Individualistic and Collectivistic Approach in Athlete Support Programmes in the German High-Performance Sport System

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Abstract: This study assessed the relative significance of athlete-related interventions and of repeated athlete selections and de-selections (individualistic and collectivistic approach) in the development of the collective of successful senior performers through athlete support programmes in Germany. The results from a longitudinal analysis of careers in the squad system over seven years (n=4,686) and a questionnaire panel study over three years (n=244) revealed that the annual turnover of squad members was 44%. Results also showed that the younger the first recruitment of an athlete, the younger the exit out of the system (r=0.92), and the higher the squad level reached, the higher was the age of recruitment into a squad. Interventions applied to the selected athletes showed no significant effects on subsequent interferences in the training process or on attainment of success. The collective of successful senior athletes was developed through regular athlete selection and de-selection rather than effects of athlete-related interventions. The observations are discussed with regard to (a) dissimilar individual career trajectories likely to lead to early inclusion in the support system compared to those likely to lead to long-term senior success, and (b) the functionality of de-coupling self-display and action at the collective level of the organisations.

Keywords: Athlete support, selection, intervention, sport organisation, longitudinal study

Introduction

Many national high-performance sport systems go to considerable lengths to support particularly promising athletes, investing sizeable resources in terms of finances, personnel and time. As illustrated by De Bosscher and her colleagues, a growing number of countries have invested increasing resources in their elite sport systems over recent decades (De Bosscher et al., 2008).

The development of international success is based on extensive training and competitions undertaken by athletes over many years, which require large individual investments (cf. for example Ericsson & Williams, 2007; McConnell et al., 2002; Vae-yens et al., 2009). The athlete and his or her family and sports club alone can afford to invest resources only to a limited extent, which may limit the athlete’s chances of success. Athlete support programmes are designed to subsidise selected athletes by supplying them with additional resources. The most promising athletes are selected
and involved in a set of interventions that are expected to lead to an increased (later) probability of success as a result of improved performance.\(^1\) I.e., these programmes principally consist of two components: The selection of athletes and ‘treatments’ applied to the selected athletes.

![Diagram](image)

Figure 1: Structure of long-term athlete development and of athlete support organisations (translation and adaptation from DSB, 1997a, 2005)

The programmes are designed to identify and recruit talented athletes already at a young age, mainly based on age-specific performance and/or success in their respective sport. Such early recruitment is expected to enable a long period of continuous facilitation of the athletes’ training process and of their progress in performance from recruitment until attainment of individual peak performance at a senior age (see Figure 1). Athlete support systems are typically organised in various stages: programmes for talent search and initial promotion during childhood, programmes designed to support talent development during youth and junior ages, and programme compo-

\(^1\) Performance and success are expected to be closely related, but they are not identical. Success constitutes the result of the comparison between the performances of the competitors, their location on a scale of ranked performances, and of the social valuation of the latter. A close correlation between performance and success may be assumed in so far as a higher performance in a given competition raises the probability of attaining greater success. However, the correlation is neither analytically nor empirically trivial, in particular regarding longer terms. Success depends not only on the respective athlete’s or team’s performance but also on the opponents’ performances. Yet, it is uncertain who the future opponents will be and what level of performance they will attain. Athlete support programmes can only pursue the goal of attaining success via interventions designed to influence the progress of the performance of the selected athletes.
nents for the support of senior sub-elite and elite athletes (cf. for example De Bos-sscher et al., 2008; Digel et al., 2006; Houlihan & Green, 2008; Sotiriadou & Shilbury, 2009). The typical pyramidal structure of the system implies the recruitment of a relatively large number of young talents at an initial stage and a stepwise reduction in the number of supported athletes at higher stages.

