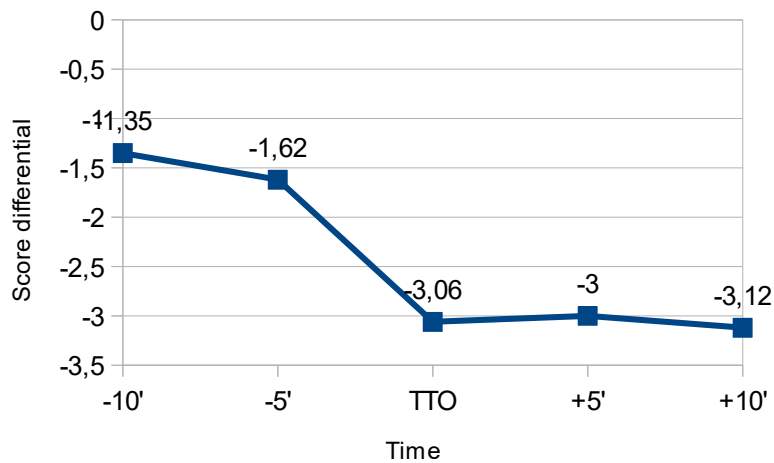
2.11. spusu Challenge 2018/2019 losing teams

Time	-10'	-5'	TTO	+5'	+10'
Score	-1,55	-1,93	-3,46	-3,57	-3,8
Ranked Score	1.	2.	3.	4.	5.
5' – TTO	-1,53				



2.12. spusu Liga 2018/2019 losing teams

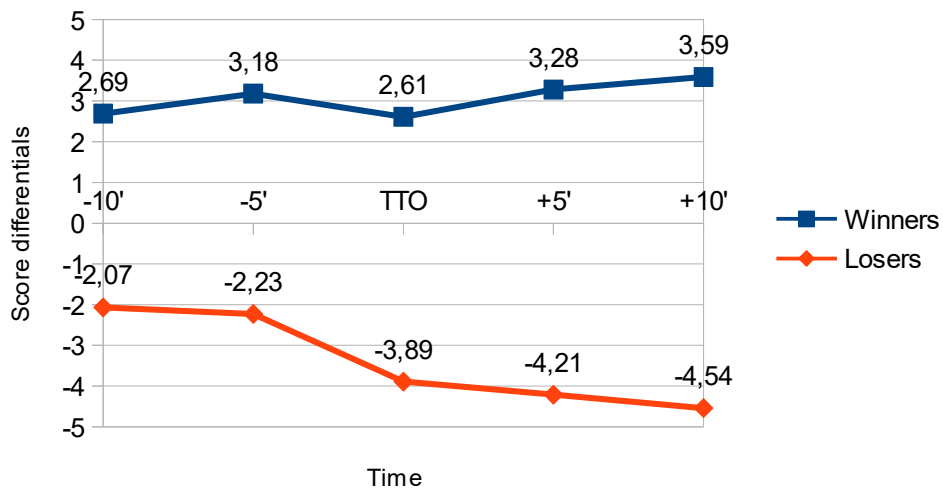
Time	-10'	-5'	TTO	+5'	+10'
Score	-1,35	-1,62	-3,06	-3	-3,12
Ranked Score	1.	2.	4.	3.	5.
5' – TTO	-1,44				



3. Score differential development

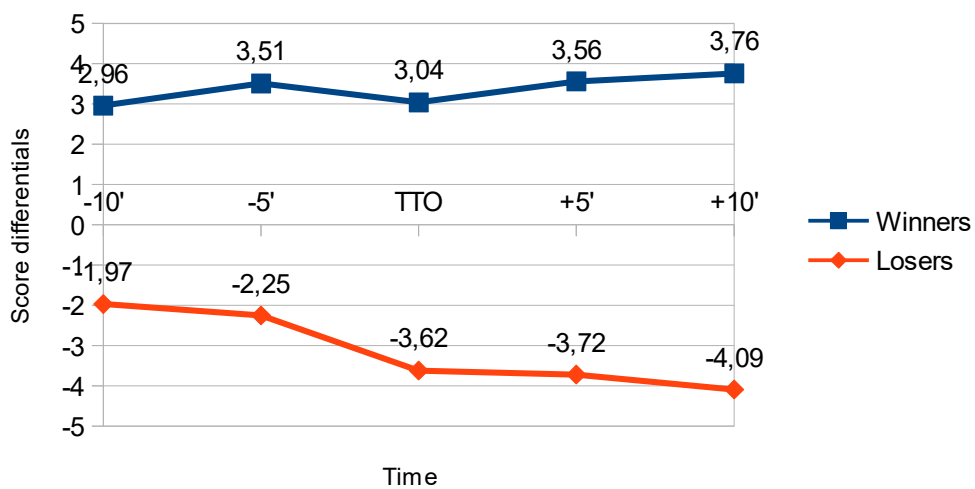
3.1. IHF MEN 2019 score differential development

Time	-10'	-5'	TTO	+5'	+10'
Winners	2,69	3,18	2,61	3,28	3,59
Losers	-2,07	-2,23	-3,89	-4,21	-4,54



