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Section A

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# Uncertainty of outcome and rule changes in European handball

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## Abstract

In this article, a new set of rules in professional handball, introduced in July 2016 are discussed. The discussion is aided by a reasonably broad empirical analysis, comparing uncertainty of outcome between European handball and football (soccer). This analysis indicates that European handball, already before the introduction of the new rules, may have had problems with severe lack of uncertainty of outcome. Given this fact, we discuss the new rules, and conclude that they may lead to further increased competitive imbalance (reduced uncertainty of outcome) in handball. Such a conclusion should be of interest for handball officials, especially when the new set of rules, here identified as possibly harmful for uncertainty of outcome, still are under debate.

**Keywords**: Uncertainty of outcome, Handball rules, Uncertainty of outcome measurement



## 1 Introduction

Handball is a team sport facing growing economic significance at the international championship level. According to IHF, the International Handball federation [Eurohandball, 2017], they reach large TV-viewing audiences for both EURO and World Championships. For instance, the 2014 female European championship reached 732 million TV-viewers, a 90% increase from 380 million viewers in 2012. Obviously, TV-viewer counts are hard to compare between sports, and such numbers do not necessarily relate



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directly to value creating potential. Still, handball is clearly growing at the international level.

However, at the national league level, the situation does not seem quite as promising. Looking at Norway as an example, the top male football league had an average of 6965 spectators/match in 2014, while male and female handball leagues had 765 and 630 respectively in the 2013/14 season, see [Wikipedia, 2017]. Hence, football had around 10 times as much (real pitch) audience demand as handball.

Recently, in July 2016, IHF introduced a new set of rules in handball. Some of these new rules have created public debate, especially a rule opening up for all teams to play 7 against 6 in attach, leaving an open goal – see [Olsen and Weiberg-Aurdal, 2017]. Most of these new rules have obvious negative consequences for uncertainty of outcome in handball. As our forthcoming analysis will show, uncertainty of outcome is not among "goods" readily available in handball, and as a consequence, these new rules may be seen as poorly planned or decided without relevant information available.

In this article, we will study uncertainty of outcome in handball closely, and discuss the new rules in such a setting. In section 2 we introduce relevant literature. In section 3, we present the new rules, and discuss them related to their possible consequences both on game play and most importantly, their impact on uncertainty of outcome. In section 4 we introduce our chosen measure for measuring uncertainty of outcome. Section 5 provides results from an empirical analysis comparing football and handball with respect to uncertainty of outcome, while section 6 discusses these results in relation to the new rules and concludes.

Our main research question is hence to argue logically why the new rule set in handball should lead to a decrease in uncertainty of outcome. Given the already (critically) low values of uncertainty of outcome in handball, introducing such rules may be harmful to already low demand at the national league level.

## 2 Relevant literature

**Uncertainty of outcome** is probably among the concepts most widely discussed and analyzed in Sport Management and Sports Economic theory. The concept, introduced by [Rottenberg, 1956] relates uncertainty of outcome in a sports competition positively to demand. That is, a very predictable competition is less interesting to watch than a more unpredictable competition. At the same time, maximizing uncertainty of outcome is not a relevant strategy. A competition with too much uncertainty of outcome will resemble a lottery, which without very high prices is not very interesting. Hence, a balanced, or optimal level (possibly depending on sport and audience) should exist. The actual economic significance of too low uncertainty of outcome is hard to quantify. However, our observations on audience numbers in Norwegian national handball leagues (see the Introduction section) indicate that ticket income is at a low level. Low ticket income leads to low sponsor income and maybe more importantly, low TV-income.

Originally a US concept, much of early literature discuss uncertainty of outcome related to US sports, see [Neale, 1964], [Noll, 1974], [Borland and MacDonald, 2003]. But of course, due to its economic significance, also football (or soccer as the Americans call it) has been a major research focus for a relatively long time, see [Forrest and Simmons, 2002]. More recently, uncertainty of outcome has also been discussed in relation to other sports; cross-country skiing and biathlon by [Solberg, Hanstad, and Steen-Johnsen, 2009], chess by [Majek and Iida, 2004] and tennis by [Corral, 2009] to name a few. An interesting recent theoretical approach can be found in [Ely, Frankel, and Kamenica, 2015].

