1

2 Motivational Patterns as an Instrument for Predicting Success in Promising Young Football

3 Players

4 Claudia Zuber, Marc Zibung and Achim Conzelmann

5 University of Bern

6

7

8

9

10 Author Note

11 Claudia Zuber, Institute of Sport Science, University of Bern, Switzerland; Marc

12 Zibung, Institute of Sport Science, University of Bern, Switzerland; Achim Conzelmann,

13 Institute of Sport Science, University of Bern, Switzerland

16 Correspondence concerning this article should be addressed to Claudia Zuber, Institute

17 of Sport Science, University of Bern, 3012 Bern, Switzerland. E-mail:

18 claudia.zuber@ispw.unibe.ch

19

1

Abstract

Psychological characteristics are crucial to identifying talents, which is why these are being incorporated in today's multidimensional talent models. In addition to multidimensionality, talent studies are increasingly drawing on holistic theories of development, leading to the use of person-oriented approaches. The present study adopts such an approach by looking at the influence that motivational characteristics have on the development of performance, in a person-oriented way. For this purpose, it looks at how the constructs achievement motive, achievement goal orientation and self-determination interact with one another, what patterns they form and how these patterns are linked to subsequent sports success. 97 top young football players were questioned twice. Another year later, it was enquired which of these players had been selected for the U15 national team. At both measuring points, four patterns were identified, which displayed a high degree of structural and individual stability. As expected, the *highly intrinsically achievement-oriented players* were significantly more likely to move up into the U15 national team. The results point to the importance of favourable patterns of motivational variables in the form of specific types, for medium-term performance development among promising football talents, and thus provide valuable clues for the selection and promotion of those.

Keywords: person-oriented approach, motivation, pattern analysis, predicting success, football

2

Introduction

The importance of psychological characteristics for competitive sports is undisputed. They are integrated as potential talent attributes into talent models that try to trace the connections believed to exist between predictors and performance development or performance in sports (van Rossum & Gagné, 2006; Williams & Franks, 1998). On an empirical level too, various studies have demonstrated a connection between individual psychological characteristics and performance in sports (Coetzee, Grobbelaar, & Gird, 2006; MacNamara, Button, & Collins, 2010). However, in view of the high complexity of talent development, it is not enough to describe the connection between different characteristics and performance in sports, because this does not take into account potential mutual interactions, nor possible compensation effects between the different variables (Meylan, Cronin, Oliver, & Hughes, 2010). For some time, therefore, it has repeatedly been recommended to use multidimensional designs to predict performance (Abbott & Collins, 2004; Auweele, Cuyper, Mele, & Rzewnicki, 1993; Fisher, 2008) and to include predictors of different dimensions in talent models (Williams & Franks, 1998). In such designs, the focus no longer lies on individual variables and the way in which they are connected to a performance criterion, but rather on entire groups of variables.

Since questions dealing with talent development refer to human developmental processes, it is helpful to draw on current theories of human development. Within the field of developmental science, dynamic interactionist approaches are favoured when explaining human development (Magnusson, 1990; in sport science Conzelmann, 2001). In addition to a dynamic interactionist perspective, Magnusson and Cairns (1996) take a holistic view of human development. In view of a complex interpretation of talent, this holistic approach seems to be particularly appropriate when dealing with questions of talent development. An individual functions and evolves as a holistic organism, whose various aspects do not develop independently of one another. The individual and his environment are regarded as a system

3

64   (Magnusson & Stattin, 2006). Hence when analysing human development, the individual

65   should always be viewed as a whole. The person-environment system can be subdivided into

66   different subsystems, which mutually interact with each other (Bergman & El-Khouri, 2003).

67   This holistic approach leads to a change in perspective, from the – hitherto dominant –

68   variable-oriented to a person-oriented approach. The person-oriented approach (Bergman &

69   Magnusson, 1997), in turn, has a number of methodological consequences: Firstly, the

70   variables involved in a (sub)system need to be measured as completely as possible. Secondly,

71   it is necessary to dispense with statistical methods based on the *General Linear Model*, since

72   the reciprocal interactions between the variables mean that the assumption of linearity has to

73   be sacrificed (Bergman & Magnusson, 1997).

74   Pattern analyses are one possible method of implementing the person-oriented

75   approach. In these, states of the system (so-called patterns) are depicted at different times and

76   the transitions between these patterns are analysed. The variables involved in a system are

77   referred to here as operating factors (Bergman, Magnusson, & El-Khouri, 2003). Due to the

78   high complexity of the person-environment system, empirical studies often focus on one

79   subsystem. Although this inevitably means a certain simplification, the basic idea of this

80   approach remains intact. For a more detailed overview of the person-oriented approach, cf.

81   Bergman, Magnusson and El-Khouri (2003) and for a comparison with the variable-oriented

82   approach, cf. Bergman and Andersson (2010).

83   Recently, attempts have been made to integrate such holistic, developmental scientific

84   concepts and their methodological consequences into sports talent research, too. So far,

85   promising results have been achieved for the subsystem *training* (Zibung & Conzelmann,

86   2013). Corresponding studies are not yet available for psychological subsystems, although it

87   is reasonable to assume that possible compensation effects and mutual interactions will matter

88   in this field too. It therefore seems an obvious choice to use the person-oriented approach in

4

89 the psychological field as well, so as to gain a better understanding of the connection between

90 psychological characteristics, their interaction and the development of performance in sports.

91   In this performance-related context, choosing operating factors requires the use of

92 performance-related variables. In talent research, within the psychological system,

93 motivational variables are viewed as being particularly relevant to talent development and

94 later success (Abbott & Collins, 2004). The achievement motivation models that are currently

95 being discussed most actively are the hierarchical model of achievement motivation (Elliot &

96 Church, 1997) and self-determinationtheory (Deci & Ryan, 1985), whereby Conroy, Elliot

97 and Coatsworth (2007) recommend combining these two concepts when examining

98 *competence* from a motivational perspective. For this reason, in the current study the

99 constructs discussed in these two theories are seen as motivational subsystem. These

100 constructs are *hope for success* and *fear of failure* , which are both components of the

101 achievement motive, as well as the achievement goal orientations *task* and *ego orientation* –

102 linked to each other in the hierarchical model of achievement motivation – as well as *self-*

103 *determination*.