Figure 2: Conceptualised squad structure – annual memberships and transitions between squad levels (according to data from the policy concepts of the sport federations; DSB, 1995)

The size of the rectangles represents the number of squad members at each level and the width of the arrows represents the number of individual annual transitions. For scale orientation: Membership stage “D” $n=24,000$; “A” $n=900$; annual transitions “No squad” $\rightarrow$ “D” $n=6857$ p.a.; “D” $\rightarrow$ “DC” $n=700$ p.a.; “A” $\rightarrow$ “No squad” $n=150$ p.a.

The athlete support programmes of German sport federations are divided into five squad levels: stages D, DC, and C constitute the sub-junior and junior squad levels, while stages B and A are the national senior squads.\footnote{The squad levels are structured by age and success. Squad A includes senior athletes who have already attained top ten places at senior world championships or Olympic Games. Squad B consists of senior athletes who have attained success at national level and who are expected to attain international success in the future (current “sub-elite”). C squad is the national junior squad. These athletes typically participate in international junior championships. The members of squads DC and D are below those of squad C in level of success and/or age. These are typically athletes who have attained successful performance at national or international sub-junior championships. Squad D is selected by the regional federation in their respective sport and the members are...} There is an initial selection
of young athletes for entry into the support system, and then further cascades of selection at the transitions to each subsequent stage. The future high-performers are expected to enter the squad system at the initial stage D and to progress linearly through the pyramidal stages of the system in an irreversible upward direction, passing through the DC and C squad until eventually reaching the B or A squad (see Figure 2). Training intensity and competitive success increase with growing duration of involvement, while athlete-related interventions are simultaneously intensified. The successful senior performers are expected to be those athletes who have “survived” all stages and levels of selection.

Being a member of a squad is of fundamental importance for athletes because it not only allows them to be included in the programme of the respective sport federation, but it is also a prerequisite for access to other supplementary programmes such as the athlete support provided by sport-aid foundations, universities, the armed forces, the police, and the Olympic Support Centres (OSC). The 20 OSCs in Germany are multi-disciplinary centres providing athlete services in the disciplines of sport medicine, physiotherapy, exercise science, biomechanics, nutritional counselling, and career counselling.

Prevalent athlete-related interventions together with the expected directionality of the intended effects were analysed in an earlier study (Güllich & Emrich, 2006). Time, namely the available time for sporting involvement, was shown to be considered a critical input resource in the development of success in the athlete support system, and the system’s interventions possess a time-economic hard core. Most measures aim at expanding the available time for training (extensive time-economy: provision of additional training opportunities, coaches, facilities, and equipment; improvement of the athlete’s load tolerability through medical and paramedical services; circumventing or buffering interferences in the training process; coordination between sport-related time demands and time demands projected on the athlete from parties outside of sport; reducing or compensating the athlete’s financial, educational, and health-related costs and risks) and/or at the intensive use of this time by increasing involvement in the regional federation’s athlete support programmes. Squad DC is selected by the national federation, but the responsibility for their support mainly lies with the regional federations. DC squad members may, however, at times be invited to participate in selected interventions within the national federation’s programme. Squads C, B and A are selected by the national federations and fully involved in their support programmes. The regional federations are, however, expected to continue supplying additional support at the local level to athletes progressing from squad levels D and DC to the higher levels C, B and A. The members of the squad levels A to DC have admission to athlete support services of the Olympic Support Centres (OSC). Sometimes, the OSC also admit selected members of the D squad to their services. Squad status at level C, B or A represents a precondition for admittance to the athlete support companies of the armed forces or police. The national Sport Aid Foundation funds individual athletes at squad levels C, B and A by supplying finances to them. However, in most federal lands there are additional regional Sport Aid Foundations that also supply funding to these athletes as well as to members of the DC and D squad level.
ing the amount of activity and the performance gain per invested time unit (intensive
time-economy: education and further education of coaches; high-profile facilities;
training monitoring and performance analysis; acceleration of the athlete’s recupera-
tion through medical and paramedical services).

Analysis of the training concepts published by German national federations and
the comparison of these prescriptions with empirical data from the performed train-
ing of world class athletes strongly supported this interpretation (Güllich & Emrich,
2006): The findings demonstrated that the federations prescribed a sizeable expansion
and at the same time a reinforced intensification of the athletes’ training. The
extent of both the intended expansion and intensification of training was larger, the
younger the athletes.

