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

Claudia Zuber, Marc Zibung and Achim Conzelmann

University of Bern

Author Note

Claudia Zuber, Institute of Sport Science, University of Bern, Switzerland; Marc Zibung, Institute of Sport Science, University of Bern, Switzerland; Achim Conzelmann, Institute of Sport Science, University of Bern, Switzerland

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Correspondence concerning this article should be addressed to Claudia Zuber, Institute of Sport Science, University of Bern, 3012 Bern, Switzerland. E-mail: claudia.zuber@ispw.unibe.ch
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
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
(Magnusson & Stattin, 2006). Hence when analysing human development, the individual should always be viewed as a whole. The person-environment system can be subdivided into different subsystems, which mutually interact with each other (Bergman & El-Khoury, 2003). This holistic approach leads to a change in perspective, from the – hitherto dominant – variable-oriented to a person-oriented approach. The person-oriented approach (Bergman & Magnusson, 1997), in turn, has a number of methodological consequences: Firstly, the variables involved in a (sub)system need to be measured as completely as possible. Secondly, it is necessary to dispense with statistical methods based on the General Linear Model, since the reciprocal interactions between the variables mean that the assumption of linearity has to be sacrificed (Bergman & Magnusson, 1997).

Pattern analyses are one possible method of implementing the person-oriented approach. In these, states of the system (so-called patterns) are depicted at different times and the transitions between these patterns are analysed. The variables involved in a system are referred to here as operating factors (Bergman, Magnusson, & El-Khoury, 2003). Due to the high complexity of the person-environment system, empirical studies often focus on one subsystem. Although this inevitably means a certain simplification, the basic idea of this approach remains intact. For a more detailed overview of the person-oriented approach, cf. Bergman, Magnusson and El-Khoury (2003) and for a comparison with the variable-oriented approach, cf. Bergman and Andersson (2010).

Recently, attempts have been made to integrate such holistic, developmental scientific concepts and their methodological consequences into sports talent research, too. So far, promising results have been achieved for the subsystem training (Zibung & Conzelmann, 2013). Corresponding studies are not yet available for psychological subsystems, although it is reasonable to assume that possible compensation effects and mutual interactions will matter in this field too. It therefore seems an obvious choice to use the person-oriented approach in
the psychological field as well, so as to gain a better understanding of the connection between psychological characteristics, their interaction and the development of performance in sports.

In this performance-related context, choosing operating factors requires the use of performance-related variables. In talent research, within the psychological system, motivational variables are viewed as being particularly relevant to talent development and later success (Abbott & Collins, 2004). The achievement motivation models that are currently being discussed most actively are the hierarchical model of achievement motivation (Elliot & Church, 1997) and self-determination theory (Deci & Ryan, 1985), whereby Conroy, Elliot and Coatsworth (2007) recommend combining these two concepts when examining competence from a motivational perspective. For this reason, in the current study the constructs discussed in these two theories are seen as motivational subsystem. These constructs are hope for success and fear of failure, which are both components of the achievement motive, as well as the achievement goal orientations task and ego orientation – linked to each other in the hierarchical model of achievement motivation – as well as self-determination.

**Achievement motivation**

The achievement motive determines whether individuals tend to approach achievement-related situations or whether they tend to avoid them (Atkinson, 1957). The positive connection between hope for success and performance in sports has been empirically confirmed in both cross-sectional (Coetzee et al., 2006; Halvari & Thomassen, 1997) and longitudinal studies (Elbe & Beckmann, 2006; Unierzyski, 2003). Fear of failure, on the other hand, is often associated with a negative correlation with performance (Halvari & Thomassen, 1997; Sagar, Busch, & Jowett, 2010). The two classical facets of the achievement motive are considered to be independent of one another (Brunstein & Heckhausen, 2010). Empirically,
however, questionnaire surveys have for the most part demonstrated moderate to high
negative correlations (Elbe & Wenhold, 2005).

**Achievement goal orientation**

Whereas the achievement motive initiates actions aimed at attaining competence,
achievement goal orientations guide these actions towards certain goals. Two different goal
orientations are distinguished, which are either called task and ego orientation (Nicholls,
1984) or mastery and performance orientation (Ames & Archer, 1988). Task/mastery
orientation is aimed at improving one’s own skills, for which purpose an internal standard of
comparison is used. Ego/performance orientation, on the other hand, focuses on displaying
one’s own superiority to other people. Its aim is to do better than others, and to show it

Among young football players, elite players have been found to display greater task
orientation than those of their peers who achieve a lower level of performance (Reilly,
Williams, Nevill, & Franks, 2000).

