


Personality traits of handball goalkeepers

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ABSTRACT

Goalkeeping in handball puts special demands on the athletes. Whereas on-court strain and conditional demands of the goalkeeper position are already intensively investigated, research on handball goalkeepers' personality traits is still lacking. In this study, the sport specific personality structure of male handball goalkeepers ($N = 81$) on competitive and leisure sport level was assessed for the first time, using a version of the BFI-10 adapted to the sport context. In comparison to the normal population, handball goalkeepers proved to be more conscientious, more neurotic, and less open for new experiences. A relation of the trait conscientiousness and the performance level became visible; goalkeepers on higher performance levels showed higher conscientiousness values. The current investigation presents a sport specific personality profile of handball goalkeepers for the first time, whereby derivations, for example, for the construction of talent diagnostic have to be seen more critical. The results of the current study provide the basis for further research which should, amongst others, especially focus on the comparison of the personality structure of goalkeepers and field players. **Keywords:** Olympic handball; Playing position; Character; Big Five.

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INTRODUCTION

The sports game team handball puts variable and complex demands on the participating athletes. These demands are strongly dependent on an athlete's playing position (e.g., Karcher & Bucheit, 2014; Ziv & Lidor, 2009). The goalkeeper is the only player who is allowed to step into the goal area and to use all parts of her/his body to block the ball in this area. Only when the goalkeeper leaves the goal area the same rules apply for her/him as for the field players (International Handball Federation, 2016). This special position leads to different demands in the goalkeeper's conditional profile, compared to that of field players (for an overview Karcher & Buchheit, 2014). The goalkeeper is the last player who can stop the opponent team from scoring a goal; in other words, she/he presents the "last instance" and embodies an individualist in the team (compare Fritz, Schmidt, & Friedrich, 2009, p. 7). Like in the sports game soccer, mistakes on this position are especially serious, because they nearly always lead to an opponent's goal (e.g., Kristiansen, Roberts, & Sisjord, 2011). To our best knowledge, up to date, no scientific findings exist on which personality traits athletes possess who play on the goalkeeper's position in handball. Further, it is still unclear if certain characteristics can be seen as performance-related.

The current explorative investigation should provide information on the personality characteristics of male handball goalkeepers on different athletic performance levels for the first time. The Big Five-model (e.g., Costa & McCrae, 1992), a characteristic-theoretical approach, is used as basis for this investigation.

Scientific work on demands in handball exist almost only for physiological parameters (for reviews see Karcher & Bucheit, 2014; Manchado, Tortosa-Martinez, Vila, Ferragut, & Platen, 2013; Wagner, Finkenzeller, Würth, & von Duvillard, 2014; Ziv & Lidor, 2009). There is hardly any relevant data on psychological strain exists (Wagner et al., 2014). With regard to goalkeeping only very few investigations concerning psychological strain have been conducted (e.g., Čavala, Trninić, Jašić, & Tomljanović, 2013; Kajtna, Vuleta, Pori, Justin, & Pori, 2012). The scientific analysis of technical demands (movement abilities) as well as cognitive/tactical demands (attention, perception, decision making) in goalkeeping does not really appear in literature. There are isolated investigations, which amongst others, emphasize the anticipative abilities of goalkeepers in handball (e.g., Loffing, Sölter, Hagemann, & Strauss, 2015; Rojas, Gutierrez-Davila, Ortega, Campos, & Parraga, 2012). Based on this small body of literature, in their extensive review Karcher and Bucheit (2014) came to the conclusion that more scientific data on psychological parameters of goalkeeping has to be collected.

In textbooks and popular literature some works regarding the goalkeeper's game can be found, in particular in German language (e.g., Fritz, Schmidt, & Friedrich, 2005; Schubert, Grintz, Potthof, & Stange, 2015; Tachdjian & Omer, 2004; Thiel, Hecker, & Späte, 1999). In practice related journals a variety of articles of biographical considerations (e.g., Omeyer & Späte, 2009) and exercise collections (e.g., Schubert, 2012) up to methodical concepts (e.g., Biegler, 2012) have been published. While these often discuss the demands on goalkeepers, there are no explanations of how the personality traits of athletes on this position are related to their performance.