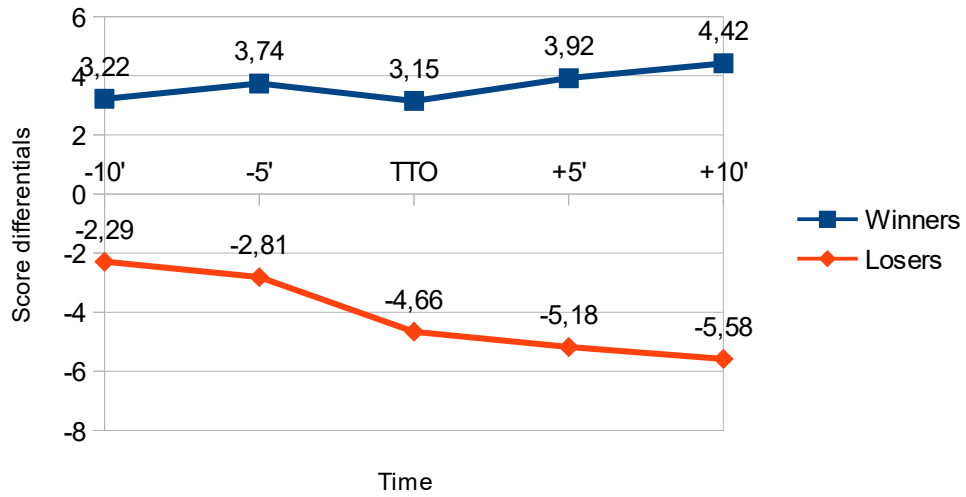
3.2. EHF EURO WOMEN 2018 score differential development

Time	-10'	-5'	TTO	+5'	+10'
Winners	2,96	3,51	3,04	3,56	3,76
Losers	-1,97	-2,25	-3,62	-3,72	-4,09



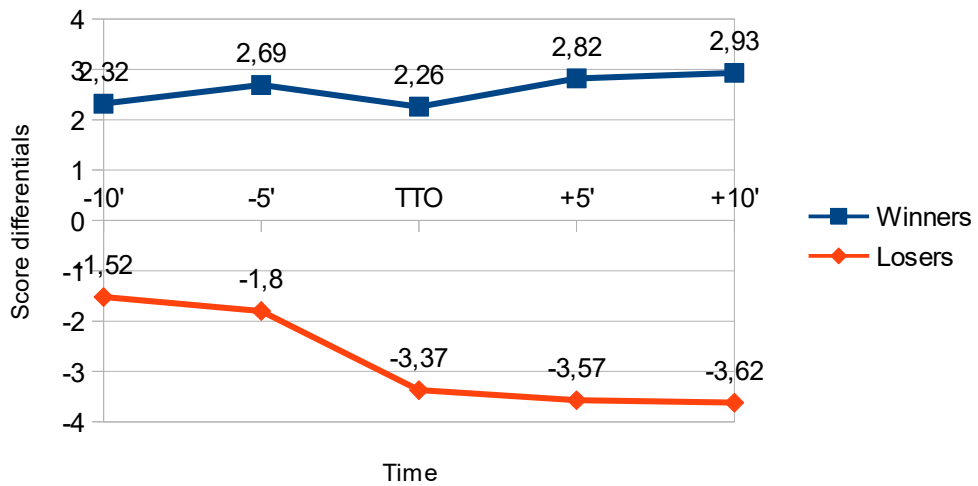
3.3. IHF WOMEN 2019 score differential development

Time	-10'	-5'	TTO	+5'	+10'
Winners	3,22	3,74	3,15	3,92	4,42
Losers	-2,29	-2,81	-4,66	-5,18	-5,58



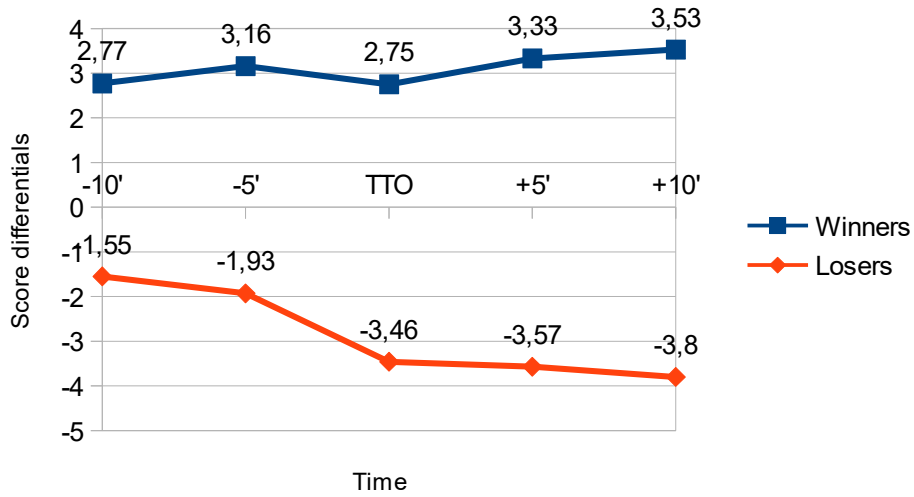
3.4. EHF EURO MEN 2020 score differential development

Time	-10'	-5'	TTO	+5'	+10'
Winners	2,32	2,69	2,26	2,82	2,93
Losers	-1,52	-1,8	-3,37	-3,57	-3,61