**Self-determination**

In self-determination theory, the reasons for motivated actions are distinguished
according to where their perceived locus of causality is, or to what extent they are self-
determined. The resulting motivational type lies on a continuum extending from amotivation,
a state with a complete absence of any motivation, through extrinsic motivation, to intrinsic
motivation as the most self-determined form of motivation (Ryan & Deci, 2000). Intrinsic
motivation is characterised by pleasure in performing the activity itself. Extrinsic motivation,
on the other hand, pertains to actions which are carried out because of the expected
consequences, such as fame, honour or prize money. Four types of extrinsic motivation are
postulated, which are characterised by increasingly high levels of self-determination or
autonomy (for an overview, see Ryan & Deci, 2007).
On the level of individual variables, a high degree of self-determination has been shown to be associated with higher levels of performance, both in adult athletes (Gillet, Vallerand, Amoura, & Baldes, 2010) and in adolescents taking part in physical education classes (Biddle & Brooke, 1992; Boiché, Sarrazin, Grouzet, Pelletier, & Chanal, 2008). Conversely, low levels of self-determination appears to hamper a successful sports career in the sense of dropping out (Calvo, Cervello, Jimenez, Iglesias, & Murcia, 2010; Pelletier, Fortier, Vallerand, & Brière, 2001; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002) or a lower level of performance in sports (Boiché et al., 2008). Depending on the cultural background, however, high levels of extrinsic motivation and amotivation can also lead to high levels of performance in sports (Chantal, Guay, Dobreva-Martinova T., & Vallerand, 1996).

On the level of combinations of variables within self-determination theory, only isolated analyses have been conducted to date in connection with performance in sports. The identified clusters did not differ so much in qualitative terms, as regards the composition of the scale combinations, but rather quantitatively, concerning the level of self-determination. In line with the hypotheses, it was found that members of the cluster with the lowest self-determination scores do least well (Boiché et al., 2008; Gillet, Vallerand, & Rosnet, 2009).

**Combinations of variables**

For a long time, the two facets of the achievement motive, hope for success and fear of failure, and the achievement goal orientations task and ego orientation were studied independently of one another. Elliot and Church (1997) later suggested the hierarchical model of achievement motivation, in which the achievement goal orientations are positioned, as mid-level constructs, between achievement motive, with its components hope for success and fear of failure, as the overarching motivational construct, and specific behaviours. From this combination of achievement motive components and achievement goal orientations, they initially extracted three achievement goals (Elliot & Church, 1997). Of the original achievement goals in the hierarchical model of achievement motivation, performance-
approach goals are associated with positive effects, and performance-avoidance goals with
negative effects on performance. Mastery goals have positive effects on intrinsic motivation,
but no effect on performance (Elliot & Church, 1997).

The combination of achievement goal orientations and self-determination was
investigated by McNeill and Wang (2005), who were able to identify the three clusters
‘amotivated’, ‘highly motivated’ and ‘high task mastery’. Competitive athletes were assigned
particularly to the “highly motivated” cluster, characterised by high scores on all the factors
measured, except for amotivation, whereas non-athletes consisted mainly of amotivated
individuals, with low scores on all variables apart from amotivation.

The research carried out so far into the connection between the discussed motivational
variables of performance in sports – both as individual variables and as combinations of
variables – can be summarised as follows: HS combined with high self-determination appears
to be particularly beneficial to performance, since both concepts are associated positively with
performance in sports (Biddle & Brooke, 1992; Boiché et al., 2008; Coetzee et al., 2006; Elbe
& Beckmann, 2006; Gillet et al., 2010; Halvari & Thomassen, 1997; Unierzyski, 2003; Zuber
& Conzelmann, 2013). Fear of failure and low self-determination, on the other hand, seem to
have a negative influence on the development of performance in sports (Calvo et al. 2010;
Halvari & Thomassen, 1997; Sagar et al., 2010). Concerning the achievement goal
orientations, the findings are ambiguous. Thus it seems that high levels of performance may
be associated with high levels of achievement orientation both in a combined form (McNeill
& Wang, 2005) and individually (Elliot & Church, 1997; Reilly et al., 2000).