Achievement motivation

105   The achievement motive determines whether individuals tend to approach achievement-

106 related situations or whether they tend to avoid them (Atkinson, 1957). The positive

107 connection between hope for success and performance in sports has been empirically

108 confirmed in both cross-sectional (Coetzee et al., 2006; Halvari & Thomassen, 1997) and

109 longitudinal studies (Elbe & Beckmann, 2006; Unierzyski, 2003). Fear of failure, on the other

110 hand, is often associated with a negative correlation with performance (Halvari & Thomassen,

111 1997; Sagar, Busch, & Jowett, 2010). The two classical facets of the achievement motive are

112 considered to be independent of one another (Brunstein & Heckhausen, 2010). Empirically,

5

113 however, questionnaire surveys have for the most part demonstrated moderate to high

114 negative correlations (Elbe & Wenhold, 2005).

Achievement goal orientation

116   Whereas the achievement motive initiates actions aimed at attaining competence,

117 achievement goal orientations guide these actions towards certain goals. Two different goal

118 orientations are distinguished, which are either called task and ego orientation (Nicholls,

119 1984) or mastery and performance orientation (Ames & Archer, 1988). Task/mastery

120 orientation is aimed at improving one's own skills, for which purpose an internal standard of

121 comparison is used. Ego/performance orientation, on the other hand, focuses on displaying

122 one's own superiority to other people. Its aim is to do better than others, and to show it

123 (Heckhausen & Heckhausen, 2010; in sport science: Duda 1993; 1992).

124   Among young football players, elite players have been found to display greater task

125 orientation than those of their peers who achieve a lower level of performance (Reilly,

126 Williams, Nevill, & Franks, 2000).

Self-determination

128   In self-determination theory, the reasons for motivated actions are distinguished

129 according to where their perceived locus of causality is, or to what extent they are self-

130 determined. The resulting motivational type lies on a continuum extending from amotivation,

131 a state with a complete absence of any motivation, through extrinsic motivation, to intrinsic

132 motivation as the most self-determined form of motivation (Ryan & Deci, 2000). Intrinsic

133 motivation is characterised by pleasure in performing the activity itself. Extrinsic motivation,

134 on the other hand, pertains to actions which are carried out because of the expected

135 consequences, such as fame, honour or prize money. Four types of extrinsic motivation are

136 postulated, which are characterised by increasingly high levels of self-determination or

137 autonomy (for an overview, see Ryan & Deci, 2007).

6

138   On the level of individual variables, a high degree of self-determination has been shown

139   to be associated with higher levels of performance, both in adult athletes (Gillet, Vallerand,

140   Amoura, & Baldes, 2010) and in adolescents taking part in physical education classes (Biddle

141   & Brooke, 1992; Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008). Conversely, low

142   levels of self-determination appears to hamper a successful sports career in the sense of

143   dropping out (Calvo, Cervello, Jimenez, Iglesias, & Murcia, 2010; Pelletier, Fortier,

144   Vallerand, & Brière, 2001; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002) or a lower

145   level of performance in sports (Boiché et al., 2008). Depending on the cultural background,

146   however, high levels of extrinsic motivation and amotivation can also lead to high levels of

147   performance in sports (Chantal, Guay, Dobreva-Martinova T., & Vallerand, 1996).

148   On the level of combinations of variables within self-determination theory, only isolated

149   analyses have been conducted to date in connection with performance in sports. The identified

150   clusters did not differ so much in qualitative terms, as regards the composition of the scale

151   combinations, but rather quantitatively, concerning the level of self-determination. In line

152   with the hypotheses, it was found that members of the cluster with the lowest self-

153   determination scores do least well (Boiché et al., 2008; Gillet, Vallerand, & Rosnet, 2009).

154   **Combinations of variables**

155   For a long time, the two facets of the achievement motive, hope for success and fear of

156   failre, and the achievement goal orientations task and ego orientation were studied

157   independently of one another. Elliot and Church (1997) later suggested the hierarchical model

158   of achievement motivation, in which the achievement goal orientations are positioned, as mid-

159   level constructs, between achievement motive, with its components hope for success and fear

160   of failure, as the overarching motivational construct, and specific behaviours. From this

161   combination of achievement motive components and achievement goal orientations, they

162   initially extracted three achievement goals (Elliot & Church, 1997). Of the original

163   achievement goals in the hierarchical model of achievement motivation, performance-

7

164 approach goals are associated with positive effects, and performance-avoidance goals with

165 negative effects on performance. Mastery goals have positive effects on intrinsic motivation,

166 but no effect on performance (Elliot & Church, 1997).

167   The combination of achievement goal orientations and self-determination was

168 investigated by McNeill and Wang (2005), who were able to identify the three clusters

169 'amotivated', 'highly motivated' and 'high task mastery'. Competitive athletes were assigned

170 particularly to the "highly motivated" cluster, characterised by high scores on all the factors

171 measured, except for amotivation, whereas non-athletes consisted mainly of amotivated

172 individuals, with low scores on all variables apart from amotivation.

173   The research carried out so far into the connection between the discussed motivational

174 variables of performance in sports – both as individual variables and as combinations of

175 variables – can be summarised as follows: HS combined with high self-determination appears

176 to be particularly beneficial to performance, since both concepts are associated positively with

177 performance in sports (Biddle & Brooke, 1992; Boiché et al., 2008; Coetzee et al., 2006; Elbe

178 & Beckmann, 2006; Gillet et al., 2010; Halvari & Thomassen, 1997; Unierzyski, 2003; Zuber

179 & Conzelmann, 2013). fear of failure and low self-determination, on the other hand, seem to

180 have a negative influence on the development of performance in sports (Calvo et al. 2010;

181 Halvari & Thomassen, 1997; Sagar et al., 2010). Concerning the achievement goal

182 orientations, the findings are ambiguous. Thus it seems that high levels of performance may

183 be associated with high levels of achievement orientation both in a combined form (McNeill

184 & Wang, 2005) and individually (Elliot & Church, 1997; Reilly et al., 2000).