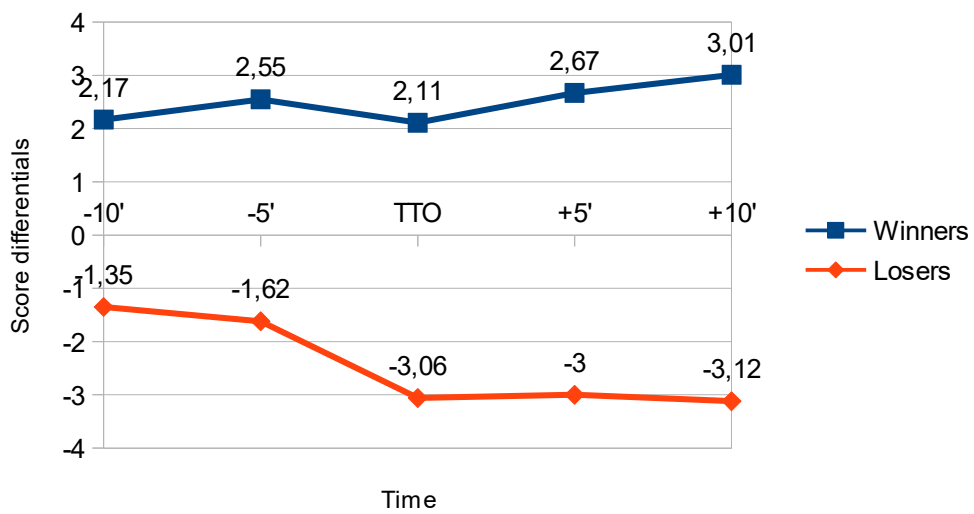
3.5. spusu Challenge 2018/2019 score differential development

Time	-10'	-5'	TTO	+5'	+10'
Winners	2,77	3,16	2,75	3,33	3,53
Losers	-1,55	-1,93	-3,46	-3,57	-3,8



3.6. spusu Liga 2018/2019 score differential development

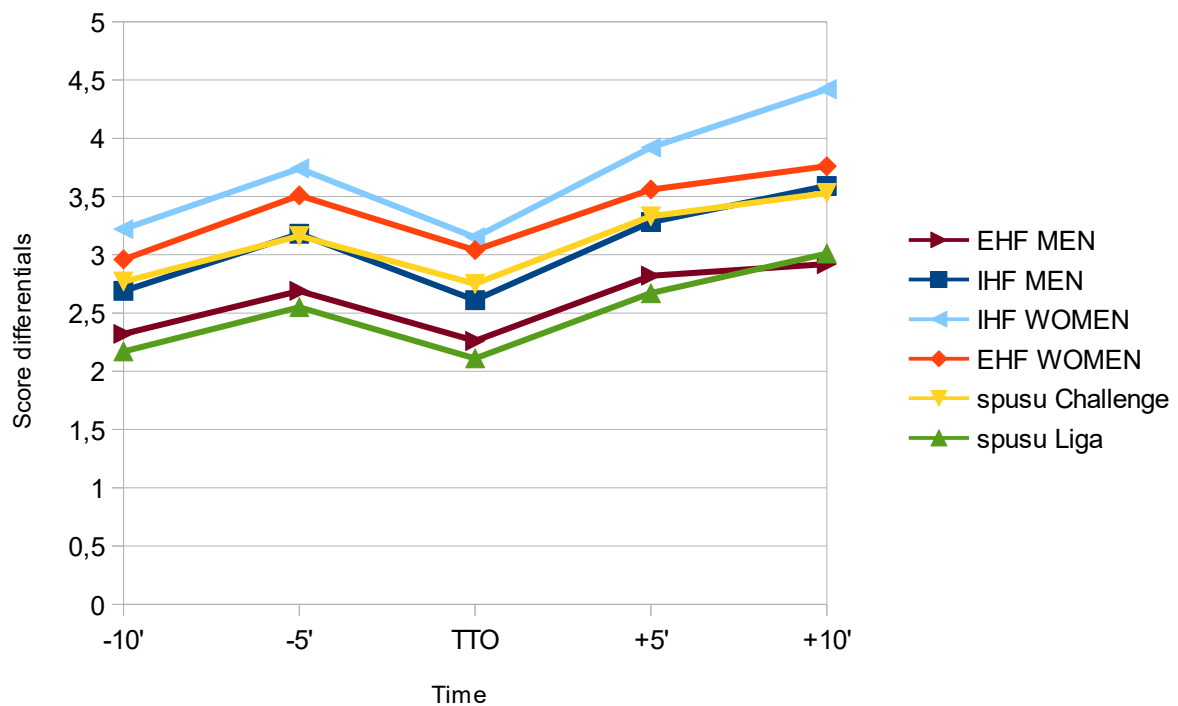
Time	-10'	-5'	TTO	+5'	+10'
Winners	2,17	2,55	2,11	2,67	3,01
Losers	-1,35	-1,62	-3,06	-3	-3,12