The present research

Based on the research presented so far and using a person-oriented approach, we will
first depict patterns of motivation-psychological variables in order to describe the state of the
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 \( \alpha_{HS t_1/t_2} = .69/.76 \) and \( \alpha_{FF t_1/t_2} = .79/.73 \)

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
their contents, these have a strong resemblance to the ego and task orientation scales (Duda, 1992). Each scale consists of six items, with a five-point response scale (from 1 = ‘strongly disagree’ to 5 = ‘strongly agree’). The internal consistencies for this study are satisfactory at both measurement points ($\alpha_{WO1/2} = .74/.72; \alpha_{GO1/2} = .66/.81$).

**Self-determination.**

Self-determination was measured using a German translation (Demetriou, 2012) of the Sport Motivation Scale (SMS) by Pelletier et al. (1995). This contains seven subscales: intrinsic motivation (three subscales: “to know”, “to accomplish”, “to experience”), external, introjected and identified regulation, as well as amotivation. Each scale consists of four items, with a seven-point response scale (from 1 = ‘does not correspond at all’ to 7 = ‘corresponds exactly’). The seven subscales were combined to form a self-determination index (Vallerand, 2001). People with high, positive scores have a high level of self-determination. With $\alpha_{t1/2} = .82/.86$ the scale displayed good internal consistencies.

**Data analysis**

**LICUR method.**

The fundamental consequences associated with relinquishing the general linear model have already been pointed out in connection with the methodological implementation of the person-oriented approach. The LICUR method (Linking of Clusters after removal of a Residue, cf. Bergman et al., 2003) is a pattern-analytical procedure that is suitable for implementing person-oriented approaches. The fundamental idea behind it is to form clusters (patterns) within each developmental phase. In order to map the developmental process, the individual transitions are then determined, either from the clusters of one phase to those in the next phase, or to a specific developmental outcome. The LICUR method consists of three steps. First, a residual analysis is carried out, in which extreme cases (residues) are identified and removed from the data set, since they would distort the cluster solution. In the next step,
clusters are formed for the specific phases (cluster analysis). In the final step, the similarity between the patterns of the different phases is determined (structural stability) and more especially the developmental (anti-)types are established (individual stability). The statistical methods applied in the first and second steps are based on the general linear model whereas in the third step, transition probabilities between patterns or developmental outcomes are determined. In other words, as suggested by the systemic development concepts, the development of the motivation types is not based on linear or continuous functions. The first and third steps were carried out using the statistics package SLEIPNER 2.1 (Bergman & El-Khouri, 2002), while the cluster analysis was done using SPSS Statistics 20.0.

Residual analysis.

For the current analysis, two residues were identified both in the first (#42, #62) and in the second (#9, #78) phase, which lies under the limit of 3% of the total sample proposed by Bergman et al. (2003). Particularly when studying talent development, such residues can provide important insights into the developmental process, since unique achievements may be the result of unique developmental paths. In the present case, however, all four residues failed to be selected for the U15 national team, so that a detailed analysis of these cases does not seem to be warranted.

Cluster analysis.

Ward’s method, using the squared Euclidian distance as a distance measure, was chosen for the cluster analysis (Everitt, 2011), as recommended in the literature for person-oriented approaches (Bergman et al., 2003; Trost & El-Khouri, 2008). The choice of the best cluster solution was guided by content as well as statistical criteria. At both measurement points, the stated criteria suggested a 4-cluster solution. The cluster solutions found were then subjected to a cluster centre analysis. The final cluster solution displays an explained error sum of squares of 47.8% at $t_1$, and of 53.6% at $t_2$. 

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Structural stability.

In order to analyse the structural stability, the average square Euclidian distance between the clusters is compared. The clusters are arranged in pairs by increasing value, meaning that the clusters that are most similar to each other end up next to each other at the same level (cf. Figure 2).

Individual stability (developmental types).

In order to analyse the individual developmental paths, the transitions between the clusters of one phase and those of the next phase, or a specific developmental outcome, are counted and checked for significant deviations from random variations ($p<.05$) using the exact Fisher 4-field distribution test based on a hypergeometric distribution. The odds ratio indicates the degree to which the probability of this developmental path has increased (developmental types) or decreased (developmental anti-types).

Results

Table 1 provides an overview of the descriptive statistics for the five operating factors of all the clusters at both measurement points. In Figure 1, the respective means are presented as $z$-standardised scores.

