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Technical Differences between Female Handball Players on Different Playing Positions

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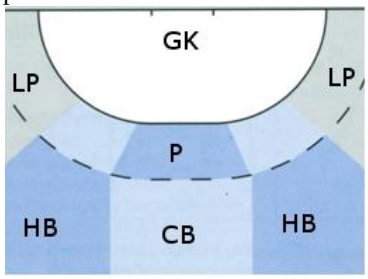
Abstract

This study analyzes the technical demands in female Team Handball on different playing positions. The position-related differences in the technical requirements for team handball are still not yet sufficiently specified. There is a discrepancy between training-recommendations and empiric data. Line players (LP) and goalkeepers (GK) are sometimes shunted to their position to keep young and inexperienced players away from the more important positions in the middle of the court like Pivots (P), Center Backs (CB) and Halfbacks (HB). Further, female team handball is underrepresented in literature. To really make use of the full potential of all players, position-specific training should be applied. This study investigates handball-relevant technical basic factors and their position specific development. 654 female handball players from all German leagues were tested cross-sectional concerning technics and other factors. The handball-specific expertise of the players was used as independent variable. The performance-differences between the positions are seen as dependent variable. After statistic calculation it occurs that the chosen factors significantly differ between the positions. Line players and Halfbacks do display high technical performance and specialization. Specialization is therefore a relevant factor in female team handball. Differentiated technical profiles for the positions were created, the differences were documented and the differences' relevance for the performance in female team handball has been accounted for.

Keywords: Handball, Positions, Technical Factors.

Introduction

In team handball there are positional differences between the players concerning several factors (Beckmann & Trux, 1991; Brack, 2002; Brand, 2004, 2006, 2009; Hagedorn, 1982; Kraus, 1976). Players should be trained to fit the specific tasks on their position (Locke & Latham, 1985; Čavala, Trninić, Jasić & Tomljanović, 2013; Ghobadi, Razabi, Farzad, Bayati & Jeffreys, 2013; Karcher & Buchheit, 2014; Lorger, Prskalo & Hraski, 2013; Michalsik, Madsen & Aargard, 2011; Schorer, Cobley, Büsch, Bräutigam & Baker, 2009). For the technical profile on the different positions in female team handball, research has not yet been sufficiently specified. In this study the labels of the attacking positions will be used for naming the different positions:



LP=Line player
HB =Halfback
CB =Center Back
P = Pivot
GK= Goalkeeper

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Graph I. Attacking positions used for naming the positions in this study. (Modified from Späte et al., 1997, p. 264).

Sports technique is defined as reaching the optimal outcome via effective use of potential (Marhold & Schnabel, 1993, Hottenrott & Hoos, 2013) with high quality. It is limited by biomechanical and other factors (Meinel, 1960), such as coordination, physiological factors, movement experience and perception (Weineck, 2010). Technique is one of the important factors in team handball (Brack, 2002, Bergström & Johansson, 2007, DHB, 2009, Krüger, Pilat, Ueckert, Frech & Mooren, 2013). Technical requirements in team handball have been undergoing changes during the last decades (Weber, 2015). Throwing techniques like both-handed throws have almost vanished, whereas the Kempa-trick has recently become more and more popular. In an overall-view it can be stated, that the most important techniques in team handball still are throwing, passing, catching and dribbling the ball. Technical investigations should therefore concentrate on those techniques.

Specialization in team handball has to be viewed from several points. In German team handball, players are first trained to be all rounders (DHB, 2005, 2009). From the age of 15, players are encouraged to specialize on a position. Specialization starts with 17. Čavala et al., (2013) demand to encourage players to specialize already with 13 years, for constitutional and anthropmetric

factors can be developed the best at this age. Matthys (2011) argues that this is too early because technical and tactical factors for other positions cannot be developed later. Players should be specialized for their position (Marczinka, 1993; Pezerat-Correia, Valamatos, Alves & Santos, 2007). Lineplayers do a lot of fast-breaks during the game (Milanese, Piscitelli, Lampis & Zancanaro, 2011; Sporiš, Vuleta, Vuleta Jr. und Milanović, 2010), whereas the goalkeepers are mostly situated within the 6-m-area where they perform fast and accurate movements to save the ball or start the offense with a long pass. The main task of the backplayers is to shoot at the goal (Milanese et al., 2011). Krüger et al. (2013) see the need to investigate more on the positional specialization. Nevertheless several authors name positional requirements when it comes to technical issues (Weber, 2015).

