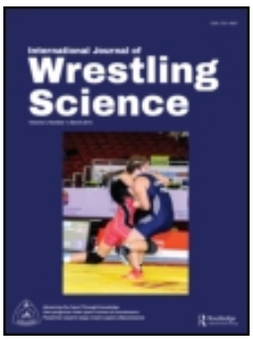

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Effect of Uniform Color on Outcome of Match at Senior World Wrestling Championships 2015

David G. Curby[1]

ABSTRACT. Published research after the 2004 Olympic Games indicated that in the combat sports of boxing, taekwondo, Greco-Roman wrestling, and freestyle wrestling, the combatants in red won more often than those in blue in each sport. This prompted several subsequent studies, including team sports, the role of judges and officials, and other factors that could contribute to a unfair bias against what is thought to be a random and benign assignment of uniform color. To further examine a possible competitive bias in wrestling because of uniform color, this study examined the results from the 2015 Senior World Wrestling Championships. The results of all 952 bouts, women's freestyle, Greco-Roman, and freestyle were reviewed, and the color associated with either winning or losing (red or blue) was recorded. A total of 458 winners wore red and 494 wore blue. These data were then assembled in a 2 × 2 contingency table for chi square analysis (χ^2) I used the Greek symbol- χ^2 χ^2 statistic was = 2.7227 and $p = .098931$. This result is not significant at $p < .05$, indicating that there was no relation between the color of the uniform and the match outcome.

Keywords: scoring analysis, rules, competition

Published research after the 2004 Olympic Games indicated that in the combat sports of boxing, taekwondo, Greco-Roman wrestling, and freestyle wrestling, the combatants wearing red won more often than those in blue in each sport. This research by Hill and Barton (2005) discussed that color can affect mood, emotion, and aggression, but they did not discuss the mechanisms that may explain this advantage in sport (i.e., whether the color red affects the wearer or the opponent). Feltman and Elliot (2011) found evidence for both wearing and viewing effects of red equipment on perceptions of dominance and threat. Other research has approached this question from the perspective of the effect the competitors uniform color has on the judges (Carazo-Vargas & Moncada-Jimenez, 2014; Krenn, 2015). Athletes in red were judged to be more aggressive. Wearing a red uniform has been shown to enhance athletes' physiological response (Dreiskaemper, Strauss, Hagemann, & Busch, 2013). Subsequent studies have examined judo (Dijkstra & Preenen, 2008; Ursula & Miarka, 2015), Ultimate Fighting Championship (Pollett & Peperkoorn, 2013) and team sport (Attrill, Gresty, Hill, & Barton, 2008) to determine the presence of an unfair competitive bias in what is thought to be a random and benign assignment of uniform color.

In international wrestling competition, competitors draw a number at weigh at random, which defines the order of start on the bracket. The wrestler listed on the top of the bracket is assigned the red uniform color and the wrestler on the bottom is assigned to wear the blue uniform.

METHOD

To further examine a possible competitive bias in wrestling because of uniform color, this study was undertaken to examine the results from the 2015 Senior World Wrestling Championships (United World Wrestling, 2015). The results of all 952 bouts (except for those bouts where a contestant was not present to start the match) from women's freestyle, Greco-Roman, and freestyle wrestling were reviewed, and the color associated with either winning or losing (red or blue) was recorded. These data were then assembled in a 2 × 2 contingency table for chi-square analysis.

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RESULTS

There were 458 winners wearing red and 494 winners wearing blue. The 2 × 2 contingency table for all styles is shown in Table 1. The chi-square statistic was = 2.7227 and the p value = .098931. This result is not significant at $p < .05$, indicating that these are independent variables, and there was no relation between the color of the uniform and the match outcome.

The contingency table provides the following information: the observed cell totals, the expected cell totals in parentheses, and the chi-square statistic for each cell in brackets. The chi-square statistic, p value, and statement of significance appear beneath the table.

The same analysis was performed for each style—women's freestyle, men's freestyle, and Greco-Roman—are shown in Tables 2 through 4, respectively.

Greco-Roman was the only style where there was a majority of winners wearing red, and there was no relation between the red uniform and winning. It is interesting to note that the only significant result was in men's freestyle, where wearing a blue uniform was significantly associated with winning. Investigations of blue versus white in judo have yielded contradictory findings. Wearing the blue judogi was found to be associated with winners by Ursula and Miarka (2015); however, Dijkstra and Preenen (2008) found no effect of blue on winning contests in judo.

CONCLUSIONS

The wearing of red uniforms is not associated with winners in this world championship. The results do not seem to merit a rule change regarding uniform colors at this time,

TABLE 1 Chi-Square Contingency Table for All Styles

	Win	*Lose*	*Marginal row totals*
Red singlet	458 (476) [0.68]	494 (476) [0.68]	952
Blue singlet	494 (476) [0.68]	458 (476) [0.68]	952
Marginal column totals	952	952	1904 (grand total)

Note. The chi-square statistic is 2.7227. The p-value is .098931. This result is *not* significant at $p < .05$.

TABLE 2 Chi-Square Contingency Table for Women's Freestyle

	Win	*Lose*	*Marginal row totals*
Red singlet	122 (127) [0.2]	132 (127) [0.2]	254
Blue singlet	132 (127) [0.2]	122 (127) [0.2]	254
Marginal column totals	254	254	508 (grand total)

Note. The chi-square statistic is 0.7874. The p value is .374887. This result is not significant at $p < .05$.

TABLE 3 Chi-Square Contingency Table for Men's Freestyle

	Win	*Lose*	*Marginal row totals*
Red singlet	151 (172) [2.56]	193 (172) [2.56]	344
Blue singlet	193 (172) [2.56]	151 (172) [2.56]	344
Marginal column totals	344	344	688 (grand total)

Note. The chi-square statistic is 10.2558. The p value is .001363. This result is significant at $p < .05$.

TABLE 4 Chi-Square Contingency Table for Greco-Roman

	Win	*Lose*	*Marginal row totals*
Red singlet	185 (177) [0.36]	169 (177) [0.36]	354
Blue singlet	169 (177) [0.36]	185 (177) [0.36]	354
Marginal column totals	354	354	708 (grand total)

Note. The chi-square statistic is 1.4463. The p value is .229118. This result is not significant at $p < .05$.

although the association between blue uniforms and winning in men's freestyle merits further observation.

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