Building on research and general theories on personality, research investigating the relation of personality and performance in sport, as well as research concerned with the strain and demands on goalkeepers in handball, we investigated goalkeepers' personality structures and the relation of those structures to their performance level in handball.

Personality and performance in Sport

The theories in personality research are diverse (cf. Angleitner & Riemann, 2005); the current work focuses on the trait-theoretical approach by Eysenck and Eysenck (1987). According to this approach, the personality of a human is a relatively stable structure composed of character, temperament, psychological and physical characteristics (Eysenck & Eysenck, 1987). These various features can be categorized in personality dimensions, for instance in the well-known five-factor-model by McCrae and Costa (1985, 1992). The five dimensions of this model are *extraversion*, *agreeableness*, *conscientiousness*, *neuroticism* and *openness for new experiences* (Costa & McCrae, 1992). Several studies have proven the accuracy of this model (Big Five) in different countries and cultural backgrounds (cf. Angleitner & Riemann, 2005). In sport, it has already often been empirically examined whether the dimensions of this model are related to athletic performance. Even though these investigations have not always led to consistent findings, the results have never been contrary.

Regarding characteristics of the extraversion dimension Egloff and Gruhn (1996) showed positive relations of extraversion to athletic performance in endurance athletes, as did Allen, Greenlees, and Jones (2011) for athletes from different domains. The results of McKelvie, Lemieux, and Stout (2003) point out that there are no differences of the impact of extraversion on performance between athletes and non-athletes in contact (e.g., football, rugby) and non-contact sports (e.g., baseball, volleyball).

A clear connection between the dimension agreeableness and athletic performance could not be proven by research so far (Allen et al., 2011; Egloff & Gruhn, 1996, Piedmont, Hill, & Blanco et al., 1999; Schwinger, Olbricht, & Stiensmeier-Pelster, 2013). Allen et al. (2011) stated though: “findings demonstrated [...] that higher-level athletes were more conscientious, compassionate, and emotionally stable than lower-level athletes” (S. 848). ‘Compassionate’ in this case does not only mean that the athletes are characterized as compassionate but in particular that they trust their teammates and are willing to cooperate with them, which is similar to the concept of agreeableness in the five-factor-model of Costa and McCrae (1992).

Allen et al. (2011) and additionally Piedmont et al. (1999) could establish conscientiousness as positive predictor of athletic performance in soccer. Schwinger et al. (2013) showed positive connections between high values in conscientiousness and a strong motivational goal orientation and discipline in swimming.

Eysenck, Nias, and Cox (1982) already stated, that high emotional stability, expressed through low values of neuroticism, is performance relevant for athletes. This claim was confirmed by McKelvie et al. (2003) and Piedmont et al. (1999), even though Egloff and Gruhn (1996) could not find a difference between athletes and non-athletes in neuroticism.

Connections between openness for new experiences and athletic performance could be shown by means of positive correlations between openness and a higher learning target orientation in swimming (Schwinger et al., 2013). Allen et al. (2011) emphasized the positive correlations between problem coping (e.g., emotion coping) and openness.

The Big Five and goalkeeping in handball

Looking at the in-game demands of the goalkeeper position and the statements about goalkeeping in textbooks and popular literature, there is a wide consensus about some characteristics which are associated with a goalkeeper’s personality.

According to Fritz et al. (2005), goalkeepers should not only block the ball with their body but should also spectacularly outlive their superiority towards the throwers (e.g., by presenting the clenched fist after saving

a ball). The authors assumed that one of the goalkeeper's tasks is the loud instruction and motivation of the defence (e.g., Fritz et al., 2005). Further, because creative actions are often necessary to save well-thrown balls (e.g., Thiel, 1999), it can be derived that goalkeeping is rather connected to extraverted than to introverted behaviour.

Especially the defending of throws out of the backcourt is characterized by a strong cooperation between defence and goalkeeper (Fritz et al., 2005). For this cooperative, tactical behaviour a trusting relationship and a strong responsibility-consciousness for one another is necessary. Even though the goalkeeper has a special role due to the rule set (IHF, 2016), he is, as mentioned above, regarded as motivator and conductor of his defence (Fritz et al., 2005); therefore, high values of social agreeableness are expected.

Thiel and Korfsmeier (2008), amongst others, state that a conscientious, passionate attitude as well as a strong sense of duty are distinctive of successful goalkeeping. These characteristic descriptions are strongly associated with high expressions of the dimension of conscientiousness in the Big Five.