When investigating performance, successful players should be taken into account. Success can be measured via expertise, where expertise is depending on several factors (Schorer, 2007): efficiency and outstanding performance, duration and reproducing of good performance, good performance not only by accident, expertise through experience (ten-year-rule, meaning ten years of training, see Janelle, Coombes, Singer & Duley, 2007), time spent training, long preparation, striving for excellence and perfection, motivation, competition experience. Janelle et al. (2007) state that genetic factors and training are both contributing to expertise (nature versus nurture). Anders Ericsson & Lehmann (1996) postulate that expertise can best be measured via hard facts like competition performance. Hohmann (2009; Sinuany-Stern, 1988) use national leagues to measure expertise. It has to be clarified whether the players on the different playing positions differ in their technical performance, and whether those differences contribute to success, measured via expertise. Further it has to be clarified whether technical positional specialization is neccessary to play on a high level.

Methodology

654 players of all German leagues were tested from May to September 2011 in their usual training locations during a Ph. D.-project at the CAU of Kiel. As tests the wall-passing-test and the slalom-dribbling test were used (Letzelter, Letzelter & Scholl, 1998). For the wall-passing-test the time for 20 passes against a wall from 4 m distance is measured. Accurate technique must be displayed, start with ball held both-handed in front of the body. For the slalom-dribbling-test the time for 30 m-slalom-dribbling in a parcours (see below) is measured via photo sensors. Players have one try from each side of the parcours, arithmetic middle is calculated. Expertise can be measured through the leagues a player has been playing over several years. Players were asked to name all clubs they have played in so far. Thus an expertise-index could be calculated for each player. International experience was counted with twelve points, 1st Bundesliga with eleven points, 2nd Bundesliga with ten and so on down to lowest league with one point and "only training, no competitions" with zero points. The index was calculated as the arithmetic middle out of nine elements:

Table I. Calculation of expertise from nine factors

Factors of expertise
Arithmetic middle of expertise points on senior level.
Expertise points for highest league played.
Arithmetic middle from current and previous season.
Points of most frequent league.
Playing experience overall in years scaled to 12 points, where 12 points is the value of the best player, all other players scaled accordingly.
Points for highest league played in youth.
Arithmetic middle of leagues played in youth.
Sum of expertise points during youth, where 12 is the value of the best player and the values of all other players got scaled accordingly.
Playing experience on senior level scaled likewise.

Specialization can be measured while calculating whether a player differs more from all other players or from all players on her position. The following formula was used for both factors wall-passing and lslom-dribbling:

$$((\bar{X}_{allplayers} - value_{factor_1 player_1 position1})^2 - (\bar{X}_{playersposition1} - value_{factor_1 player_1 position1})^2)^2$$

A test must be considered valid if it divides players into different leagues (Letzelter et al., 1988; Mombeger, 2007; Speicher, Kleinöder, Klein, Schack & Mester, 2006). This can be tested via ANOVA. Wall-

passing and slalom-dribbling fulfil the requirements and are therefore considered relevant for team handball. All tests are objective, because all the testers and teams have been sufficiently briefed before the test. All tests were conducted with the same testers and material. Reliability has to be $r \geq 0,5$ (Bös & Tittelbach, 2002). For slalom-dribbling and wall-passing, r = 0,53 and r = 0,72 were found by Letzelter et al. (1998). Differences were calculated via ANOVA, correlations were calculated via Pearson, Spearman`s rho and Kendall`s tau b.

Hypotheses

1. Wall-passing and slalom-dribbling differ according to playing position.
2. Wall-passing and slalom-dribbling correlate differently with expertise on the different playing positions.
3. Specialization correlates with expertise on the different playing positions:

Results

On lower performance levels goalkeepers displayed worse performance than fieldplayers (FP), not due to specialization but due to training deficits. Lower leagues are therefore left out in the tables. Lineplayers and pivots showed good results. In wall-passing GK were not as good as FP. Differences in slalom-dribbling mostly occur on intermediate and high levels. GK are slower than FP, also P are slower than HB, LP and CM in the higher leagues (tab. 2, 3). On several positions values for wall-passing and slalom-dribbling correlate with expertise, sometimes in different directions (tab. 4). For the positions specialization correlates with expertise in different ways (Table V).