4. Pattern analyses and tendencies

4.1. Winning teams' pattern analyses and tendencies

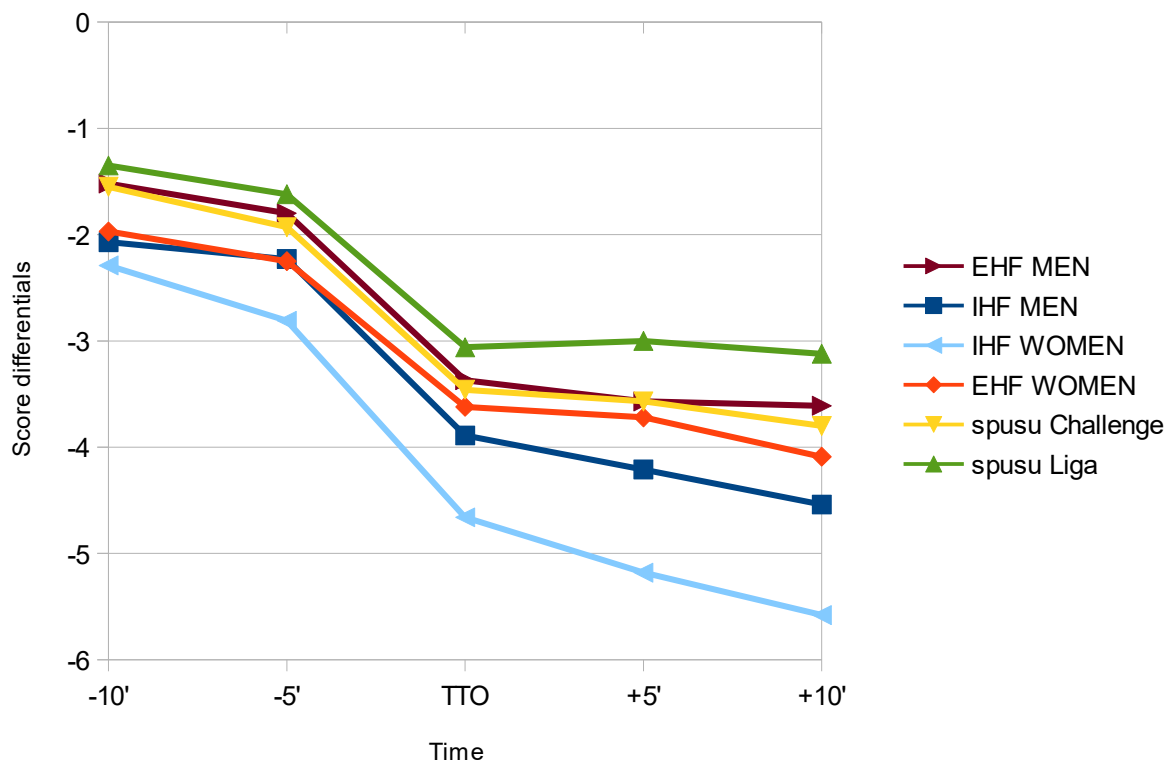
	-10'	-5'	TTO	+5'	+10'
IHF MEN	2,69	3,18	2,61	3,28	3,59
EHF MEN	2,32	2,69	2,26	2,82	2,93
EHF WOMEN	2,96	3,51	3,04	3,56	3,76
IHF WOMEN	3,22	3,74	3,15	3,92	4,42
spusu Ch.	2,77	3,16	2,75	3,33	3,53
spusu Liga	2,17	2,55	2,11	2,67	3,01



Although not directly comparable to each other, because of gender and competition differences the score differential developments of winning teams' coaches show remarkably similar tendencies.

4.2. Losing teams' pattern analyses and tendencies

	-10'	-5'	TTO	+5'	+10'
IHF MEN	-2,07	-2,23	-3,89	-4,21	-4,54
EHF MEN	-1,52	-1,8	-3,37	-3,57	-3,61
EHF WOMEN	-1,97	-2,25	-3,62	-3,72	-4,09
IHF WOMEN	-2,29	-2,81	-4,66	-5,18	-5,58
spusu Ch.	-1,55	-1,93	-3,46	-3,57	-3,8
spusu Liga	-1,35	-1,62	-3,06	-3	-3,12



Although not directly comparable to each other, because of gender and competition differences the score differential developments of losing teams' coaches show remarkably similar tendencies.

5. Initial findings and comparison

Winning teams	-5'	TTO	differential	→	+10'
MECh*	2,64	2,21	-0,43	→	2,86
WECh*	2,28	1,72	-0,56	→	2,14
BLM*	2,93	2,36	-0,57	→	3,11
HLA*	2,98	2,5	-0,48	→	3,3

Losing teams	-5'	TTO	differential	→	+10'
MECh*	-1,41	-2,78	-1,37	→	-3,09
WECh*	-1,28	-2,63	-1,35	→	-2,82
BLM*	-1,68	-3,18	-1,5	→	-3,47
HLA*	-1,95	-3,4	-1,45	→	-3,83

Winning teams	-5'	TTO	differential	→	+10'
IHF MEN	3,18	2,61	-0,57	→	3,59
EHF MEN	2,69	2,26	-0,43	→	2,93
EHF WOMEN	3,51	3,04	-0,47	→	3,76
IHF WOMEN	3,74	3,15	-0,59	→	4,42
spusu Challenge	3,16	2,75	-0,41	→	3,53
spusu Liga	2,55	2,11	-0,44	→	3,01

Losing teams	-5'	TTO	differential	→	+10'
IHF MEN	-2,23	-3,89	-1,66	→	-4,54
EHF MEN	-1,8	-3,37	-1,57	→	-3,61
EHF WOMEN	-2,25	-3,62	-1,37	→	-4,09
IHF WOMEN	-2,81	-4,66	-1,85	→	-5,58
spusu Challenge	-1,93	-3,46	-1,53	→	-3,8
spusu Liga	-1,62	-3,06	-1,44	→	-3,12