Even though goalkeeping is generally characterized by a preponderance of negative experiences (saving rate of an average 25%; ehf.com; ihf.info), the goalkeeper must still display positive body language and focus on the next attack, even after an opponent's goal (Fritz et al., 2005). To maintain high concentration levels for a long time, having a high self-efficacy expectation can be helpful (e.g., Biegler, 2012; Kalle & Klahn, 2011; Thiel & Korfsmeier, 2008). Consequently, low neuroticism values would be predicted for goalkeepers, with regard to the dimension of emotional stability.

According to Thiel and Colleagues (1999) a basic demand of goalkeeping is an open and flexible work attitude, because game situations are never the same and thus, require creative and flexible action-taking. Goalkeepers are also required to find new and unconventional solutions in difficult game phases. Furthermore, goalkeepers are often characterized as strong, autodidactic people because of their special role in the team (Feldmann & Lawrow, 1998). These demands can be linked to a very pronounced openness for new things.

Considering the above-listed research, connecting athletic performance and the five personality dimensions as well as the previously described demands of the goalkeeper position on personality traits derived out of textbooks and popular literature, assumptions about the sport-specific personality of handball goalkeepers are presented here¹.

Based on the requirements for courageous and creative saves and for embodying the conductor of the defence (e.g., Fritz et al., 2005), high values of extraversion are predicted for goalkeepers. As reported by Allen et al. (2011), it is further assumed that there is a positive relation between extraversion and the athletic performance level in goalkeepers.

A strong, trusting relationship between the goalkeeper and his defence (e.g., Fritz et al., 2005) lead to expectations of high agreeableness values for the goalkeeper's personality. Because these demands should be the same independent of the athletic performance level, and previous studies in other sport domains did not find any relation either (e.g., Piedmont et al., 1999), no connection between the performance level and agreeableness values is expected in the current study.

¹ Because in this framework comparable and relevant empirical research is missing, the following hypotheses have to be considered as purely explorative.

The handball game seems to demand high levels of conscientiousness (e.g., Thiel & Korfsmeier, 2008); thus, it is expected that goalkeepers will express high levels of this trait. There is plenty of evidence that conscientiousness in sport can be seen as performance predictor (e.g., Allen et al., 2011), hence, a positive connection between the personality dimension conscientiousness and athletic performance is predicted.

Low neuroticism values seem to be of advantage in goalkeeping and are accordingly predicted here; this characteristic seems to be necessary for handling negative success balances typically experienced by goalkeepers in handball. In line with Eysenck (1982), who stated that a high emotional stability seems to be relevant for performance in sport, it should be shown that goalkeepers on a higher performance level have lower neuroticism values than goalkeepers on lower performance levels.

The open, flexible work attitude and the creative actions required in goalkeeping, as suggested by Thiel et al. (1999), make for expectations of a pronounced openness towards new things as part of the goalkeeper's personality. Even though, for example, Schwinger et al. (2013) could show a positive relation between openness and athletic performance, this relation is not predicted for the goalkeeper's personality in the current study, because the task-demands of goalkeeping do not differ on different performance levels.

MATERIAL AND METHODS

To examine the above listed assumptions, a cross-sectional study was conducted with goalkeepers on two different performance levels by means of a questionnaire. In the current study goalkeepers playing in the 1st-3rd league in Germany were considered as playing on a high performance level, as those leagues are assigned to competitive sport in the German Handball Federation. All goalkeepers playing in leagues lower than that in Germany, i.e. from the 4th league on, were defined as playing on a low performance level.

The current study was aimed to outline the sport-specific personality dimensions *extraversion*, *agreeableness*, *conscientiousness*, *neuroticism* and *openness* of goalkeepers in handball and to examine the assumptions regarding the relation of different personality dimensions and the performance level (1st-3rd league vs. 4th league and lower).

The study was carried out in accordance with the Helsinki Declaration of 2013.