Table II. Wall-passing: Differences between the positions, descriptive and ANOVA / Scheffe

Differences	***N***	***MW***	***SD***	***Df***	***F***	***P***	***η***
Whole population	593	26,51	2,69	592	4,876	< 0,001	0,179 (low)
GK vs. HB	82 / 161	27,41 / 26,20	3,01 / 2,49	-	-	< 0,024	-
GK vs. CM	82 / 92	27,41 / 25,80	3,01 / 2,34	-	-	< 0,004	-
Bundesliga 1 to 3	174	24,97	2,07	173	2,027	< 0,093 (tendency)	0,214 (low)
Intermediate level	287	26,47	2,19	286	2,753	< 0,028	0,195 (low)
GK vs. CM	42 / 43	27,22 / 25,86	2,46 / 2,09	-	-	< 0,081 (tendency)	-

Table III. Slalom-dribbling: Differences between the positions, descriptive and ANOVA / Scheffe

Differences	***N***	***MW***	***SD***	***df***	***F***	***p***	***η***
Whole population	490	7,64	0,59	489	8,913	< 0,001	0,261 (middle)
GK vs. LP	70 / 146	7,95 / 7,60	0,71 / 0,56	-	-	< 0,001	-
GK vs. HB	70 / 133	7,95 / 7,56	0,71 / 0,48	-	-	< 0,001	-
GK vs. CM	70 / 78	7,95 / 7,46	0,71 / 0,42	-	-	< 0,001	-
CM vs. P	78 / 63	7,46 / 7,78	0,42 / 0,73	-	-	< 0,025	-
Bundesliga 1 to 3	156	7,29	0,43	155	5,854	<0,001	0,366 (middle)
GK vs. LP	24 / 45	7,56 / 7,16	0,41 / 0,30	-	-	< 0,003	-
GK vs. HB	24 / 36	7,56 / 7,20	0,41 / 0,33	-	-	< 0,016	-
GK vs. CM	24 / 29	7,56 / 7,23	0,41 / 0,31	-	-	< 0,046	-
LP vs. P	45 / 22	7,16 / 7,46	0,31 / 0,71	-	-	< 0,087 (tendency)	-
Intermediate level	236	7,66	0,46	235	8,603	<0,001	0,361 (high)
GK vs. LP	38 / 68	7,99 / 7,66	0,52 / 0,48	-	-	< 0,009	-
GK vs. HB	38 / 67	7,99 / 7,56	0,52 / 0,39	-	-	< 0,001	-
GK vs. CM	38 / 37	7,99 / 7,45	0,52 / 0,35	-	-	< 0,001	-
League 3	117	7,30	0,44	116	5,932	< 0,001	0,418 (high)
LP vs. P	35 / 15	7,15 / 7,63	0,24 / 0,79	-	-	< 0,006	-
LP vs. GK	35 / 15	7,15 / 7,58	0,24 / 0,38	-	-	< 0,023	-
HB vs. P	27 / 15	7,22 / 7,63	0,34 / 0,79	-	-	< 0,048	-
CM vs. P	25 / 15	7,24 / 7,63	0,33 / 0,79	-	-	< 0,068 (tendency)	-

Table IV. Correlations between technical factors and expertise on the different playing positions

Correlations	LP	HB	CB	P	GK
Wall-passing	High negative $p < 0,001$ $\eta = -0,629$	High negative $p < 0,001$ $\eta = -0,657$	Middle negative $p \leq 0,014$ $\eta = -0,395$	High negative $p < 0,001$ $\eta = -0,597$	Middle negative $p \leq 0,035$ $\eta = -0,304$
Slalom-dribbling	High negative $p < 0,001$ $\eta = -0,625$	Middle negative $p \leq 0,004$ η - 0,469	Middle negative $p \leq 0,020$ $\eta = -0,341$	Middle negative $p < 0,001$ $\eta = -0,470$	.