In conclusion, the construction principles of the ideal-typical conception of the
athlete support system are based on three fundamental assumptions (Emrich & Gül-
lich, 2005; Güllich & Emrich, 2006):
• Talented athletes can already be identified at a young age based on early per-
formance and/or success.
• Success in senior elite sport is the result of a linear career in one sport over many
years.
• Success increases with increasing duration of involvement in this sport, as well
as with increased volume and intensity of practice and of support interventions
applied to the athlete.

Empirical examinations of the careers of world class athletes have, however, casted
doubt on the validity of these assumptions (see state of research below).

Problem

The support system is designed to enable a successful national representation of the
German sport system at international championships: “The [...] aim is to improve
Germany’s position in the Olympic summer sports by 2012 and to consolidate and
extend it in the winter sports” (translation from DSB, 2005, 5; see also DSB, 1997a;
1997b). The target is clearly at the collective level, namely the aggregation of the
athletes’ individual attainments and comparison to the aggregated achievements of
other countries (e.g. in medal tallies). Exactly which athletes in which sports attain
the achievements is essentially insignificant.3

The collective success is pursued through two different approaches:

1. The individualistic approach: A set of facilitative interventions is applied to the
athletes included in the support programme. These interventions provided at the

3 This is significant in so far as the support programmes aim at attainment of success in the
future. However, many athletes who will be successful in the future may not yet have been
identified at early stages. The supportive interventions can only be applied to the athletes who
are selected by the support system, but not to future high-performers who are still unknown
to the system at a young age.
individual athlete level expedite their individual performance progress. This increased individual performance is expected to aggregate across the individuals, leading to improved collective success.

2. The collectivistic approach: The collective of the most successful senior athletes is composed through recurrent procedures of selection and recruitment of athletes into support programmes through all age periods and de-selection of current members of the programme who are replaced by others deemed to possess greater potential for success by this time.\(^4\)

The concepts of the German sport system clearly reflect the perception that collective success is mainly pursued by facilitating the progress of the individual performance of the athletes included in the support programmes through a long-term continuous nurturing process (i.e., the individualistic approach; see Figure 1). The German Olympic Sports Association (Deutscher Olympischer Sportbund, DOSB) states that “German high-performance sport will only remain successful if continuous support of athletes from young talent through to final peak performance is ensured” (translation from DOSB, 2010, 7; see also DSB, 1997b).

There is little empirical research addressing either of the effects of the interventions applied to the athletes or the selection and de-selection of athletes in the support system. The question is raised to what extent the development of the collective of successful senior performers is rather based on beneficial performance-related effects of the interventions applied to the selected athletes, or on repeated procedures of selection, de-selection, and replacement of athletes across the various age stages.

**State of research**

Interest focusses on (1) studies addressing the validity of the fundamental assumptions underlying the construction of the support system and (2) investigations studying effects of athlete-related interventions, the development of athletes included in that system, and the stability or fluctuation of the population of included athletes.

Ad (1): Earlier (Güllich & Emrich, 2006; 2012), we compared world class and national class athletes retrospectively with regard to their juvenile success level and training volume. Early performance or success during childhood and youth proved to be no reliable indicator of their long-term potential for future success. Thus, selection procedures that are based on early performance/success are associated with considerable error (see also Kupper & Wallberg, 1978; McConnell et al., 2002; Regnier et al., 1993). However, no alternative techniques for reliable early talent identification are available to date (see Vaeyens et al., 2009, for a review).