Although the concept is logical (almost obvious), empirical attempts to measure it are not completely conclusive – see e.g. [Szymanski, 2009] and [Buraimo and Simmons, 2008]. Some researchers like [Haugen, 2016b] and [Pawlowski, 2013] have hypothesized that certain football fans are "in love" with their favorite team, and will hence be better off with certain victories rather than thrilling matches, sometimes ending in unexpected and unpleasant losses. As a consequence, the net demand effect of uncertainty of outcome may depend on different types of fans, and in some situations, too many aficionados may induce less positive demand effects due to uncertainty of outcome.

As pointed out in [Dawson and Downward, 2005], a series of methodological options/problems exist related to **measurement of uncertainty of outcome**. In the short run, and when team sport leagues are the candidate for analysis (as in our case), basically two options exist: table rankings or table point scores. The nice thing about rankings is of course that difference in point score systems – as in the case of handball/football – does not matter. Still, pure rankings miss the obvious – if teams win by many points, leagues may be determined early, and all this information will be lost.

For a longer time period, the obvious point that a repeated ranking structure[1] can and should be identified as an element of low uncertainty of outcome, will be missed by the methodology we apply. But, as our main concern in this article is a comparison between handball and football, the finer issues of problems in uncertainty of outcome measurement may – as we see it – be left out.

**Rule changes** and their possible influence on uncertainty of outcome are more sparsely treated in the literature. A general review is found in [Szymanski, 2003]. The change from the 2-1-0 to the 3-1-0 point score system in football has drawn the interest of several authors, see for instance [Haugen, 2008] and [Brocas and Carillo, 2004]. Consequences in changed qualification rules for Champions league are discussed in [Schokkaert and Swinnen, 2016].

Of particular interest for this paper is the book of [Haugen, 2012]. This work provides an interesting theoretical **comparison between football and handball** with respect to uncertainty of outcome. It is argued that the complexity of game play is significantly larger in football than in handball, due to certain game play limitations in handball. For instance: the three-step-rule and forbidden passive play are used as arguments why football should have more competitive play and hence larger uncertainty of outcome. A very limited set of empirical examples are given, showing the author's points.

## 3 New handball rules

As pointed out in the introduction, see section 1, a new set of rules were introduced in handball in July 2016. In this section, we will examine these 5 new rules, and discuss them mainly related to their potential effect on uncertainty of outcome, but also, to some extent, in relation to other potential adverse effects. According to the sparse information (see [IHF, 2016], [IHF, 2015]) we have been able to find on the arguments by IHF for introducing these rules, the rough statement "*to make the sport even more attractive*" seems to be a reasonable summary.

The fact that the testing procedure was performed only on two youth world championships [IHF, 2017] also indicates that more analysis/discussion regarding consequences perhaps could have been conducted.

[1] If the table ranking repeats itself, it can repeat itself with small or large point differences, clearly situations with different uncertainty of outcome – unobservable by the method we apply.

The rules (in short from [IHF, 2017]) are (quote):

1. **Goalkeeper as a player**: The goalkeeper may be used as a seventh field player.
2. **Injured player**: An injured player should leave the playing court after receiving medical care on the court and can only re-enter after the third attack of his team is complete.
3. **Passive play**: After showing the forewarning signal the team forewarned has a total of 6 passes to shoot on goal.
4. **Last minute**: In Rules 8:5, 8:6, 8:10c and 8:10d, the wording "last minute of a game" should be replaced by "last 30 seconds of a game".
5. **Blue card**: The referees have a blue card in addition to the yellow and red ones to provide more clarity regarding the disqualification of a player. If this card is shown, a written report will accompany the score sheet and the Disciplinary Commission will be responsible for further actions.

The main relevant point to note here, is that all rules mostly should lead to decreased uncertainty of outcome in handball.

**Rule 1**, opening up for a general 7 against 6 attacking style, is an obvious candidate in such a manner. If one team is much better than another, they will (almost always) be better both in attack and in defense. An extra player in attack will hence produce an extra superiority for the better team. Surely, the same thing can be said for the worse team, but the risk of playing with an open goal should make it far easier for the more skilled opponent both to get the ball – either by a better goal keeper saving and hitting the empty goal – or by simply better defensive play gaining ball control to again score in the open goal. A good example on this change of playing style was observed by the runner up team in female EURO 2016 - Holland, constantly playing 7 against 6 in attack and truly gaining advantages from it. Hence a playing style equilibrium of the best teams utilizing this rule change to gain even greater superiority is to be expected.