Participants

Eighty-four male participants took part in the study (20.24% 1st league, 23.81% 2nd league, 15.48% 3rd league, 4th league and lower 40.48%) with a mean age of 26.87 years ($SD = 5.32$ years); they indicated that they started to play handball at an average age of 8.90 years ($SD = 4.51$ years). The weekly training workload of participants in the 1st-3rd league was around $M = 7.49$ training-units² ($SD = 2.01$), and of participants in the 4th league and lower around $M = 2.95$ training-units ($SD = 1.59$). The random sample consisted of nine different nationalities (88.10% German); one participant did not provide information about his nationality. The sample showed a relatively high educational level (1.19% German Hauptschul-graduation, 13.10% secondary school certificate, 51.19% Abitur, 13.10% advanced technical college certificate, 21.43% university).

² One training unit lasted about 90 to 120min.

Measure

The BFI-10 by Rammstedt and John (2007) was used in the current investigation. This strongly shortened survey tool for the Big-Five (consisting of 10 items) was used to make the examination of the participants as economic as possible (processing time about 2 minutes). Because the questionnaire was supposed to be applied on the sporting context, the items by Rammstedt and John (2007) were adapted (one positive and one negative polarized item on each dimension, see appendix). The participants had to answer the ten items on a five-point scale (with the endpoints *not correct at all* to *fully correct*). Following the questionnaires, the socio-demographic data was collected.

Procedure

The survey was conducted in paper-pencil-format and also published as online-survey (www.easyfeedback.de). The response rate of the paper-pencil-format was 56.00%. All participants that started the online-survey completed it fully.

Analysis

To investigate the connection between the expression of the personality dimensions and performance level, simple t-tests were calculated. Cohen's d_z values were calculated as indicators of the effect strength (cf. Lakens, 2013). Levene-tests verified variance homogeneity in the five different dimensions measured in the questionnaire, all $p_s > .38$. To discuss the sport-specific personality profile of handball goalkeepers, the personality profile of the normal population on same age and education level ($N = 1134$) evaluated by Rammstedt, Kemper, Klein, Beierlein, and Kovaleva (2012) was used for comparison.

RESULTS

Due to incompleteness of the surveys, three participants had to be excluded from the analysis. The analysis was conducted in accordance with Rammstedt and John (2007; recoding of the negative polarized items), and the mean of both items on each dimension was determined for every participant. Figure 1 shows the average values of the dimensions, whereby a high value signals a high expression (e.g., very extraverted) and a low value stands for a low expression (e.g., sparsely extraverted) of the certain trait.

No big differences between the goalkeeper sample ($M = 3.96$, $SD = 0.91$) and the population mean ($M = 3.82$, $SD = 0.86$, Rammstedt et al., 2012, p. 27)³ became visible for the dimension of extraversion, when comparing the values independent of performance level. The prediction that extraversion could be a unique characteristic of goalkeepers, had to be discarded based on this comparison. The assumption of a positive relation of the performance level and the expression of extraversion (higher performance = higher extraversion), is descriptively visible but cannot be verified statistically, $t(79) = -0.95$, $p = .34$, $d_z = 0.24$ (Figure 1).

For the dimension agreeableness the assumption that high agreeableness values would be characteristic of athletes on the goalkeeper position ($M = 3.75$, $SD = 0.73$) was descriptively confirmed compared to the normal population ($M = 3.41$, $SD = 0.76$; Rammstedt et al., 2012, p. 29). The prediction that agreeableness values are independent of the performance level (Figure 1) is also supported by the data, $t(79) = 0.14$, $p = .88$, $d_z = 0.03$.

³ It should be noted here that the values from Rammstedt et al. (2012) do not rely on the sport-specific, modified survey used on this study, but on a survey for general personality. Inference statistical comparisons (one-sample t-tests) were conducted and confirm the descriptive statements, a presentation of these comparisons is not appropriate because of the different surveys.