The present research

186   Based on the research presented so far and using a person-oriented approach, we will

187 first depict patterns of motivation-psychological variables in order to describe the state of the

188 system at a certain time, using the game of football as an example. In addition, we will

examine the stability of these patterns, since this is of key importance in predicting success

(cf. Régnier, Salmela, & Russell, 1993). Two types of stability need to be distinguished. If the

patterns remain stable on a group level (structural stability; Bergman et al., 2003), then the

same patterns can be identified at different points in time. If certain courses of development

are more frequent on an individual level than predicted by chance, (individual stability;

Bergman et al., 2003), then these are described as developmental types. If these types are in

addition associated with success in sports – which will also be examined in this paper –

promoting a player who displays those patterns should be particularly promising. If individual

stability occurs between patterns that are themselves structurally stable, it can in addition be

assumed that it does not matter at what point in time the type is determined, a fact that would

be particularly valuable to the talent selection process.

Our analysis will therefore be guided by the following questions:

1. Which patterns can be identified in promising young football players in terms of the three concepts achievement motive, achievement goal orientation and self-determination?

2. Can the same patterns be seen again at a later time (structural stability)?

3. What developmental paths are followed by the young football talents during this time interval (individual stability)?

4. Do the patterns found allow hypotheses to be put forward concerning a player's later success in sports?

5. Are certain patterns associated with a particularly high level of sports success later, and are any hypotheses that may have been deduced confirmed?

Since the hypotheses of the fourth question can only be formulated once the patterns have

been determined (explorative procedure), they will – somewhat unconventionally – only be

formulated when the results are discussed, and then tested immediately.

Method

Participants and procedure

At t_1 (Summer 2011), 134 male young football talents ($M_{Age} = 12.26$, $SD = 0.29$), who

were members of six regional teams of the Swiss Football Association, were recruited for the

study. The players took part in two tests, one year apart, in which the motivational variables

were ascertained by means of questionnaires. Those 97 players ($M_{Age} = 12.24$, $SD = 0.29$),

who took part at both measurement times, were included in the analyses. Due to missing

values, one subject was excluded from the data set at t_1, and three at t_2. One year after t_2, the

selection of players for the U15 national team was used as the performance criterion. The

study was approved by the ethics committee of the Phil.-hum. Faculty at the University of

Bern.

Measures

Achievement motive.

To determine the achievement motive, the two components hope for success and fear of

failure were measured using the German version of the short scale of the *Achievement*

Motives Scale – Sport (AMS-Sport) (Wenhold, Elbe & Beckmann, 2009). Each scale consists

of five items, with a four-point response scale (from 0 = 'does not apply to me at all' to 3 =

'applies completely to me'). The internal consistencies were acceptable for group

comparisons, at $\alpha_{HS\ t1/t2} = .69/.76$ and $\alpha_{FF\ t1/t2} = .79/.73$

Achievement goal orientations.

The achievement goal orientations were measured using the German version (Elbe,

2004) of the Sport Orientation Questionnaire (SOQ) by Gill and Deeter (1988). Of the three

dimensions measured, the scales win ("I have the most fun when I win") and goal orientation

("I try hardest when I have a specific goal") will be used in the current analyses. In terms of

238   their contents, these have a strong resemblance to the ego and task orientation scales (Duda,

239   1992). Each scale consists of six items, with a five-point response scale (from 1 = 'strongly

240   disagree' to 5 = 'strongly agree').The internal consistencies for this study are satisfactory at

241   both measurement points ($\alpha_{WOt1/t2}$ = .74/.72;$\alpha_{GOt1/t2}$ = .66/.81).

242   **Self-determination.**

243   Self-determination was measured using a German translation (Demetriou, 2012) of the

244   Sport Motivation Scale (SMS) by Pelletier et al. (1995). This contains seven subscales:

245   intrinsic motivation (three subscales: "to know", "to accomplish", "to experience"), external,

246   introjected and identified regulation, as well as amotivation. Each scale consists of four items,

247   with a seven-point response scale (from 1 = 'does not correspond at all' to 7 = 'corresponds

248   exactly'). The seven subscales were combined to form a self-determination index (Vallerand,

249   2001). People with high, positive scores have a high level of self-determination. With $\alpha_{t1/t2}$ =

250   .82/.86 the scale displayed good internal consistencies.

251 **Data analysis**

252   **LICUR method.**

253   The fundamental consequences associated with relinquishing the general linear model

254   have already been pointed out in connection with the methodological implementation of the

255   person-oriented approach. The LICUR method (**Li**nking of **Clu**sters after removal of a

256   **R**esidue, cf. Bergman et al., 2003) is a pattern-analytical procedure that is suitable for

257   implementing person-oriented approaches. The fundamental idea behind it is to form clusters

258   (patterns) within each developmental phase. In order to map the developmental process, the

259   individual transitions are then determined, either from the clusters of one phase to those in the

260   next phase, or to a specific developmental outcome. The LICUR method consists of three

261   steps. First, a residual analysis is carried out, in which extreme cases (residues) are identified

262   and removed from the data set, since they would distort the cluster solution. In the next step,

    11

263 clusters are formed for the specific phases (cluster analysis). In the final step, the similarity

264 between the patterns of the different phases is determined (structural stability) and more

265 especially the developmental (anti-)types are established (individual stability). The statistical

266 methods applied in the first and second steps are based on the general linear model whereas in

267 the third step, transition probabilities between patterns or developmental outcomes are

268 determined. In other words, as suggested by the systemic development concepts, the

269 development of the motivation types is not based on linear or continuous functions. The first

270 and third steps were carried out using the statistics package SLEIPNER 2.1 (Bergman & El-

271 Khouri, 2002), while the cluster analysis was done using SPSS Statistics 20.0.

272 **Residual analysis.**

273 For the current analysis, two residues were identified both in the first (#42, #62) and in

274 the second (#9, #78) phase, which lies under the limit of 3% of the total sample proposed by

275 Bergman et al. (2003). Particularly when studying talent development, such residues can

276 provide important insights into the developmental process, since unique achievements may be

277 the result of unique developmental paths. In the present case, however, all four residues failed

278 to be selected for the U15 national team, so that a detailed analysis of these cases does not

279 seem to be warranted.