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\(^4\) The size of the national population and the rate of identification of talented athletes are significant social factors. The pool from which the athletes can be selected is typically larger in larger countries and in popular sports with mass participation. It can be expanded by talent search programmes, but also by nationalising successful performers from other countries.
Internationally successful senior athletes accumulate sizeable specific training in the course of their career, but within relatively success-homogeneous populations the amount of specific practice does not distinguish performers with higher or lower senior success (Güllich & Emrich, 2006; 2012; see also Johnson, 2006; McConnell et al., 2002; Van Rossum, 2000). On the other hand, most world class performers were shown to be characterised by a higher sports-spanning variability of involvements and a rather decelerated development in their domain sport during childhood and youth as compared to national class performers (Güllich & Emrich, 2006; 2012). We concluded that some of the basic assumptions underlying the support system were not confirmed and partly falsified empirically.

Ad (2): The effects of individual intervention measures applied to athletes are largely unstudied to date. Frequent reports on performance advantages of members of support programmes compared to their non-selected peers or the observation that most successful athletes have been involved in some support programme during some period of their career (e.g. Emrich et al., 2009; McConnell et al., 2002; Oldenziel et al., 2004; Ward et al., 2004) do not contribute to the question to what extent support programmes lead to performance/success, or performance/success leads to recruitment into these programmes. Cross-sectional comparison between senior world class and national class athletes revealed no significant difference in the intensity of the use of particular athlete support services. The world class performers had, however, first utilised the athlete services of the Olympic Support Centres only at a later age (Güllich & Emrich, 2006).

Comparison of performance development over multiple years during childhood between members of talent promotion programmes and non-members (Winter, 1993; Pauer, 1996; Martin et al., 1999; Radtke, 2002) revealed that the members displayed a performance advantage at all times of measurement, but an increase of their performance advantage over time was not consistently demonstrated. In addition, support programmes may exhibit noteworthy fluctuation of members. For example, an extracurricular talent development programme organised in schools after classes exhibited an annual turnover of members ranging from 40 to 60% (Joch, 1992). In German Elite Sport Schools (ESS), 46% of the new members admitted each year constituted replacements of athletes who exited these schools before attaining their high school diploma (Güllich, 2006). Emrich et al. (2009) revealed (a) that the turnover rate of the members and the size of the ESS in terms of total number of members were correlated positively and (b) that the reason why members had been asked to leave the support programme was in most cases because they were attributed a decreased potential for success in their sport.

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5 For studies in specific sports see Carlson, 1990; Johnson, 2006; Ronbeck et al., 2009; for longitudinal testing and examination of the scope of the findings see Güllich & Emrich, 2012.
In summary, there is uncertainty about the expected beneficial effects of support interventions on athletes’ improved individual long-term performance progress, while repeated selection, de-selection and replacement of members may play a significant role. Studies purposefully addressing the relative significance of the individualistic and the collectivistic approach in athlete support programmes are, however, lacking. The present study purposes to explore the role of both approaches relative to some of the outcomes of the athlete support system based on a longitudinal investigation of the careers of squad athletes over multiple years. This study provides ...

1. At the individual athlete level:

   (a) An empirically based description of the age structure, duration, and continuity of individual careers in the squad system, the athletes’ transitions between the squad stages, and a comparison between more and less successful squad careers.

   (b) A comparison between users and non-users of athlete services with regard to their subsequent success development and to interferences in their training process.

2. At the collective level:

   A description of the fluctuation of the squad members and of the annual turnover of members within the squad.

According to the individualistic approach, members of the federations’ squads are expected to exhibit better progress in their performance and reduced interference in their training process compared to their non-supported peers. Consequently, they should enlarge their lead in performance with increasing duration of involvement in the support programme. Under this hypothesis, membership in the squad system would be very stable, replacements of squad members with non-members would be infrequent, and higher squad levels would be composed exclusively of members of the squad levels below. Alternatively, a high fluctuation among the squad members and/or frequent side-entries into the support system at higher stages would indicate that the composition of the collective of successful performers is instead rather based on frequent selections and de-selections of athletes (collectivistic approach).

Methods

Two data sets were used for the present study: archived squad files from a seven-year period and an athlete survey collected over three years using a panel design. This study was approved by the German Federal Institute of Sport Science including ethical standards.