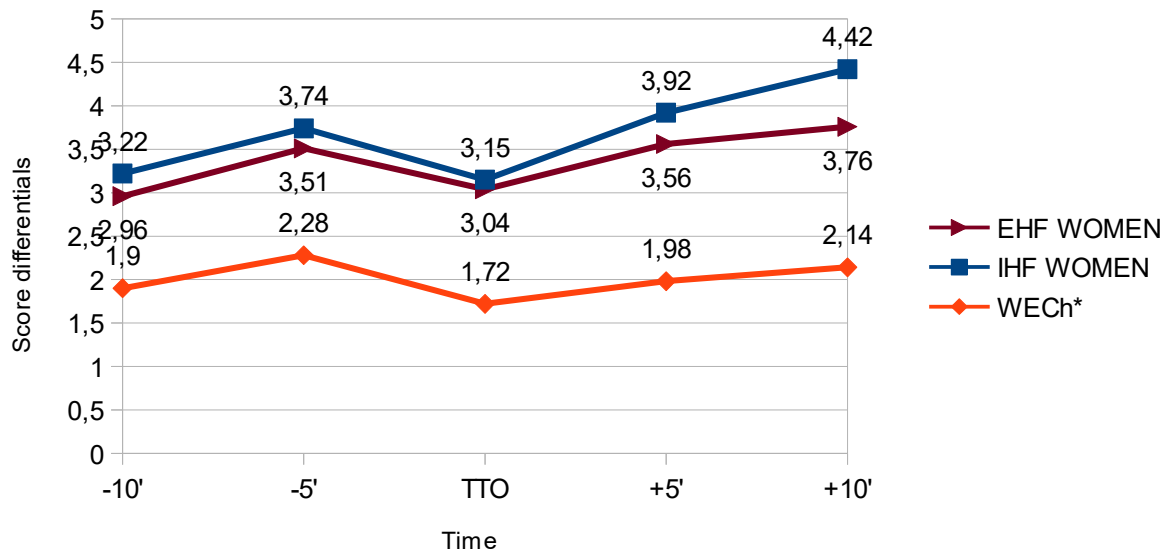
6. Winning teams comparison

	-5'	TTO	differential		+10'
MECh*	2,64	2,21	-0,43	→	2,86
IHF MEN	3,18	2,61	-0,57	→	3,59
EHF MEN	2,69	2,26	-0,43	→	2,93
	-5'	TTO	differential		+10'
WECh*	2,28	1,72	-0,56	→	2,14
EHF WOMEN	3,51	3,04	-0,47	→	3,76
IHF WOMEN	3,74	3,15	-0,59	→	4,42
	-5'	TTO	differential		+10'
BLM*	2,93	2,36	-0,57	→	3,11
spusu Challenge	3,16	2,75	-0,41	→	3,53
	-5'	TTO	differential		+10'
HLA*	2,98	2,5	-0,48	→	3,3
spusu Liga	2,55	2,11	-0,44	→	3,01

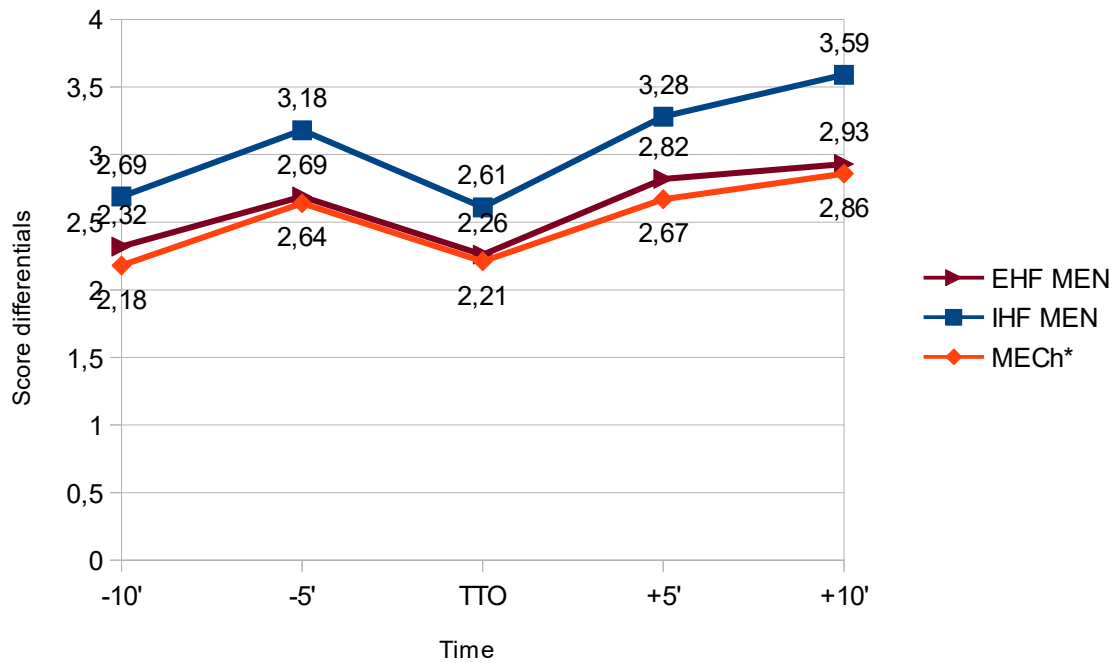
While score differentials have expectedly changed, the tendencies of when a TTO is taken remain unchanged. Winning teams' coaches, as previously discussed in the initial study, still take **performance-based** TTOs, rather than result-based TTOs. The result of these performance-based TTOs is a further increase in their teams' lead. Throughout all observed competitions the TTO of winning teams' coaches did in fact enable the teams to regain composure again. Throughout all observed competitions the final intermediate score remains the best of the recorded five, leading to the same conclusion the initial study had come to: Winning teams's coaches intervene early, when the score has not changed extensively yet. Subsequently the teams managed to extend their lead after the TTO.

The overall tendencies, as in the courses of the depicted curves in the following graphs, clearly show that, besides the score differentials, the usage of TTOs has in fact not changed. This behaviour is expected by winning teams' coaches.