280 **Cluster analysis.**

281 Ward's method, using the squared Euclidian distance as a distance measure, was chosen

282 for the cluster analysis (Everitt, 2011), as recommended in the literature for person-oriented

283 approaches (Bergman et al., 2003; Trost & El-Khouri, 2008). The choice of the best cluster

284 solution was guided by content as well as statistical criteria. At both measurement points, the

285 stated criteria suggested a 4-cluster solution. The cluster solutions found were then subjected

286 to a cluster centre analysis. The final cluster solution displays an explained error sum of

287 squares of 47.8% at t_1, and of 53.6% at t_2.

12

288   **Structural stability.**

289   In order to analyse the structural stability, the average square Euclidian distance

290 between the clusters is compared. The clusters are arranged in pairs by increasing value,

291 meaning that the clusters that are most similar to each other end up next to each other at the

292 same level (cf. Figure 2).

293   **Individual stability (developmental types).**

294   In order to analyse the individual developmental paths, the transitions between the

295 clusters of one phase and those of the next phase, or a specific developmental outcome, are

296 counted and checked for significant deviations from random variations ($p<.05$) using the

297 exact Fisher 4-field distribution test based on a hypergeometric distribution. The odds ratio

298 indicates the degree to which the probability of this developmental path has increased

299 (developmental types) or decreased (developmental anti-types).

300   **Results**

301   Table 1 provides an overview of the descriptive statistics for the five operating factors

302 of all the clusters at both measurement points. In Figure 1, the respective means are presented

303 as z-standardised scores.

304   Insert Table 1 about here

305   Insert Figure 1 about here

306   One conspicuous feature is the high scores for the operating factors win orientation,

307 goal orientation and self-determination in the entire sample, as well as the low scores for the

308 factor fear if failure. These conspicuous scores are presumably largely attributable to the

309 specific sample, which has already been pre-selected. No significant differences are found

310 between the two measurement points.

13

311   With regard to the first question posed, four patterns are found at both measurement

312   points (cf. Figure 1). The clusters at t_1 are replicated in a similar form at t_2. Hence there is a

313   high degree of structural stability. The distances (mean square Euclidian distance between

314   clusters) only fall in the range 0.05-0.42. Hence the same labels have been used for both

315   measurement points. The clusters are all relatively homogenous at both MTs, as reflected by

316   the low values of the homogeneity coefficients. At both measurement points, the *win-oriented*

317   *failure-fearing players* prove to be the least homogeneous cluster. Nevertheless, differences in

318   the pattern of motives – in the sense of a sharpening − are seen between t_1 and t_2. The pattern

319   of the *average motivated players* becomes even more average, that of the *highly intrinsically*

320   *achievement-oriented players* becomes even more self-determined, and the two groups that

321   fear failure become more anxious about failing.

Developmental (anti-)types

323   Figure 2 shows the developmental (anti-)types between t_1 and t_2. The three

324   developmental types observable between t_1 and t_2 may be seen to occur between similar, i.e.

325   structurally stable, clusters. Thus there is a higher-than-random probability that members of

326   the group of *highly intrinsically achievement-oriented players*, the *win-oriented failure-*

327   *fearing players* and the *non-achievement-oriented failure-fearing players* will continue to be

328   in the same group a year later. The two developmental antitypes occur between two dissimilar

329   clusters, suggesting that it is rare for substantial changes in the pattern of motives to occur

330   over a period of one year. In addition, certain paths are identified along which no transitions

331   have taken place; as expected, these occur between dissimilar clusters.

332   The transition probabilities between t_2 and the U15 national team are of special interest

333   in terms of the fourth question asked in this article – one that is particularly relevant to talent

334   development and selection. Based on the way in which the individual operating factors are

335   associated with performance in sports (see summary of the current research above), the cluster

336   of the *highly intrinsically achievement-oriented players* may be assumed to produce a higher-

14

337 than-random number of players selected for the U15 national team. By contrast, it is to be

338 assumed that players from the cluster of the *non-achievement-oriented failure-fearing players*

339 are nominated less often for the national team than chance would suggest.

340   Insert Figure 2 near here

341   Looking at the transition probabilities from t_2 to the performance criterion, the first

342 conjecture is indeed confirmed: one developmental type occurs from the cluster of the *highly*

343 *intrinsically achievement-motivated players* to the U15 national team (cf. Figure 2). In

344 addition, no transition occurs from the cluster of the *non-achievement-oriented failure-fearing*

345 *players* into the U15 national team. In view of the one-sided distribution of the number of

346 cases used for the performance criterion, this does not represent a significant deviation;

347 however as a general trend it is certainly in accordance with the hypothesis. In summary, it

348 may be stated that the pattern of *highly intrinsically achievement-oriented players* is both

349 structurally and individually stable, and is furthermore associated to a particularly high degree

350 with success in football.

351   **Discussion**

352   The present study was the first to use a person-oriented approach to map the

353 motivational subsystem of young football talents and to investigate by non-linear means how

354 this subsystem is related to sports success. In doing so, four clusters were identified, which

355 were structurally stable over a period of one year. The high individual stability between twin

356 clusters suggests that in most players there are no fundamental changes in the motivational

357 subsystem. This agreement between the structural and the individual stability suggests that the

358 motivational system is relatively stable over this time period, which indicates a certain

359 selection relevance in the actual process of talent selection.