One conspicuous feature is the high scores for the operating factors win orientation, goal orientation and self-determination in the entire sample, as well as the low scores for the factor fear if failure. These conspicuous scores are presumably largely attributable to the specific sample, which has already been pre-selected. No significant differences are found between the two measurement points.
With regard to the first question posed, four patterns are found at both measurement
dots (cf. Figure 1). The clusters at $t_1$ are replicated in a similar form at $t_2$. Hence there is a
high degree of structural stability. The distances (mean square Euclidian distance between
clusters) only fall in the range 0.05-0.42. Hence the same labels have been used for both
measurement points. The clusters are all relatively homogenous at both MTs, as reflected by
the low values of the homogeneity coefficients. At both measurement points, the \textit{win-oriented
failure-fearing players} prove to be the least homogeneous cluster. Nevertheless, differences in
the pattern of motives – in the sense of a sharpening – are seen between $t_1$ and $t_2$. The pattern
of the \textit{average motivated players} becomes even more average, that of the \textit{highly intrinsically
achievement-oriented players} becomes even more self-determined, and the two groups that
fear failure become more anxious about failing.

\textbf{Developmental (anti-)types}

Figure 2 shows the developmental (anti-)types between $t_1$ and $t_2$. The three
developmental types observable between $t_1$ and $t_2$ may be seen to occur between similar, i.e.
structurally stable, clusters. Thus there is a higher-than-random probability that members of
the group of \textit{highly intrinsically achievement-oriented players}, the \textit{win-oriented failure-
fearing players} and the \textit{non-achievement-oriented failure-fearing players} will continue to be
in the same group a year later. The two developmental antitypes occur between two dissimilar
clusters, suggesting that it is rare for substantial changes in the pattern of motives to occur
over a period of one year. In addition, certain paths are identified along which no transitions
have taken place; as expected, these occur between dissimilar clusters.

The transition probabilities between $t_2$ and the U15 national team are of special interest
in terms of the fourth question asked in this article – one that is particularly relevant to talent
development and selection. Based on the way in which the individual operating factors are
associated with performance in sports (see summary of the current research above), the cluster
of the \textit{highly intrinsically achievement-oriented players} may be assumed to produce a higher-
than-random number of players selected for the U15 national team. By contrast, it is to be assumed that players from the cluster of the non-achievement-oriented failure-fearing players are nominated less often for the national team than chance would suggest.

Looking at the transition probabilities from $t_2$ to the performance criterion, the first conjecture is indeed confirmed: one developmental type occurs from the cluster of the highly intrinsically achievement-motivated players to the U15 national team (cf. Figure 2). In addition, no transition occurs from the cluster of the non-achievement-oriented failure-fearing players into the U15 national team. In view of the one-sided distribution of the number of cases used for the performance criterion, this does not represent a significant deviation; however as a general trend it is certainly in accordance with the hypothesis. In summary, it may be stated that the pattern of highly intrinsically achievement-oriented players is both structurally and individually stable, and is furthermore associated to a particularly high degree with success in football.

**Discussion**

The present study was the first to use a person-oriented approach to map the motivational subsystem of young football talents and to investigate by non-linear means how this subsystem is related to sports success. In doing so, four clusters were identified, which were structurally stable over a period of one year. The high individual stability between twin clusters suggests that in most players there are no fundamental changes in the motivational subsystem. This agreement between the structural and the individual stability suggests that the motivational system is relatively stable over this time period, which indicates a certain selection relevance in the actual process of talent selection.

Overall, most of the developmental types identified were in line with expectations. High levels of win and goal orientation, hope for success and self-determination are associated, not
only individually but also collectively, with greater success and accordingly with higher performance in sports. Hence a range of different interactions appear to exist, as well as various means of compensation between different variables as assumed by talent research (Meylan et al., 2010). Similar means of compensation are seen in the paths between the clusters identified at $t_2$ and the performance criterion. While players with the highest probability of transition into the top level of performance (Cluster 2-1) display – in terms of performance – favourable scores on all operating factors; no developmental types are found to lead from Clusters 2-2 and 2-3 – characterised by one or two variables scoring on a below-average level – to the top level of performance. Individual players with such patterns of motives are in fact nevertheless selected for the U15 national team. This suggests that individual motivational weaknesses do not in themselves necessarily have a negative effect on success or performance development. However, if all the variables of the motivational subsystem are unfavourable, the overall system state does seem to impair performance. This is demonstrated by the fact that not a single non-achievement-oriented failure-fearing player was selected for the national team. Conclusions of this kind cannot be drawn on the basis of variable-oriented analyses, pointing out the added value of the person-oriented approach that has been adopted here.