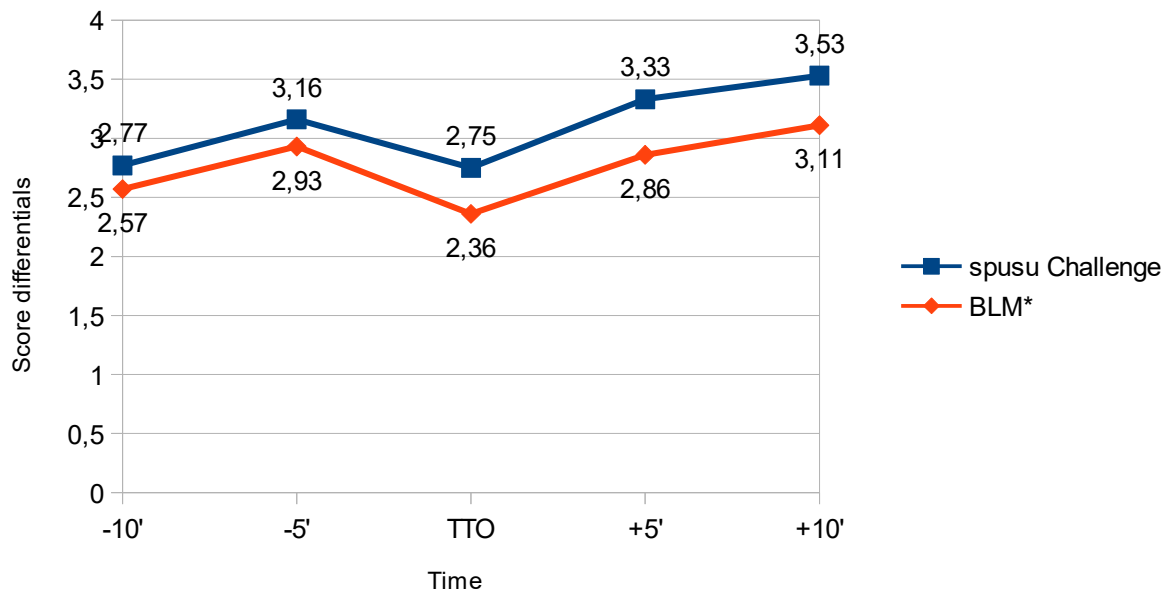
6.1. Winning teams tendencies comparison: Women International



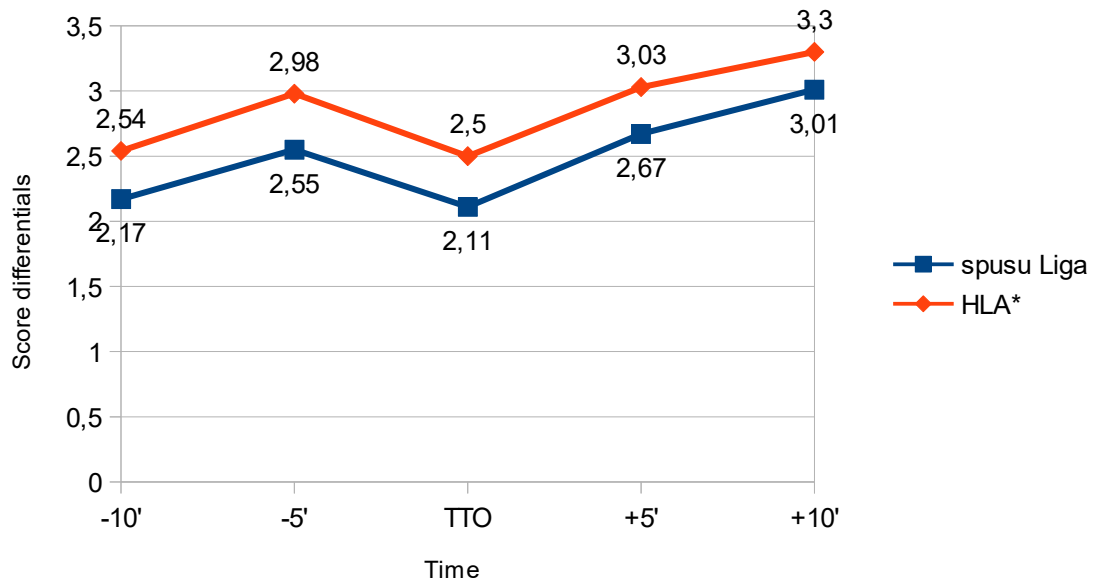
6.2. Winning teams tendencies comparison: Men International