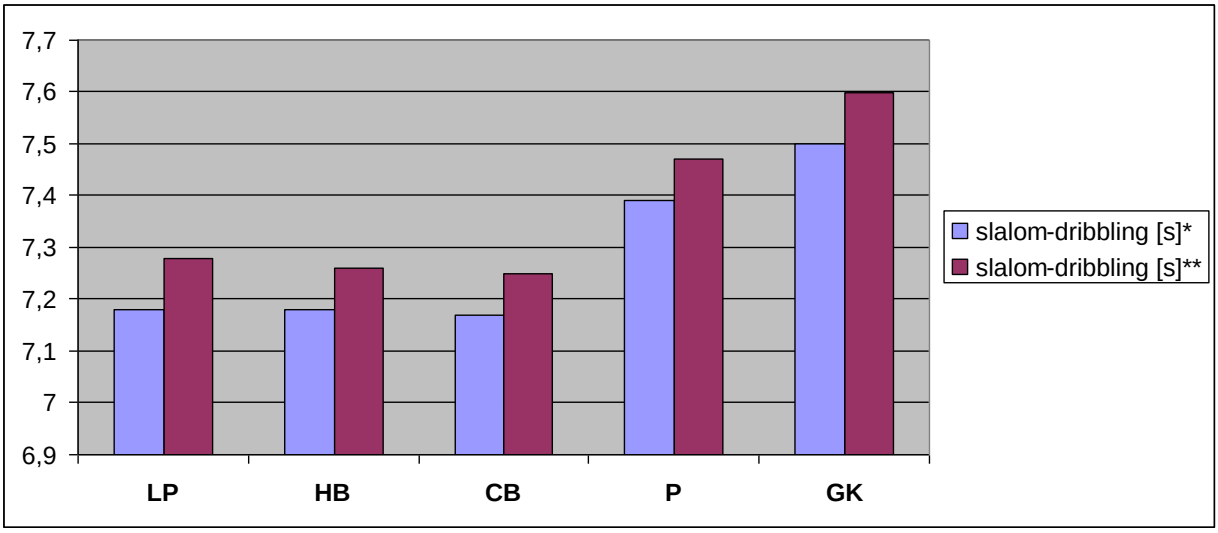
. = no correlations found.

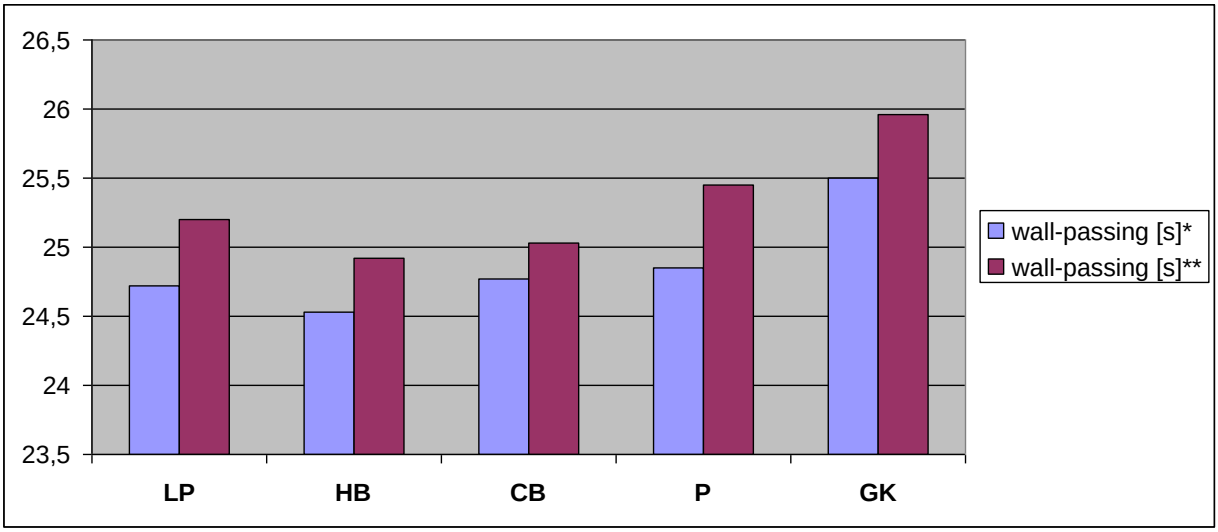
Table V. Correlations between specialization in technical factors and expertise

Correlations	LP	HB	CB	P	GK
Wall-passing	High negative $p < 0,001$ $\eta = -0,537$	High positive $p < 0,001$ $\eta = 0,537$	Middle positive $p \leq 0,014$ $\eta = 0,339$	Middle negative $p < 0,001$ $\eta = -0,597$	Middle negative $p \leq 0,035$ $\eta = -0,304$
Slalom-dribbling	High positive $p < 0,001$ $\eta = 0,541$	Weak positive $p < 0,001$ $\eta = 0,299$	Middle positive $p \leq 0,020$ $\eta = 0,341$	Middle negative $p \leq 0,003$ $\eta = -0,470$	.