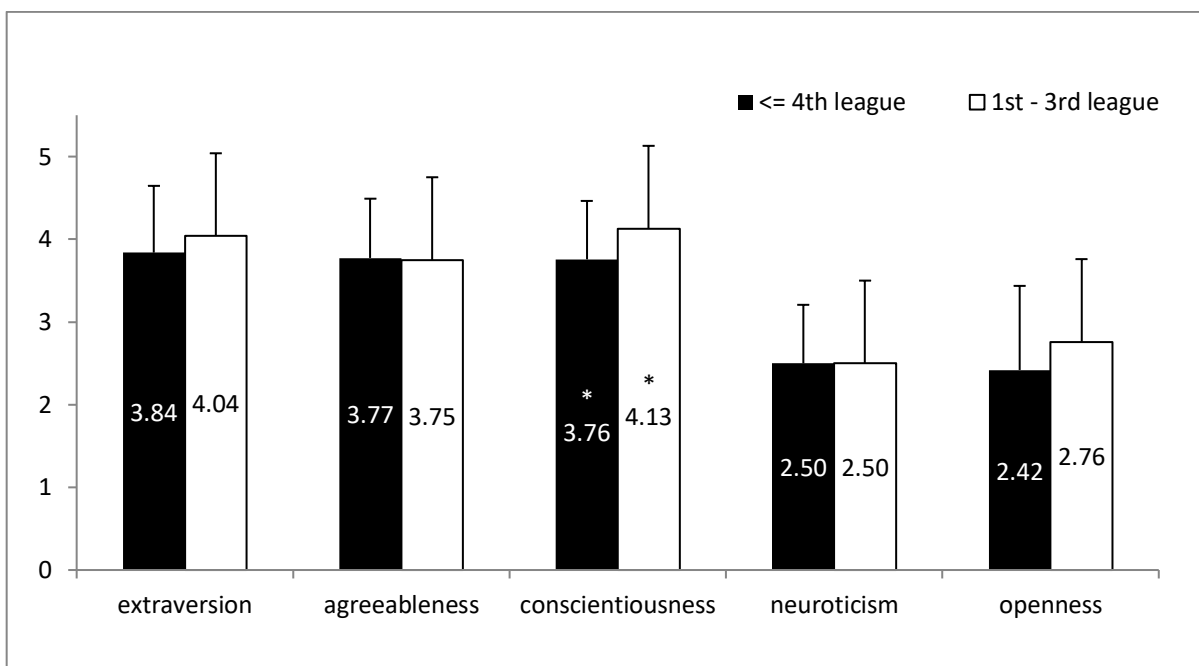


Figure 1. Values of the sport-specific, modified Big Five personality dimensions expressed by handball goalkeepers on two different performance levels (* $p < .05$). Error bars represent standard deviations.

On average, higher conscientiousness values for goalkeepers ($M = 3.98$, $SD = 0.69$) than for the normal population ($M = 3.78$, $SD = 0.75$; Rammstedt et al., 2012, p. 28) were found, although this seemed to only apply to goalkeepers on a higher performance level (Figure 1). Therefore, higher performing goalkeepers indicated significantly higher conscientiousness values than goalkeepers on a lower performance level, $t(79) = -2.41$, $p = .02$, $d_z = 0.52$. Thus, our predictions regarding the conscientiousness dimension could be confirmed.

Contrary to our assumption, goalkeepers showed higher levels of neuroticism in their profile ($M = 2.50$, $SD = 0.77$) than the normal population tested by Rammstedt and colleagues (2012, p. 27; $M = 2.01$, $SD = 0.60$). As expected, no differences between performance levels were detected for this dimension, $t(79) < 0.0001$, $p = 1$, $d_z = 0.00$.

Finally, also the predicted high levels of openness for new experiences was refuted by the results of the comparative observation, which showed that goalkeepers display significantly lower levels of openness ($M = 2.63$, $SD = 1.01$) than the normal population ($M = 3.37$, $SD = 0.89$; Rammstedt et al., 2012, p. 26). The assumption that a higher performance level should be associated with higher values on the openness dimension is indicated by descriptive data (Figure 1), but could not be confirmed statistically $t(79) = -1.48$, $p = .14$, $d_z = 0.33$.

DISCUSSION

The current study, for the first time, investigated the sport-specific personality profile of handball goalkeepers (compared with normal population means), and furthermore, examined whether differences in this profile can be found on different performance levels.