6.3. Winning teams tendencies comparison: spusu Challenge



6.4. Winning teams tendencies comparison: spusu Liga



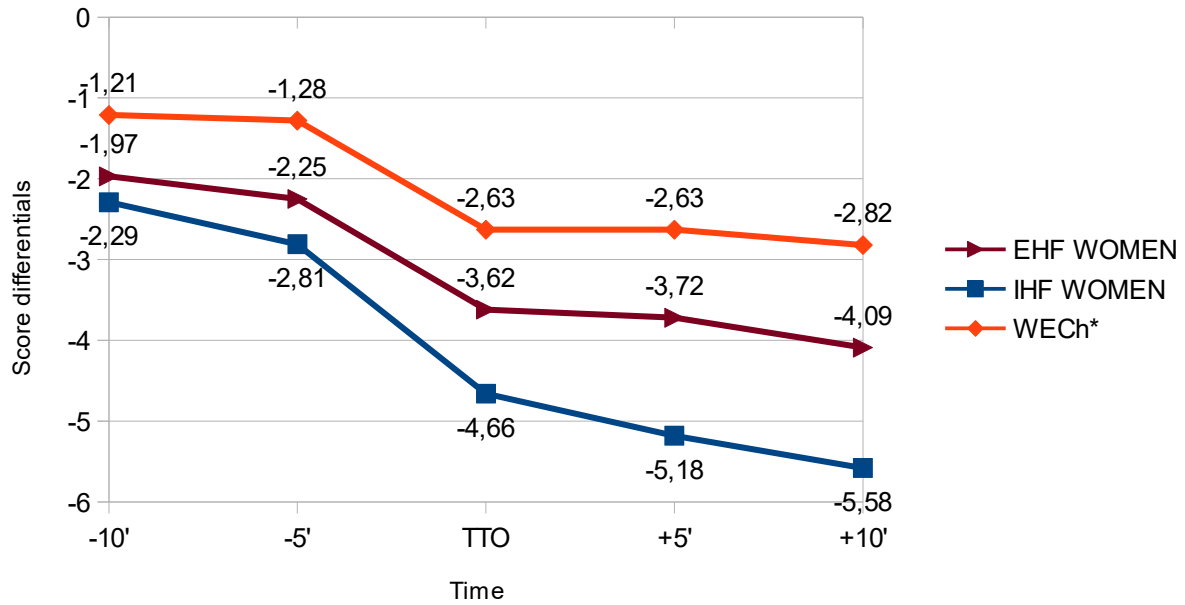
7. Losing teams comparison

	-5'	TTO	differential		+10'
MECh*	-1,41	-2,78	-1,37	→	-3,09
IHF MEN	-2,23	-3,89	-1,66	→	-4,54
EHF MEN	-1,8	-3,37	-1,57	→	-3,61
	-5'	TTO	differential		+10'
WECh*	-1,28	-2,63	-1,35	→	-2,82
EHF WOMEN	-2,25	-3,62	-1,37	→	-4,09
IHF WOMEN	-2,81	-4,66	-1,85	→	-5,58
	-5'	TTO	differential		+10'
BLM*	-1,68	-3,18	-1,5	→	-3,47
spusu Challenge	-1,93	-3,46	-1,53	→	-3,8
	-5'	TTO	differential		+10'
HLA*	-1,95	-3,4	-1,45	→	-3,83
spusu Liga	-1,62	-3,06	-1,44	→	-3,12

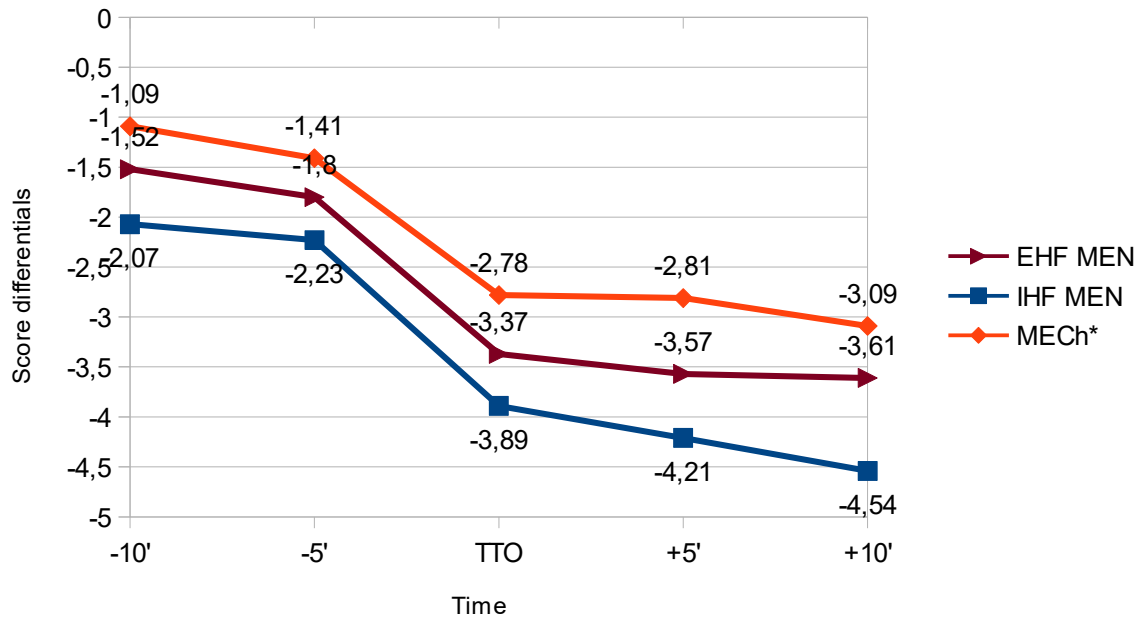
While score differentials have expectedly changed, the tendencies of when a TTO is taken remain unchanged. Losing teams' coaches, as previously discussed in the initial study, still take **result-based** TTOs, rather than performance-based TTOs. The further decline of the score differential after a result-based TTO remains inevitable. Throughout all observed competitions the TTO of losing teams' coaches did in fact slow down the opponents' „run“. However, the final intermediate score remains the worst out of the recorded five, leading to the same conclusion the initial study had come to: Losing teams' coaches bide their time, before taking a TTO, up until the point where the current score is not considered „acceptable“ anymore. At this point in time the score had already changed extensively.

The overall tendencies, as in the courses of the depicted curves in the following graphs, clearly show that, besides the score differentials, the usage of TTOs has in fact not changed. This behaviour by losing teams' coaches is very much unexpected, given then findings of the initial study.