Document Analyses of Squad Files

German sport federations are required to report information about their squad members annually to a variety of organisations including state committees for high-per-
formance sport. These squad files include each athlete’s age and current squad status (stages D to A). We screened the complete files provided by the committees of four states (Mecklenburg-West Pomerania, North Rhine-Westfalia, Rhineland-Palatinate, and Saxony) from 1992-98 with 4,579 squad members in seven Olympic sports (athletics, cycling, field hockey, rowing, table tennis, weight lifting, and wrestling\(^6\); 70% male, 30% female). This data set was supplemented by the retrospective reconstruction of the squad careers of 107 participants in the Olympic Summer Games 2000 (56% male, 44% female; 26 sports) over the last seven years preceding the Olympics based on files provided by the National Anti-Doping Agency (NADA).

We used the following data for our analyses: age at first recruitment, age at exiting the squad system, individual transitions between squad stages, discontinuities in the squad career, and the attained squad level. We described the squad careers based on these variables and compared athletes who attained higher vs. lower squad levels.

Athlete Survey

A total of 244 members of the national squads in all Olympic sports responded to a questionnaire submitted by mail in a panel design in the autumns of 1999 and 2002\(^7\) (age 20.6 ± 5.2 years (Mean ± SD); 61% male, 39% female; 50% squad A or B, 50% below; 7.8 ± 3.2 training sessions per week; success level 46% top-ten placing at international championships, 45% at national championships, 9% below). Among other things, the respondents reported their current success, injuries during the last two years, and interruptions to their training process of two months or more due to non-physical reasons such as conflicting educational or professional demands during the last two years. They also reported to what extent they used certain athlete support services (cf. Emrich, 1996; Emrich & Wadsack, 2005).

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\(^6\) The regional federations that volunteered for their data to be used for this analysis belonged to the federations certified by the umbrella organisation DSB as “priority sport” with privileged funding within the respective federal land.

\(^7\) This sample was part of two larger trans-sectional surveys described in detail by Güllich & Emrich (2012). We submitted questionnaires via postal mailings to a layered random sample of \(n = 2,000\) at \(t_1\) (fall 1999). The sample was composed of 40% of all squad A, B and C members, respectively, and in addition 20% of all DC squad athletes. The 776 respondents from \(t_1\) were sent questionnaires once again three years later (\(t_2\), fall 2002). Of these, 244 athletes responded again (feedback rate 31%). This panel sample was representative of the total population of all national squad athletes in Olympic sports with regard to the distribution of sports categories (cgs, game, martial arts, artistic composition and other sports; cf. Güllich & Emrich, 2012), gender and region of residence (East or West Germany). The feedback rate was slightly greater among athletes at higher squad levels, at both \(t_1\) and \(t_2\) (squad A: 38% and 37%, B: 31% and 37%, C: 32% and 31%, DC: 30% and 26%). We elected not to introduce weighting factors, however, because in none of the athlete services were differing effects between junior and senior athletes found (all \(p > .05\), respectively).
Significant differences between athletes with vs. without injury at $t_1$ in the proportions of users of general medicine ($\chi^2=3.87, p<.05$), orthopaedics ($\chi^2=10.00, p<.01$), internal medicine ($\chi^2=4.42, p<.05$), physiotherapy ($\chi^2=14.49, p<.01$), and performance analysis in biomechanics ($\chi^2=10.19, p<.01$) and exercise science ($\chi^2=5.02, p<.05$).

Note: Career counselling mostly includes services aiming at the compatible coordination of the demands of the sporting involvement with demands external to sport, e.g. education, professional occupation. Athlete services in exercise science mostly include performance analysis and also training monitoring and training analysis.