This new rule is also the one which has gained greatest criticism in popular media. Typical with handball aficionado commentators making statements like: "*scoring on an open goal is not handball*".

**Rule 2** makes it more risky to "fake injuries". Apart from the fact that this rule may induce more physical danger for players, increasing the risk of not expressing potential damages, it makes it obviously harder for weaker teams to try to gain time given an unexpected lead in a match. Such a rule may seem just (it should not pay-off to cheat), but obviously decreasing uncertainty of outcome.

**Rule 3** is the most obvious rule change for real uncertainty of outcome reductions. Objectifying passive play, that is defining a given number of passes after signaling passive play, will make it much harder for weaker teams to attack and score goals. Luckily, the rule has not yet been fully implemented as referees still use personal judgement in such situations, as the last two major tournaments, female EURO 2016 and men's 2017 handball world championships have demonstrated.

**Rule 4** is perhaps not that important, neither for actual game play, nor for uncertainty of outcome, But, a rule making it more risky to try to keep a lead by "illegal means" in the end of match is clearly advantageous for the best teams.

The "blue card" rule, rule 5, is like rule 4 perhaps not the most important one. But again, structuring and making rules clearer will almost always be beneficial for the best teams. In most situations, weaker teams only option is to try to twist the rules a little bit.

Apart from the obvious surprising fact that IHF wants to play hazard with a sports product seemingly in good and increasingly good shape, what really surprises are the fact that the uncertainty of outcome consequences of these new rules has been completely absent from the public debate. After all, as upcoming paragraphs will demonstrate, handball is not

rich on uncertainty of outcome, at least not in national leagues.

## 4 Comparing uncertainty of outcome – football and handball

In this section, we will discuss our chosen method to compare uncertainty of outcome between European handball and football[2][3], as well as the methodology we chose to use in order to achieve such a comparison. In section 2, some pointers to measurement of uncertainty of outcome were introduced. We decided to apply the methodology in [Haugen, 2008] as it seems most convenient regarding comparisons between different sports. Furthermore, the case of comparing handball and football is already discussed to some extent (although very limited empirically) in [Haugen, 2012], where the same uncertainty of outcome measurement tool is applied.

A quick resume of the method seems appropriate. In [Haugen, 2008] and [Haugen, 2012], uncertainty of outcome is measured by $\rho_L$ defined by:

$$\rho_L = \frac{\sum_{i=1}^{T}(LCP_i - AP_i)^2}{\sum_{i=1}^{T}(LCP_i - MCP)^2} \cdot 100 \qquad (1)$$

In (1), $LCP_i$ contains a table of Least Competitive Point scores constructed by letting the league winner achieve all victories, the second best all victories apart from matches played against the winner and so on. The subscript $i$ runs over all teams ($T$) in the league. Formally it can be computed by:

$$LCP_i = (N - 2(i-1))\omega_P \qquad (2)$$

where $N$ is the number of matches played and $\omega_p$ is the number of points achieved by a victory. There is (normally given the league structure) a link between the number of teams, $T$ and the number of matches $N$. For instance, in a normal double Round Robin tournament, this link is:

$$T = \frac{N}{2} + 1 \qquad (3)$$

$MCP$ (Maximal Competitive Point score) in (1) holds the opposite of $LCP_i$, namely a league with maximal competition. In such a case, either each team wins and loses (home and away for instance) against any other team, or (as is chosen for simplicity) all matches end in a draw. In that case, all teams end up on equal points achieving

$$MCP = N\delta_p \qquad (4)$$

points, if $\delta_p$ is the number of points achieved in a draw. $AP_i$ contains the actual point scores on a given league table. The final multiplication by 100 in (1) produces a range for $\rho_L$ in the interval [0, 100]%.