360   Overall, most of the developmental types identified were in line with expectations. High

361 levels of win and goal orientation, hope for success and self-determination are associated, not

362   only individually but also collectively, with greater success and accordingly with higher

363   performance in sports. Hence a range of different interactions appear to exist, as well as

364   various means of compensation between different variables as assumed by talent research

365   (Meylan et al., 2010). Similar means of compensation are seen in the paths between the

366   clusters identified at t_2 and the performance criterion. While players with the highest

367   probability of transition into the top level of performance (Cluster 2-1) display – in terms of

368   performance – favourable scores on all operating factors; no developmental types are found to

369   lead from Clusters 2-2 and 2-3 – characterised by one or two variables scoring on a below-

370   average level – to the top level of performance. Individual players with such patterns of

371   motives are in fact nevertheless selected for the U15 national team. This suggests that

372   individual motivational weaknesses do not in themselves necessarily have a negative effect on

373   success or performance development. However, if all the variables of the motivational

374   subsystem are unfavourable, the overall system state does seem to impair performance. This

375   is demonstrated by the fact that not a single *non-achievement-oriented failure-fearing player*

376   was selected for the national team. Conclusions of this kind cannot be drawn on the basis of

377   variable-oriented analyses, pointing out the added value of the person-oriented approach that

378   has been adopted here.

379   The following critical issues must be taken into consideration as regards the study

380   conducted: Firstly, the holistic approach chosen has only been partially implemented by this

381   study in looking at the motivational subsystem. A truly holistic systemic examination of

382   talented football players would have to also consider further psychological and performance-

383   determining variables from other dimensions, such as motor skills and environmental

384   circumstances (Williams & Franks, 1998). For reasons of research economy, however, it is

385   simply not possible to consider the entire person-environment system empirically in holistic

386   terms, which is why it has become accepted practice to confine oneself to individual

387   subsystems (cf. Bergman & Magnusson, 1997; Trost & El-Khouri, 2008; Zibung

388 & Conzelmann, 2013). Secondly, when interpreting the patterns identified, it should not be

389 forgotten that the sample produced extremely high scores for the individual variables. Hence

390 the term "below-average" merely refers to the scores after being adjusted through z-

391 standardisation of the comparative sample, not to the absolute scores.

392   Future longitudinal studies should check to what extent the identified clusters are also

393 found in other sports and in other stages of development, and whether they are also associated

394 with longer-term success in sports. While the nomination for the U15 national team is a

395 highly relevant criterion for top-class football in Switzerland, it is not able to predict

396 deterministically the level of success at the age of peak performance. If the motivational

397 patterns can be shown to predict success longitudinally too, they might in future be used in

398 talent selection.

399   Despite these limitations, the results of this study indicate that an achievement-oriented

400 motivational attitude which is also expressed phenotypically has a significant influence on the

401 selection decisions of national coaches and is therefore an important talent criterion.

402

17

403   **References**

404   Abbott, A., & Collins, D. (2004). Eliminating the dichotomy between theory and practice in

405   talent identification and development: Considering the role of psychology. *Journal of*

406   *Sports Sciences, 22*(5), 395–408.

407   Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning

408   strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260–267.

409   Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological*

410   *Review, 64*(6), 359–372.

411   Auweele, Y. V., Cuyper, B. D., Mele, V. V., & Rzewnicki, R. (1993). Elite performance and

412   personality: From description and prediction to diagnosis and intervention. In R. N. Singer,

413   M. Murphey, & L. K. Tennant (Eds.), *Handbook of research on sport psychology* (2nd ed.,

414   pp. 257–292). New York: Macmillan Publishing Company.

415   Bergman, L. R., & Andersson, H. (2010). The person and the variable in developmental

416   psychology. *Journal of Psychology, 218*(3), 155–165.

417   Bergman, L. R., & El-Khouri, B. M. (2002). *SLEIPNER - a statistical package for pattern-*

418   *oriented analyses: User Manual.* Unpublished manuscript, Stockholm University.

419   Bergman, L. R., & El-Khouri, B. M. (2003). A person-oriented approach: Methods for today

420   and methods for tomorrow. *New Directions for Child and Adolescent Development, 101*,

421   25–38.

422   Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on

423   developmental psychopathology. *Development and Psychopathology, 9*, 291–319.

424   Bergman, L. R., Magnusson, D., & El-Khouri, B. M. (2003). *Studying individual development*

425   *in an interindividual context: A person-oriented approach. Paths through life: Vol. 4.*

426   Mahwah, N.J: Erlbaum.

18

427 Biddle, S., & Brooke, R. (1992). Intrinsic versus extrinsic motivational orientation in physical

428   education and sport. *British Journal of Educational Psychology, 62*(2), 247–256.

429 Boiché, J. C., Sarrazin, P. G., Grouzet, F. M., Pelletier, L. G., & Chanal, J. P. (2008).

430   Students' motivational profiles and achievement outcomes in physical education: A self-

431   determination perspective. *Journal of Educational Psychology, 100*(3), 688–701.

432 Brunstein, J. C., & Heckhausen, H. (2010). Achievement motivation. In J. Heckhausen & H.

433   Heckhausen (Eds.), *Motivation and action* (1st ed., pp. 137–183). Cambridge: Cambridge

434   University Press.

435 Calvo, T. G., Cervello, E., Jimenez, R., Iglesias, D., & Murcia, J. A. (2010). Using self-

436   determination theory to explain sport persistence and dropout in adolescent athletes.

437   *Spanish Journal of Psychology, 13*(2), 677–684.

438 Chantal, Y., Guay, F., Dobreva-Martinova T., & Vallerand, R. J. (1996). Motivation and elite

439   performance: An exploratory investigation with Bulgarian athletes. *International Journal*

440   *of Sport Psychology, 27*, 173–182.

441 Coetzee, B., Grobbelaar, H. W., & Gird, C. C. (2006). Sport psychological skills that

442   distinguish successful from less successful soccer teams. *Journal of Human Movement*

443   *Studies, 51*(6), 383–401.

444 Conroy, D. E., Elliot, A. J., & Coatsworth, J. D. (2007). Competence motivation in sport and

445   exercise: The hierarchical model of achievement motivation and self-determination theory.

446   In M. Hagger & N. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in*

447   *exercise and sport* (pp. 181–192). Champaign: Human Kinetics.