The following critical issues must be taken into consideration as regards the study conducted: Firstly, the holistic approach chosen has only been partially implemented by this study in looking at the motivational subsystem. A truly holistic systemic examination of talented football players would have to also consider further psychological and performance-determining variables from other dimensions, such as motor skills and environmental circumstances (Williams & Franks, 1998). For reasons of research economy, however, it is simply not possible to consider the entire person-environment system empirically in holistic terms, which is why it has become accepted practice to confine oneself to individual subsystems (cf. Bergman & Magnusson, 1997; Trost & El-Khoury, 2008; Zibung
Conzelmann, 2013). Secondly, when interpreting the patterns identified, it should not be
forgotten that the sample produced extremely high scores for the individual variables. Hence
the term “below-average” merely refers to the scores after being adjusted through z-
standardisation of the comparative sample, not to the absolute scores.

Future longitudinal studies should check to what extent the identified clusters are also
found in other sports and in other stages of development, and whether they are also associated
with longer-term success in sports. While the nomination for the U15 national team is a
highly relevant criterion for top-class football in Switzerland, it is not able to predict
deterministically the level of success at the age of peak performance. If the motivational
patterns can be shown to predict success longitudinally too, they might in future be used in
talent selection.

Despite these limitations, the results of this study indicate that an achievement-oriented
motivational attitude which is also expressed phenotypically has a significant influence on the
selection decisions of national coaches and is therefore an important talent criterion.


Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 1–19). Champaign: Human Kinetics.


Table 1

Descriptive Statistics for the Operating Factors

<table>
<thead>
<tr>
<th>Measuring point</th>
<th>Win orientation (Range 1-5)</th>
<th>Goal orientation (Range 1-5)</th>
<th>Hope for success (Range 0-4)</th>
<th>Fear of failure (Range 0-4)</th>
<th>Self-determination (Range 18-18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>s</td>
<td>M</td>
<td>s</td>
<td>M</td>
</tr>
<tr>
<td>Total (n=94)</td>
<td>4.17</td>
<td>0.67</td>
<td>4.71</td>
<td>0.37</td>
<td>2.43</td>
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<tr>
<td>Cluster 1-1 (n=29)</td>
<td>4.63</td>
<td>0.38</td>
<td>4.91</td>
<td>0.14</td>
<td>2.84</td>
</tr>
<tr>
<td>Cluster 1-2 (n=26)</td>
<td>4.57</td>
<td>0.42</td>
<td>4.82</td>
<td>0.20</td>
<td>2.10</td>
</tr>
<tr>
<td>Cluster 1-3 (n=20)</td>
<td>3.49</td>
<td>0.43</td>
<td>4.88</td>
<td>0.16</td>
<td>2.40</td>
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<tr>
<td>Cluster 1-4 (n=19)</td>
<td>3.63</td>
<td>0.53</td>
<td>4.10</td>
<td>0.25</td>
<td>2.26</td>
</tr>
<tr>
<td>Total (n=92)</td>
<td>4.34</td>
<td>0.57</td>
<td>4.73</td>
<td>0.39</td>
<td>2.39</td>
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<tr>
<td>Cluster 2-1 (n=33)</td>
<td>4.56</td>
<td>0.41</td>
<td>4.92</td>
<td>0.15</td>
<td>2.84</td>
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<tr>
<td>Cluster 2-2 (n=20)</td>
<td>4.82</td>
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<tr>
<td>Cluster 2-3 (n=26)</td>
<td>3.95</td>
<td>0.48</td>
<td>4.76</td>
<td>0.31</td>
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<tr>
<td>Cluster 2-4 (n=13)</td>
<td>3.79</td>
<td>0.57</td>
<td>4.03</td>
<td>0.38</td>
<td>1.71</td>
</tr>
</tbody>
</table>

The clusters 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

- Highly intrinsically achievement-oriented players
- Win-oriented failure-fearing players
- Average motivated players
- Non-achievement-oriented failure-fearing players
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.

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