The underlying logic of equation (1) should hence be straightforward to grasp. The nominator in the fraction, $\sum_{i=1}^{T}(LCP_i - AP_i)^2$, contains the aggregated squared deviation between a given table and the least possible competitive league. If the league being considered is competitive, this distance will be large (close to 1), and as the denominator, $\sum_{i=1}^{T}(LCP_i - MCP)^2$, is constant with respect to $AP_i$ and the given league structure and holding the aggregated maximal potential possible variation, the result (the computed fraction) will be close to 100%. If the league holds low competition, $AP_i$ will be closer to $LCP_i$, and the aggregated squared differences will compose a smaller number (closer to 0). Hence, in such a situation, as the denominator is given, a smaller number is produced. That is, a small $\rho_L$ indicates low competition or uncertainty of outcome, while a high $\rho_L$ indicates the opposite.

[2] Football is chosen as our comparing sport mainly due to its obvious economic significance. Furthermore, football (still) has a reasonable uncertainty of outcome, even though recent research indicates dramatic changes even here. See [Haugen and Heen, 2018].

[3] Clearly, it seems reasonable to perform an empirical analysis investigating the effects of the new rules on uncertainty of outcome in handball. However, the new rules were so new, at the time of writing, and even now, that this was infeasible. We sincerely hope that other researchers may find this task interesting and perform such empirical analyses if the IHF sticks with their new rules.

## 5 Empirical results

| COUNTRY | FOOTBALL | | HANDBALL | |
|---|---|---|---|---|
| | $\rho_L^{MEN}$ | $\rho_L^{WOMEN}$ | $\rho_L^{MEN}$ | $\rho_L^{WOMEN}$ |
| AUSTRIA | 37.31% | 6.75% | Play-off | 6.80% |
| DENMARK | 25.98% | Play-off | Play-off | Play-off |
| GERMANY | 29.28% | 16.44% | 5.06% | 8.01% |
| MACEDONIA | 30.58% | Play-off | Play-off | 2.31% |
| NORWAY | 32.36% | 8.82% | 5.48% | 4.23% |
| ROMANIA | Play-off | N/A | Play-off | 4.66% |
| SLOVENIA | 37.54% | N/A | Play-off | 2.36% |
| SERBIA | 30.58% | N/A | 5.26% | N/A |
| SWEDEN | 24.22% | 13.76% | Play-off | Play-off |
| UKRAINE | 37.04% | N/A | 0.81% | N/A |
| CROATIA | 16.94% | 12.38% | 6.33% | 12.36% |
| FRANCE | 35.07% | 5,50% | Play-off | Play-off |
| SPAIN | 28.27% | 8,60% | 19,57% | 8,50% |
| $\bar{\rho}_L^{MEN,WOMEN}{}_{FOOTBALL,HANDBALL}$ | 29,83% | 10,32% | 7.09% | 6.15% |
| $\bar{\rho}_L^{FOOTBALL,HANDBALL}$ | 23.02% | | 6.55% | |

**Table 1**: Calculated $\rho_L$'s in football and handball, for men and women.

Table 1 contains empirical results. We started out with an idea of picking different types of countries with respect to dimensions like size and performance quality. That is, we wanted to span different qualities in both football and handball, small and big countries as well as gender. Unfortunately, the existence of handball leagues at a reasonable professional level as well as the occurrence of playoffs[4] in many handball leagues, limited this idea. Hence, many cells in table 1 are ruled out through the term play-off (on yellow background) as well as Not Available (white N/A on red background).

We used the following rule for potential exclusion of a league with play-off: All leagues in both sports determined by a play-off system are excluded, with the exception of Round Robin playoffs with at least 6 teams.

The web-pages: [Stats, 2017], [EHF, 2017], [SW, 2017], [HD, 2017], [AOF, 2017], [Scorespro, 2017], [FSCWR, 2017], and [Livescore, 2017] were used to acquire necessary information to produce the information in table 1.

An obvious problem to handle, when computing $\rho_L$'s in football and handball, is the existence of different point score systems.

[4] If a team sport league is decided through extensive playoffs (more than two teams play a cup tournament after an initial league) is too much of a deviation from normal league play in order to use the "final league table" as data input. In these situations, the focus on the playoff may overshadow the actual league performance, and our estimates of uncertainty of outcome are most probably misleading. As a consequence, many leagues, especially in handball, cannot be used.