448 Conzelmann, A. (2001). *Sport und Persönlichkeitsentwicklung. Möglichkeiten und Grenzen*

449   *von Lebenslaufanalysen* [Sports and personality development. Opportunities and limitations of

450   life course analyses]. Schorndorf: Hofmann.

451 Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human*

452 *behavior.* New York: Plenum.

453 Demetriou, Y. (2012). *Health promotion in physical education: Development and evaluation*

454 *of the eight week PE programme "HealthyPEP" for sixth grade students in Germany.*

455 Forum Sportwissenschaft: Vol. 25. Hamburg: Czwalina.

456 Duda, J. L. (1992). Motivation in sport settings: A goal perspective approach. In G. C.

457 Roberts (Ed.), *Motivation in sport and exercise.* Champaign, Ill.: Human Kinetics Books.

458 Duda, J. L. (1993). Goals: A social-cognitive approach to the study of achievement

459 motivation in sport. In R. N. Singer, M. Murphey, & L. K. Tennant (Eds.), *Handbook of*

460 *research on sport psychology* (2nd ed., pp. 421–436). New York: Macmillan Publishing

461 Company.

462 Elbe, A., & Wenhold, F. (2005). Cross-cultural test-control criteria for the achievement

463 motives scale-sport. *International Journal of Sport and Exercise Psychology, 3*(2), 163–

464 177.

465 Elbe, A.-M. (2004). Testgütekriterien der deutschen Version des Sport Orientation

466 Questionnaires [Psychometric properties of the German version of the Sport Orientation

467 Questionnaire]. *Spectrum der Sportwissenschaft, 16*(1), 96–107.

468 Elbe, A.-M., & Beckmann, J. (2006). Motivational and self-regulatory factors and sport

469 performance in young elite athletes. In D. Hackfort & G. Tenenbaum (Eds.), *Essential*

470 *processes for attaining peak performance* (pp. 137–157). Aachen: Meyer & Meyer Sport.

471 Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance

472 achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218–232.

473 Everitt, B. S. (2011). *Cluster analysis* (5th ed.). Chichester: Wiley-Blackwell.

474 Fisher, R. (Ed.) (2008). *Talent identification and development: The search for sporting*

475 *excellence.* Berlin: ICSSPE.

476   Gill, D. L., & Deeter, T. E. (1988). Development of the Sport Orientation Questionnaire.

477   *Research Quarterly for Exercise and Sport, 59*(3), 191–202.

478   Gillet, N., Vallerand, R. J., Amoura, S., & Baldes, B. (2010). Influence of coaches' autonomy

479   support on athletes' motivation and sport performance: A test of the hierarchical model of

480   intrinsic and extrinsic motivation. *Psychology of Sport and Exercise, 11*(2), 155–161.

481   Gillet, N., Vallerand, R., & Rosnet, E. (2009). Motivational clusters and performance in a

482   real-life setting. *Motivation and Emotion, 33*(1), 49–62.

483   Halvari, H., & Thomassen, T. O. (1997). Achievement motivation, sports-related future

484   orientation, and sporting career. *Genetic Social and General Psychology Monographs,*

485   *123*(3), 343–365.

486   Halvari, H., & Thomassen, T. O. (1997). Achievement motivation, sports-related future

487   orientation, and sporting career. Genetic Social and General Psychology Monographs,

488   123(3), 343–365.

489   Heckhausen, J., & Heckhausen, H. (2010). Motivation and development. In J. Heckhausen &

490   H. Heckhausen (Eds.), *Motivation and action* (1st ed., pp. 384–443). Cambridge:

491   Cambridge University Press.

492   MacNamara, A., Button, A., & Collins, D. (2010). The role of psychological characteristics in

493   facilitating the pathway to elite performance: Part 1: Indentifying mental skills and

494   behaviors. *The Sport Psychologist, 24*, 52–73.

495   Magnusson, D. (1990). Personality development from an interactional perspective. In L. A.

496   Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 193–222). New York,

497   NY: Guilford Press.

498   Magnusson, D., & Cairns, R. B. (1996). Developmental science: Toward a unified

499   framework. In R. B. Cairns, G. H. Elder, & E. J. Costello (Eds.), *Developmental science*

500   (pp. 7–30). Cambridge: University Press.

21

501 Magnusson, D., & Stattin, H. (2006). The Person in context: A holistic-interactionistic

502 approach. In W. Damon (Ed.), *Handbook of child psychology* (6th ed., pp. 400–464).

503 Hoboken, N.J., Chichester: Wiley; John Wiley.

504 McNeill, M. C., & Wang, C. K. (2005). Psychological profiles of elite school sports players in

505 Singapore. *Psychology of Sport and Exercise, 6*(1), 117–128.

506 Meylan, C., Cronin, J., Oliver, J., & Hughes, M. (2010). Talent identification in soccer: The

507 role of maturity status on physical, physiological and technical characteristics.

508 *International Journal of Sports Science & Coaching, 5*(4), 571–592.

509 Nicholls, J. G. (1984). Achievement motivation: conceptions of ability, subjective experience,

510 task choice, and performance. *Psychological Review, 91*(3), 328–346.

511 Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). Associations Among

512 Perceived Autonomy Support, Associations among perceived autonomy support, forms of

513 self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*(4), 279–

514 306.

515 Pelletier, L. G., Tuson, K. M., Fortier, M. S., Vallerand, R. J., Briere, N. M., & Blais, M. R.

516 (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and

517 amotivation in sports: The Sport Motivation Scale (SMS). *Journal of Sport & Exercise*

518 *Psychology, 17*(1), 35–53.

519 Régnier, G., Salmela, J., & Russell, S. J. (1993). Talent detection and development in sport. In

520 R. N. Singer, M. Murphey, & L. K. Tennant (Eds.), *Handbook of research on sport*

521 *psychology* (2nd ed., pp. 290–313). New York: Macmillan Publishing Company.

522 Reilly, T., Williams, A. M., Nevill, A., & Franks, A. (2000). A multidisciplinary approach to

523 talent identification in soccer. *Journal of Sports Sciences, 18*, 695–702.

524 Ryan, R. M., & Deci, E. L. (2007). Active human nature: Self-determination theory and the

525 promotion and maintenance of sport, exercise, and health. In M. Hagger & N.