. = no correlations found

It is possible to calculate the optimal performance for players on a position for a given league via linear regression. Players suitable for 3rd Bundesliga in Germany have to display certain values per position (see below, estimated failures between 2,13 and 2,58 for wall-passing and 0,33 and 0,66 for slalom-dribbling).

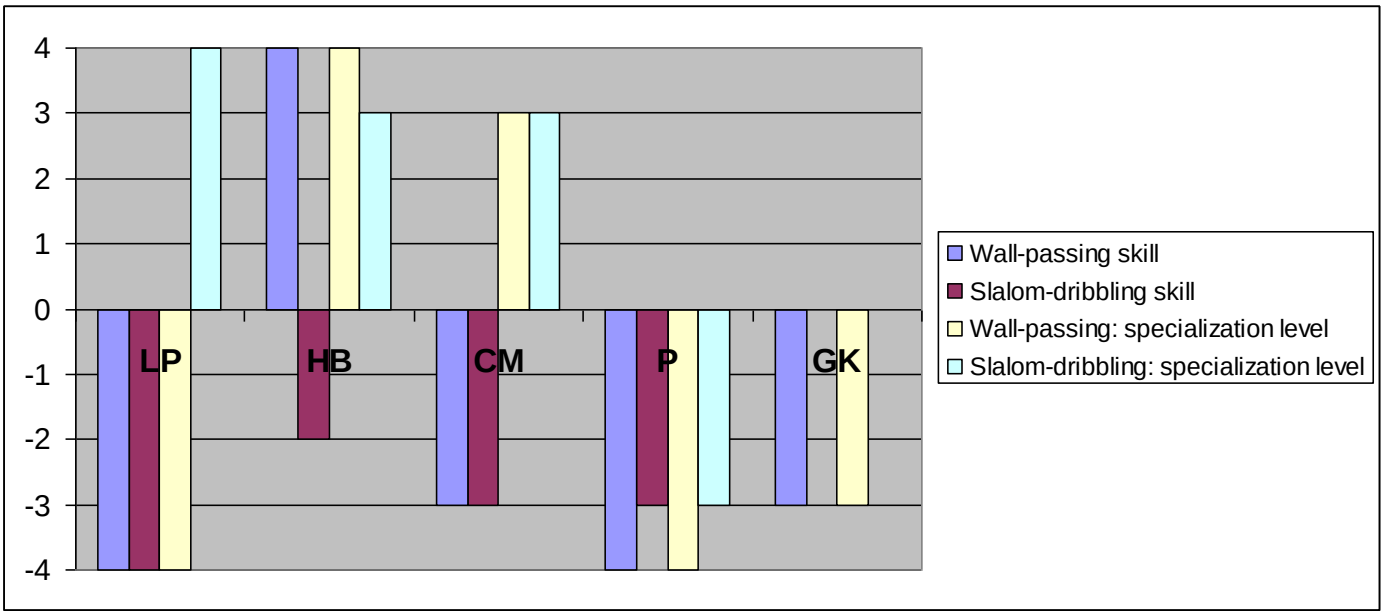




*Calculated for three levels (1st to 3rd Bundesliga, intermediate level, regional level). ** Calculated for all eleven leagues.

Graph 2. Sufficient performance for wall-passing for 3rd Bundesliga in Germany.

Technical profiles with skill- and specialization levels for the positions, taken from the correlation results, can be seen in the following graph.



Graph 3. Position-specific technical profiles with performance skill- and specialization-levels.

Discussion

Passing / Catching and slalom-dribbling are relevant on all positions, with field players even more so than with goalkeepers. Passing, catching and slalom-dribbling therefore have to be considered position-independent basics. While GK do have deficits in those basics, HB are specialized with good performance in both factors. LP are also highly skilled with specialization in slalom-dribbling. CBs demonstrate good performance with moderate specialization, while P and GK should adjust their performance to the levels of the other positions. LP, HB and CB had the best values. The hypotheses can be accepted. Specialization is important in team handball and needs to be specified further concerning other handball-relevant factors as well as training deficits on certain positions and specialization stages and ages separately for male and female players, guidelines have to be specified for German team handball. CB and HB have to be considered differently, also P have to be viewed separate from the rest of the FP. GK should not be placed in the goal just to keep them away from the field to compensate their technical

deficits.

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