In football, all European leagues apply the 3-1-0-system – 3 points for a win, 1 points for a draw and 0 points for a loss. However, in handball, the previously normal football system of 2-1-0 (2 points as opposed to 3 for a win) is the normal rule. Exceptions do however exist, some handball leagues use the 3-1-0 system, but few. Our measurement tool, $\rho_L$, is point score system dependent and in order to compare uncertainty of outcome one would ideally prefer a point-score-system-neutral measuring tool. Unfortunately, such tools do not exist. This ought to be obvious. As long as point differences between teams are used as proxies for quality difference, the point score system will and should affect computed $\rho_L$'s. Given this, two options exist. Either to calculate $\rho_L$ neglecting the difference in point score systems, or transform all tables into the same point score system. The last option will at least secure that comparisons are plausible. However, this last option is problematic, as all tables are a result of strategies implemented by teams given the point score system at hand. Hence doing this we assume that a change in the point score system will not affect the teams' equilibrium strategies. Obviously, this is incorrect – for example as demonstrated in [Haugen, 2008], [Haugen, 2007], [Haugen, 2016a], [Fernandez-Cantelli and Meeden, 2003], [Corral, Prieto-Rodriguez, and Simmons, 2010] and [Brocas and Carillo, 2004]. Still, as our results indicate that uncertainty of outcome in handball is very low, the potential consequences of changing the point score system when it comes to effective team rankings seems insignificant. Additionally, we have calculated $\rho_L$'s for both 3-1-0 as well as 2-1-0 systems for appropriate handball leagues and the results do not differ substantially. Hence, we chose the second option, transforming all necessary handball tables to a 3-1-0 system. That is, our estimated $\rho_L$'s are (at least) numerically comparable.

Table 1 contains estimated $\rho_L$-values[5], one for each country distributed in gender as well as football/handball. The two final rows contain average $\rho_L$-values.

The main interesting output lies in the final row – $\rho_L^{FOOTBALL} = 23.02\%$ and $\rho_L^{HANDBALL} = 6.55\%$. The difference in these values are significant at the 99.999% level[6] and indicates that our data suggest significantly larger uncertainty of outcome in football than in handball. In fact, some of the observations - for instance from Ukrainian male handball - indicate a surprising lack of league competition. To some extent, such observations may be considered somewhat alarming. We will return to this matter in the next section.

## 6 Discussion/Conclusions

In previous sections, we have demonstrated through existing research, logic and empirical analysis, that handball may be considered to have a real problem with lack of uncertainty of outcome. Surely, this should not come as a surprise for handball officials. However, the new rules introduced recently and their effects, discussed in section 3, indicate that the effect of these rule changes may actually reduce uncertainty of outcome even more. Considering other potentially negative effects, also discussed in section 3, this is surprising. Does handball not see the main weakness of their sport? Does handball not recognize uncertainty of outcome as a positive demand effect?

One possible – although questionable explanation – could be that handball recognizes football as the winner, and chooses to keep low competition in national leagues,

[5] See equation (1). The actual raw data in excel-format are available from the authors upon request. These data are, as indicated above, gathered from open internet sources. A single year is used for both sports and all countries. The actual year may vary due to different season structures in different countries, but the main picking criteria has been the latest possible finished season. As a consequence, the data used are mainly gathered from the 2016/2017 season.

[6] A standard *t*-test as well as a Mann-Whitney test is applied. Refer to appendix A for details.

hoping to achieve high competitiveness at the national level. In fact, this may be an interesting strategy as the competitive level between national teams are quite good. We choose not to provide similar type of data here[7], as the results in recent handball EURO and World Championships clearly indicate improved competition. One way of achieving better competitiveness at a higher level (national), could be to keep low competition at the national leagues in order to concentrate resources on one or two teams, repeatedly playing in champions league and hence getting in more or less total control. Such a control could lead to better players in these few clubs, and of course may lead to improved performance for national teams.

Still, such an advanced strategy seems hard to believe in. Furthermore, such a strategy is obviously dangerous when it comes to public sport subsidies. Limited local competitive leagues may produce more obvious "needle eyes" for local talent, leading to less young talent being produced, and in the long run make arguing for public subsidies tougher.