526   Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp.

527   1–19). Champaign: Human Kinetics.

528   Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic

529   motivation, and well-being. *American Psychologist, 55*(1), 68–78.

530   Sagar, S. S., Busch, B. K., & Jowett, S. (2010). Success and failure, fear of failure, and coping

531   responses of adolescent academy football players. *Journal of Applied Sport Psychology,*

532   *22*(2), 213–230.

533   Sarrazin, P., Vallerand, R., Guillet, E., Pelletier, L., & Cury, F. (2002). Motivation and

534   dropout in female handballers: A 21-month prospective study. *European Journal of Social*

535   *Psychology, 32*(3), 395–418.

536   Trost, K., & El-Khouri, B. M. (2008). Mapping Swedish females' educational pathways in

537   terms of academic competence and adjustment problems. *Journal of Social Issues, 64*(1),

538   157–174.

539   Unierzyski, P. (2003). Level of achievement motivation of young tennis players and their

540   future progress. *Journal of Sport Science and Medicine, 2*, 184–186.

541   Vallerand, R. J. (2001). A hierarchical model of intrinsic and extrinsic motivation in sport and

542   exercise. In G. C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 263–

543   319). Champaign, IL: Human Kinetics.

544   van Rossum, J., & Gagné, F. (2006). Talent development in sports. In F. A. Dixon & S. M.

545   Moon (Eds.), *The handbook of secondary gifted education* (pp. 281–316). Waco, Tex:

546   Prufrock Press.

547   Wenhold, F., Elbe, A.-M., & Beckmann, J. (2009). *Achievement Motives Scale - Sport (AMS-*

548   *Sport). Fragebogen zum Leistungsmotiv im Sport: Manual* [Achievement Motives Scale –

549   Sport (AMS–Sport). Questionnaire on the achievement motive in sports: Manual]. Bonn:

550   Bundesinstitut für Sportwissenschaft.

23

551   Williams, A. M., & Franks, A. (1998). Talent identification in soccer. *Sports Exercise and*

552   *Injury, 4*(4), 159–165.

553   Zibung, M., & Conzelmann, A. (2013). The role of specialisation in the promotion of young

554   football talents: A person-oriented study. *European Journal of Sport Science, 13*(5), 452–

555   460.

556   Zuber, C., & Conzelmann, A. (2013). The impact of the achievement motive on athletic

557   performance in adolescent football players. *European Journal of Sport Science*. Advance

558   online publication. doi: 10.1080/17461391.2013.837513

Table 1

Descriptive Statistics for the Operating Factors

	Operating factors									
	Win orientation (Range 1-5)		Goal orientation (Range 1-5)		Hope for success (Range 0-4)		Fear of failure (Range 0-4)		Self-determination (Range 18-18)	
Measuring point 1	M	s	M	s	M	s	M	s	M	s
Total (n=94)	4.17	0.67	4.71	0.37	2.43	0.48	0.60	0.60	9.32	2.60
Cluster 1-1 (n=29)	4.63	0.38	4.91	0.14	2.84	0.27	0.14	0.27	10.41	1.84
Cluster 1-2 (n=26)	4.57	0.42	4.82	0.20	2.10	0.49	1.03	0.71	7.50	2.98
Cluster 1-3 (n=20)	3.49	0.43	4.88	0.16	2.40	0.39	0.47	0.37	10.85	1.80
Cluster 1-4 (n=19)	3.63	0.53	4.10	0.25	2.26	0.35	0.84	0.43	8.50	1.97
	Win orientation		Goal orientation		Hope for success		Fear of failure		Self-determination	
Measuring point 2	M	s	M	s	M	s	M	s	M	s
Total (n=92)	4.34	0.57	4.73	0.39	2.39	0.51	0.63	0.57	9.39	2.44
Cluster 2-1 (n=33)	4.56	0.41	4.92	0.15	2.84	0.23	0.22	0.27	11.43	1.40
Cluster 2-2 (n=20)	4.82	0.22	4.84	0.23	2.39	0.44	1.22	0.57	8.42	2.51
Cluster 2-3 (n=26)	3.95	0.48	4.76	0.31	2.17	0.36	0.47	0.39	9.08	1.54
Cluster 2-4 (n=13)	3.79	0.57	4.03	0.38	1.71	0.31	1.08	0.31	6.30	1.29

The cluster are numbered such that the first digit denotes the time of the measurement and the digit after the hyphen denotes the number of the cluster within that phase, going from 1 to 4.

Figure 1. z-standardised motive patterns for the clusters identified at times t_1 and t_2. Operating factors:

1 = Win orientation; 2 = Goal orientation; 3 = Hope for success; 4 = Fear of failure; 5 = Self-determination
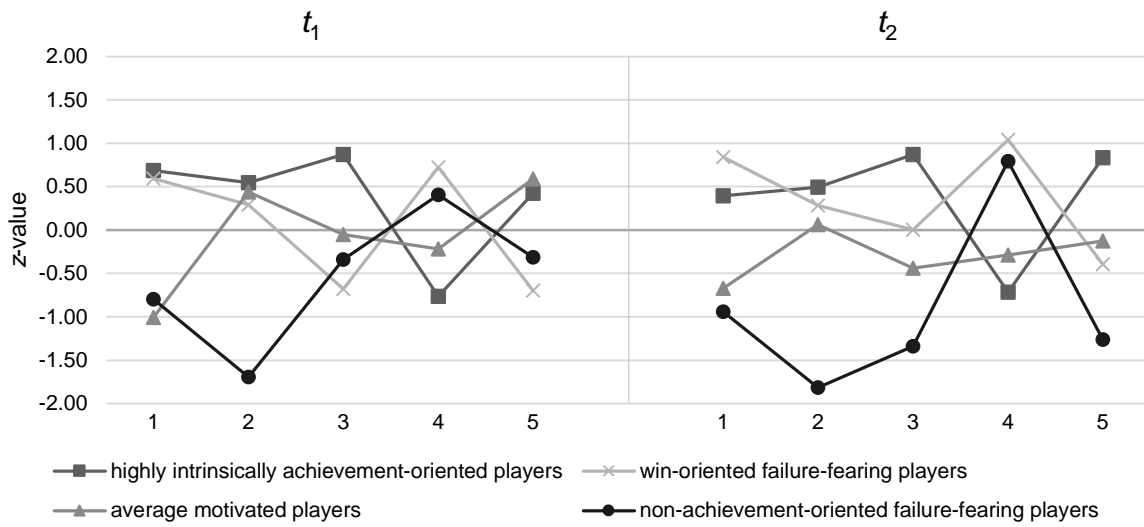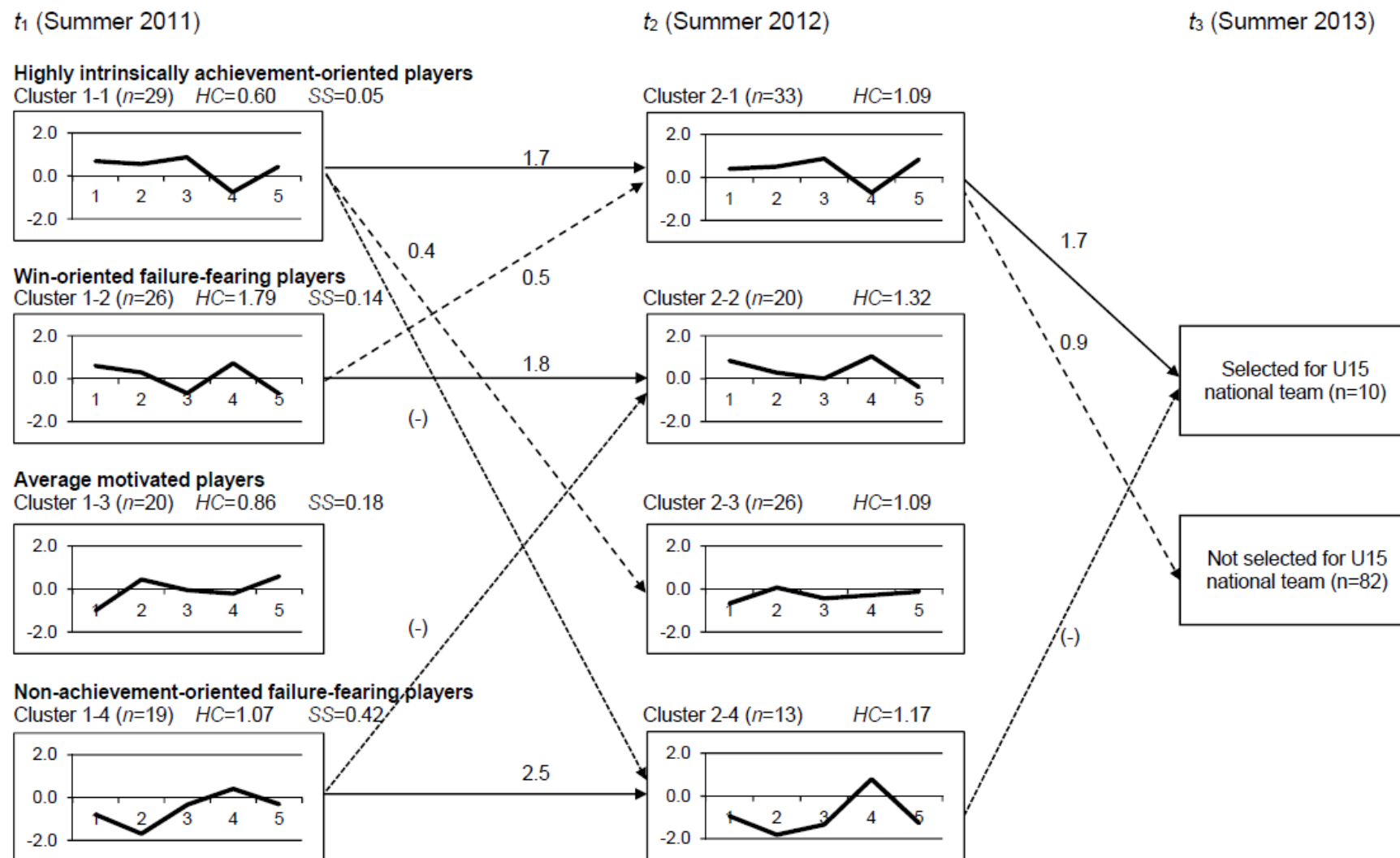
Figure 2. z-score profiles of the clusters (cluster centroids) and developmental (anti-)types for t_1 and t_2 and selection for the U15 national team.

t_1 (Summer 2011)

Highly intrinsically achievement-oriented players
Cluster 1-1 (*n*=29)   *HC*=0.60   *SS*=0.05

Win-oriented failure-fearing players
Cluster 1-2 (*n*=26)   *HC*=1.79   *SS*=0.14

Average motivated players
Cluster 1-3 (*n*=20)   *HC*=0.86   *SS*=0.18

Non-achievement-oriented failure-fearing players
Cluster 1-4 (*n*=19)   *HC*=1.07   *SS*=0.42

t_2 (Summer 2012)

Cluster 2-1 (*n*=33)   *HC*=1.09

Cluster 2-2 (*n*=20)   *HC*=1.32

Cluster 2-3 (*n*=26)   *HC*=1.09

Cluster 2-4 (*n*=13)   *HC*=1.17

t_3 (Summer 2013)

Selected for U15 national team (*n*=10)

Not selected for U15 national team (*n*=82)

Operating factors:
1 = Win orientation
2 = Goal orientation
3 = Hope for success
4 = Fear of failure
5 = Self-determination

HC = Homogeneity coefficient (mean square Euclidian distance within the cluster)

The numbers next to the arrows represent the odds ratios and hence indicate by how much the probability of this development path is increased or decreased

SS = Structural stability (mean square Euclidian distance between twin clusters (= clusters on same level)

⟶ Developmental type
⇢ Developmental anti-type
⤑ No transitions (-)