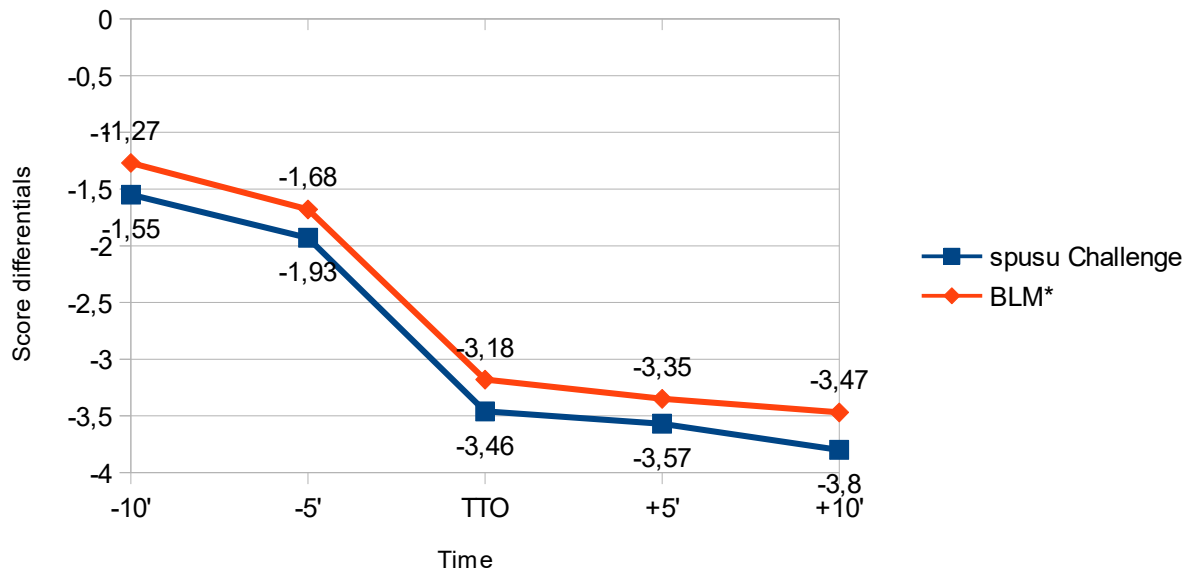
7.1. Losing teams tendencies comparison: Women International



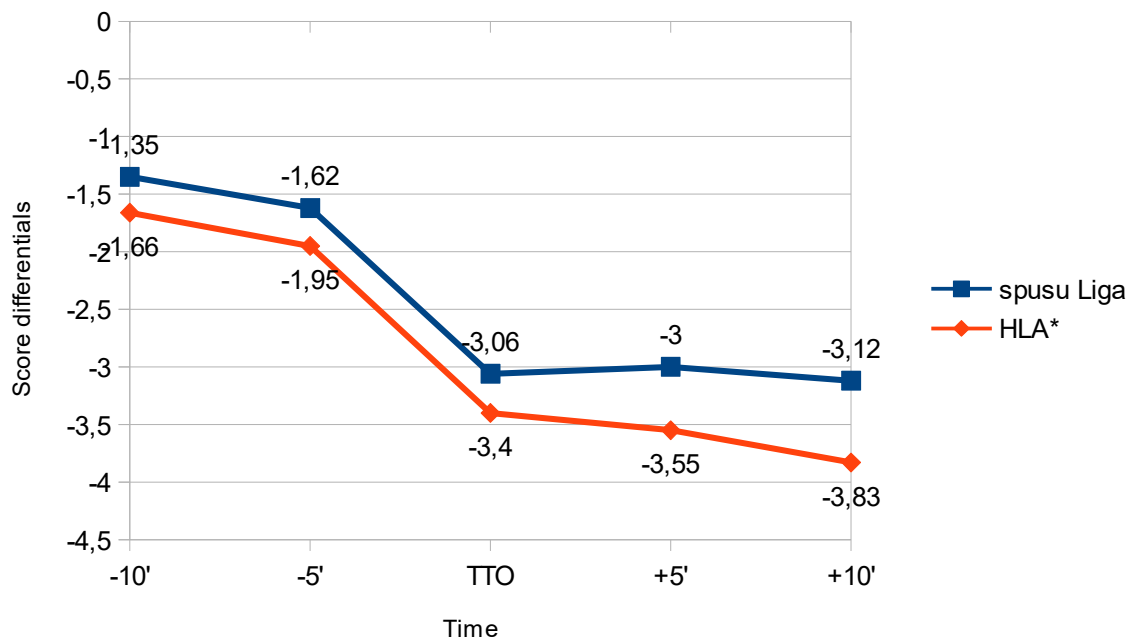
7.2. Losing teams tendencies comparison: Men International



7.3. Losing teams tendencies comparison: spusu Challenge



7.4. Losing teams tendencies comparison: spusu Liga



8. Conclusion

As previously found in the initial study the winning teams' coaches on average still take a TTO, when the previously established lead has not been increasing anymore, but slightly shrinking within five minutes before the TTO is ultimately taken. These slight decreases do not exceed a disadvantage of -0,59 goals. The continuation of this behaviour was expected, as the taking of a **performance-based** TTO had in the past already lead to an overall better outcome for the team.

In contrast, the losing teams' coaches on average still just take a TTO, after the score has changed extensively in comparison. The coaches of the eventual losers awaited at least a disadvantage of -1,37 goals within five minutes before taking a TTO. The continuation of this behaviour was unexpected, as the taking of a **result-based** TTO had in the past already lead to an overall worse outcome for the team.