According to Ingledew, Markland, and Sheppard (2004) high levels of extraversion are relevant for team-sport athletes, an assumption which could not be confirmed in the current examination of handball goalkeepers, independent of the performance level. Goalkeepers are often associated with extraverted behaviour (e.g., instructing loudly, motivating; Fritz et al, 2005). Yet considering our results, this behaviour seems to be task-specific (just in short phases of organizing the defence or after saving a ball) rather than tied to the goalkeepers' sport-specific personality. A comparison with field players would be relevant for future research, especially considering Rogulj, Srhoj, Nazor, Srhoj, and Čavala (2005) and Čavala et al. (2013), stating that goalkeepers have a rather introverted profile due to their position-specific isolation and consequently limited interaction possibilities. Because of this position-specific isolation, goalkeepers are often seen as individualists (Rogulj et al., 2005; Čavala et al., 2013). Surprisingly, in our study high agreeableness values are shown as a sport-specific personality trait. Here too, future studies should consider differences between athletes playing on the goalkeeper's and athletes playing on a field player's position. On the other hand, it is no surprise that a highly conscientious attitude forms part of the goalkeeper personality. Furthermore, the currently found relation between conscientiousness and performance level confirms the results of studies in other different sport domains (e.g., Allen et al., 2011; Piedmont et al., 1999, Schwinger et al. 2013). Whereas the emotional stability does not seem to be performance relevant, the negative success balance of goalkeepers ($\leq 30\%$ saved shots in mean) could explain the high neuroticism values in our study. Those values also support the findings of investigations from Allen et al. (2011) and Ingledew et al. (2004), who state that neurotic traits are characteristic for team athletes. The finding that handball goalkeepers are less open to new experiences than the normal population contradicts results from studies in other different sports (Allen et al., 2011; Schwinger et al., 2013). Some textbooks (Feldmann & Lawrow, 1998; Thiel et al., 1999) argue that a flexible, creative and open work attitude is demanded on the goalkeeper position; apparently, this assumption cannot be connected with handball-specific personality structures but seems to be rather task-specific.

The current study is one of few investigations dealing with the personality structure of handball goalkeepers and is supposed to close the research gap concerning cognitive parameters (cf. Karcher & Buchheit, 2014) in the sports game handball. This study does not come without limitations however; by adapting the survey instrument to the sporting context only the sport personality was inquired. Thus, the comparisons to the normal population, drawn here, have to be considered as speculative. Inferences for the area of talent scouting or for specific training measures are, therefore, only possible to a reduced extent. Future studies should focus on investigating the general personality characteristics of handball goalkeepers, and they should especially focus on differences in the personality structure compared to the field players. Age and gender differences should also be considered in future research because women, for example, on average express higher neuroticism values than men (e.g., Costa, Terracciano, & McCrae, 2001).

CONCLUSION

In summary, the current study provides a first sport-specific personality profile of handball goalkeepers on competitive and leisure sport level. The personality dimensions conscientiousness and openness seem to be especially related to performance level. No connections between the performance level and the expression of extraversion, agreeableness, and emotional stability were visible. Interestingly, handball goalkeepers seem to be less open for new experiences than the normal population, but more conscientious and more neurotic. The current study can be seen as a first explorative approach and as basis for future research and for more profound investigations of playing position dependent personality structures in handball.