One thing such a strategy should and could not produce, is the competitive level of Ukrainian male handball. As table 1 indicates, we estimated $\rho_L = 0.81\%$. This is an interestingly low number. It indicates that this league, in the 2015/16 season, was almost completely without competition. This result was so unexpected, that we decided to examine this league a bit closer, by finding $\rho_L$'s for more than the last season. Table 2 shows these results:



[7] Looking at the most recent EURO female handball tournament in Sweden December 2016, we observe that Norway (the champion), although winning all 5 group matches ended up with only 3.6 goals per match more than their opponents. Holland, the runner up, achieved only 2.8 goals more per match than their opponents.

| UKRAINE (Men's handball) | | | | | |
|---|---|---|---|---|---|
| YEAR | 2015/16 | 2014/15 | 2013/14 | 2012/13 | 2011/12 |
| $\rho_L$ | 0.81% | N/A | 0.58% | Play-off | 4.71% |
| $\overline{\rho_L}$ | 2% | | | | |

**Table 2**: $\rho_L$as a function of time in Ukrainian male handball.

Although the number of available observations is somewhat low, table 2 indicates low uncertainty of outcome in all periods. An average $\rho_L$ of 2% tells a story of a league with peculiarly low competition in recent years. In fact, the competitive structure is so low that many would find it suspicious. We will not make any particular claims regarding the Ukrainian situation. After all, Ukraine is a country which has undergone, and still undergoes severe political problems. Anyway, such low $\rho_L$-values could be used as a signal to handball officials of leagues that could be investigated further, maybe with corruption or match-fixing in mind. Table 1 indicates that other countries than Ukraine show (maybe) too low values. As such, the female handball leagues of both Macedonia and Slovenia (and maybe even Norway and Romania) might be interesting candidates for further investigation.

The fact that measurements of uncertainty of outcome could be used (at least as) indicators of irregularities in local leagues is interesting, and it may perhaps be seen as a novelty. One should of course be extremely careful of making low $\rho_L$-values 'equal' to irregularities. But, this analytic method might provide signals of conduct and behavior one has not considered previously. As such, this way of analyzing leagues may provide additional helpful decision support for IHF and handball officials.

One additional aspect our empirical analysis indicates, is that many football leagues still provide adequate uncertainty of outcome. Many commentators have discussed the development of European football and negative aspects related to uncertainty of outcome. For instance, the superiority of Real Madrid and Barcelona in Spain and the dominant position of Bayern Munich and Borussia Dortmund in Germany has been used as arguments of negative competitive development in European football leagues. Our results can of course contribute limitedly to such a problem, as we have not analyzed time development of $\rho_L$'s. Still, our numbers indicate clearly that if handball might be seen as a relevant competing sport to football, football has little to fear yet. The difference between uncertainty of outcome between handball and football is, as our observations clearly indicate, still significant and in favor of football. Recent rule changes in handball does not indicate that this head start will diminish. Unfortunately, from handball's point of view, it will probably move in the opposite direction.

## Appendix A: Details of statistical tests

As table 3 indicates, $\rho_L^{FOOTBALL}$ and $\rho_L^{HANDBALL}$ are statistically different, at least at the 99.999% level.

**T-Test**

**Group Statistics**

| | Type idrett | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Usncertainty outcome match | Football | 19 | 23,0221 | 11,29344 | 2,59089 |
| | Handball | 14 | 6,5486 | 4,74174 | 1,26728 |

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Usncertainty outcome match | Equal variances assumed | 21,146 | ,000 | 5,119 | 31 | ,000 | 16,47353 | 3,21826 | 9,90985 | 23,03722 |
| | Equal variances not assumed | | | 5,712 | 25,613 | ,000 | 16,47353 | 2,88422 | 10,54057 | 22,40649 |

**Mann-Whitney Test**

**Ranks**

| | Type idrett | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Usncertainty outcome match | Football | 19 | 23,00 | 437,00 |
| | Handball | 14 | 8,86 | 124,00 |
| | Total | 33 | | |

**Test Statistics[a]**

| | Usikkerhet utfall kamper |
|---|---|
| Mann-Whitney U | 19,000 |
| Wilcoxon W | 124,000 |
| Z | -4,153 |
| Asymp. Sig. (2-tailed) | ,000 |
| Exact Sig. [2*(1-tailed Sig.)] | ,000[b] |

a. Grouping Variable: Type idrett

b. Not corrected for ties.

**Table 3**: *t*-test and Mann-Whitney test– SPSS

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