REFERENCES

- Allen, M. S., Greenlees, I., & Jones, M. (2011). An investigation of the five-factor model of personality and coping behaviour in sport. *J Sport Sci*, 29(8), 841-850. <https://doi.org/10.1080/02640414.2011.565064>
- Angleitner, A. & Riemann, R. (2005). Eigenschaftstheoretische Ansätze. [Behaviouristic Approaches]. In Weber, H. & Rammsayer, T. (Eds.), *Handbuch der Persönlichkeitspsychologie und Differentiellen Psychologie*, [Textbook of personality- and differential psychology], 93-103. Göttingen: Hogrefe Verlag GmbH & Co. KG.
- Biegler, M. (2012). Innovatives Torwarttraining. [Innovative goalkeeper-exercise]. *Handballtraining*, 9+10, 6-17.
- Čavala, M., Trninić, V., Jašić, D., & Tomljanović, M. (2013). The influence of somatotype components and personality traits on the playing position and the quality of top croatian female cadet handball players. *Collegium Antropol*, 37(2), 93-100.
- Costa, P. T. & McCrae, R. R. (1985). *The NEO Personality Inventory Manual*. Odessa: Psychological Assessment Resources.
- Costa, P. T. & McCrae, R. R. (1992). *Revised NEO Personality Inventory and NEO Five Factor Professional Manual*. Odessa, FL: Psychological Assessment Resources. <https://doi.org/10.1037/t07553-000>
- Costa, P. T., Terracciano, A. & McCrae, R. R. (2001). Gender differences in personality traits across cultures: Robust and surprising findings. *J Per Soc Psychol*, 81, 322-331. <https://doi.org/10.1037//0022-3514.81.2.322>
- International Handball Federation (2016). *Rules of the Game. Indoor Handball. Edition 1*. Basle.
- Egloff, B. & Gruhn, J. (1996). Personality and endurance sports. *Pers Individ Differ*, 21, 1223-1229. [https://doi.org/10.1016/0191-8869\(96\)00048-7](https://doi.org/10.1016/0191-8869(96)00048-7)
- Eysenck, H. J., Nias, D. K. B., & Cox, D. N. (1982). Sport and personality. *Adv Behav Res Ther*, 4, 1-56.
- Eysenck, H. J. & Eysenck, M. W. (1987). *Persönlichkeit und Individualität. [Personality and individuality]*. München, Weinheim: Psychologie Verlags Union.
- Fritz, H., Schmidt, W., & Friedrich, A. (2005). *Technik, Taktik und Training für Handball-Torhüter und ihre Trainer. [Save and win. Technic, taktik and excercise handball-goalkeeper and their coaches]*. Münster: Philippka-Verlag.
- Ingledeu, D. K., Markland, D., & Sheppard, K. E. (2004). Personality and self-determination of exercise behaviour. *Pers Individ Differ*, 36(8), 1921-1932. <https://doi.org/10.1016/j.paid.2003.08.021>
- Kalle, T. O. & Klahn, S. (2011). Es kann nur einen geben. [There could be only one]. *Handballmagazin*, 4, 14-18.
- Kajtna, T., Vuleta, D., Pori, M., Justin, I., & Pori, P. (2012). Psychological characteristics of slovene handball goalkeepers. *Kinesiology*, 44(2), 209-2017.
- Karcher, C. & Buchheit, M. (2014). On-court demands of elite handball, with special reference to playing positions. *Sports Med*, 44, 797-814. <https://doi.org/10.1007/s40279-014-0164-z>
- Kristiansen, E., Roberts, G. C., & Sisjord, M. K. (2011). Coping with negative media content: The experiences of professional football goalkeepers. *Int J Sport Exe Psychol*, 9, 295-307. <https://doi.org/10.1080/1612197x.2011.623451>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Front Psychol*, 4, article 863. <https://doi.org/10.3389/fpsyg.2013.00863>

- Loffing, F., Sölter, F., Hagemann, N. & Strauss, B. (2015). Accuracy of outcome anticipation, but not gaze behavior, differs against left- and right-handed penalties in team-handball goalkeeping. *Front Psychol*, 6. <https://doi.org/10.3389/fpsyg.2015.01820>
- Manchado, C., Tortosa-Martinez, J., Vila, H., Ferragut, C., & Platen, P. (2013). Performance factors in women's team handball: physical and physiological aspects a review. *J Strength Cond Res*, 27, 1708-1719. <https://doi.org/10.1519/jsc.0b013e3182891535>
- McKelvie, S. J., Lemieux, P. & Stout, D. (2003). Extraversion and neuroticism in contact athletes, no contact athletes and non-athletes: A research note. *Athletic insight*, 5, 19-27.
- Omeyer, T. & Späte, D. (2009). Ich spiele mit dem Werfer. [I play with the throwing player]. *Handballtraining*, 12, 1-15.
- Piedmont, R. L., Hill, D. C. & Blanco, S. (1999). Predicting athletic performance using the five-factor model of personality. *Pers Individ Differ*, 27, 769-777. [https://doi.org/10.1016/s0191-8869\(98\)00280-3](https://doi.org/10.1016/s0191-8869(98)00280-3)
- Rammstedt, B. & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *J Res Pers*, 41, 203-212. <https://doi.org/10.1016/j.jrp.2006.02.001>
- Rammstedt, B., Kemper, C. J., Klein, M. C., Beierlein, C., & Kovaleva, A. (2012). Eine kurze Skala zur Messung der fünf Dimensionen der Persönlichkeit. Big-Five-Inventory-10 (BFI-10). [A short scale for measuring five dimension of personality. Big-Five-Inventory-10 (BFI-10)]. Köln: GESIS - Leibniz-Institut für Sozialwissenschaften. <https://doi.org/10.1037/e523472012-152>
- Rogulj, N., Srhoj, V., Nazor, M., Srhoj, L., & Čavala, M. (2005). Some anthropologic characteristics of elite female handball players at different playing positions. *Collegium Antropol*, 29(2), 705-709.
- Rojas, F. J., Gutierrez-Davila, M., Ortega, M., Campos, J., Parraga, J. (2012) Biomechanical analysis of anticipation of elite and inexperienced goalkeepers to distance shots in handball. *J Hum Kin*, 34, 41-48. <https://doi.org/10.2478/v10078-012-0062-0>
- Schubert, R. (2012). Viel Abwechslung für die Torwarte. Eine Übungssammlung für das Torwart-Gruppentraining. Teil 3. [Diversity for Goalkeepers. A collection of excercises for the goalkeeper-grouptraining. Part 3.]. *Handballtraining*, 9+10, 6-17.
- Schubert, R., Grintz, O., Potthof, N. & Stange, M. (2015). Handballtraining Fokus: Torwarttraining - Trainingsformen für alle Leistungsbereiche.[Handballtraining Fokus: Goalkeeper exercise – Exercise for all performance levels]. Münster: Philippka-Verlag.
- Schwinger, M., Olbricht, S. & Stiensmeier-Pelster, J. (2013). Der Weg von der Persönlichkeit zu sportlichen Leistungen – Ein hierarchisches Modell. [The way from personality to sports performance. A hierarchical model. *Z Sportpsychol*, 20 (3), 81-93. <https://doi.org/10.1026/1612-5010/a000100>
- Tachdjian, C. & Omer, J. (2006). Gardien de but de Handball: L'analyse et le travail. [Goalkeeper in handball. The analysis and the work.].
- Thiel, A., Hecker, S., & Späte, D. (1999). Halten wie wir. [Saving like us]. Münster: Philippka-Verlag.
- Thiel, A. & Korfmeier, F. (2008). Üben nach Art des Hexers. [Excercising like the Hexer] *Handballtraining*, 4, 4-14.
- Wagner, H., Finkenzeller, T., Würth, S., & von Duvillard, S. P. (2014). Individual and Team Performance in Team-Handball: A Review. *J Sports Sci Med*, 13, 808-816.
- Ziv, G. & Lidor, R. (2009). Physical characteristics, physiological attributes, and on-court performances of handball players: A review. *Euro J Sport Sci*, 9, 375-386. <https://doi.org/10.1080/17461390903038470>

Appendix

Sport-specific modified items for the five dimensions of the BigFive in the used language (German)

<i>Extraversion</i> Item 1, 6	Ich bin während eines Spiels eher zurückhaltend, reserviert. Ich gehe beim Spiel aus mir heraus, bin präsent.
<i>Verträglichkeit</i> Item 2, 7	Ich schenke meinen Mitspielern leicht Vertrauen, glaube an ihre Fähigkeiten. Ich neige während eines Spiels dazu, andere zu kritisieren.
<i>Gewissenhaftigkeit</i> Item 3, 8	Ich bin während eines Spiels bequem, neige zur Faulheit. Ich kontrolliere mich stets während der Ausübung meines Sports.
<i>Neurotizismus</i> Item 4, 9	Ich bin während eines Spiels entspannt, lasse mich durch Stress nicht aus der Ruhe bringen. Ich werde während eines Spiels leicht nervös und unsicher.
<i>Offenheit</i> Item 5, 10	Ich habe bei meinem Spielstil nur wenig künstlerisches Interesse. Ich habe einen kreativen Spielstil.

Translation of the items

<i>Extraversion</i> Item 1, 6	During a game I am rather cautious, reserved. In the game I am outgoing, present.
<i>Agreeableness</i> Item 2, 7	I easily trust my teammates, believe in their skills. In the game I tend to criticize other players.
<i>Conscientiousness</i> Item 3, 8	During a game I am comfortable, tend to be lazy. I always control myself during the implementation of my sport.
<i>Neuroticism</i> Item 4, 9	I am relaxed during a game, stress doesn't irritate me. I easily get nervous and insecure during a game.
<i>Openness</i> Item 5, 10	I have only little artistic interest in my playing style. I have a creative playing style.



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