There are athlete support services that are applied directly to the athlete’s organism (medicine, physiotherapy, nutritional counselling), those that aim at controlling the efficacy of the performed training (performance analysis in the disciplines of biomechanics, exercise science, and sport medicine; analysis of the performed training from the perspective of exercise science), and services mainly aiming at the facilitation of a compatible coupling of the sporting involvement with education or profession-

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8 More strictly speaking, these services are designed to test whether the available time for training has been used efficiently or could be used more efficiently.
Individualistic and Collectivistic Approach in Athlete Support Programmes

We compared (1) users and non-users of the medical and paramedical services, performance analysis, and training analysis at \( t_1 \) with regard to the occurrence of injuries at \( t_2 \), (2) users and non-users of career counselling at \( t_1 \) with regard to training interruptions at \( t_2 \) due to non-physical reasons, and (3) users and non-users of each individual service discipline at \( t_1 \) with regard to the subsequent development in their success from \( t_1 \) to \( t_2 \).

It needs to be considered that the inclusion in these services may on the one hand represent an indicator of current success (more successful athletes are more likely to be included in these services) and of interventions expected to facilitate the individual’s subsequent performance progress. On the other hand, the involvement in the services may also reflect adversity such as injuries or problems in coordinating involvement in sport with educational or professional demands, which may prompt the athlete’s use of support services.

Table 1: Proportions of athletes with injuries and with interruptions of their training due to other (non-physical) reasons at \( t_1 \) and at \( t_2 \) (three years later)

<table>
<thead>
<tr>
<th></th>
<th>( t_2 )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( t_1 ) Yes</td>
<td>76.0%</td>
<td>24.0%</td>
</tr>
<tr>
<td></td>
<td>45.6%</td>
<td>54.4%</td>
</tr>
<tr>
<td>Training Interruption due to Other Reasons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( t_1 ) Yes</td>
<td>23.8%</td>
<td>76.2%</td>
</tr>
<tr>
<td></td>
<td>14.0%</td>
<td>86.0%</td>
</tr>
</tbody>
</table>

In the present sample, the users and non-users of physiotherapy differed in their current success (higher success among the users, \( p < .05 \)), but the users vs. non-users of all other service disciplines did not (\( p > .05 \), respectively). A higher proportion of the respondents who reported an injury at \( t_1 \) than of those without an injury used medical and paramedical services, performance analysis, and training monitoring (Figure 3). In addition, injured athletes at \( t_1 \) were more likely to also be injured at \( t_2 \), while this did not apply to respondents with or without interruptions of training due to other (non-physical) reasons (Table 1). Athletes with vs. without injury at \( t_1 \) and those with vs. without training interruptions due to other reasons at \( t_1 \) did not differ significantly in the subsequent development of their success, respectively (\( p > .05 \)). For these reasons, comparisons between users and non-users of services with regard to injuries at \( t_2 \) were conducted within the sub-samples of athletes with and without injury at \( t_1 \), respectively, while group comparisons with regard to interruptions of their training
due to non-physical reasons at $t_2$ and with regard to the subsequent development of success were conducted across the complete sample.

Statistical Analyses
Analyses were performed in SPSS 20.0. Correlations are expressed by Pearson’s coefficient. Group comparisons employed $\chi^2$-test, unpaired $T$-test, and ANOVA. Success development from $t_1$ to $t_2$ in the survey panel study was analysed using ANOVA with repeated measurements (General Linear Model, GLM). The success attained at each of $t_1$ and $t_2$ was recorded in a 3-digit-code: The first digit represented the level of the athlete’s highest championship in the respective year (values 1 to 5: world, European, national, regional level, below) and the second and third digit represented the attained placing (values 01 to 99). The success figures were converted into ranks within the sample in order to guarantee formal equidistance of the values (cf. Bortz, 2005).

The annual turnover rate of squad members was calculated for each year as:

$$\frac{(\text{number of entering athletes} + \text{number of exiting athletes})}{2}{/\text{total number of current members}}$$

All statistical hypothesis testing was two-tailed. The significance level was set at $p<.05$.

Results

Squad Files
In the squad files sample, the highest attained squad level was the D-squad in 72% of the cases, 14% DC, 7% C, and 7% B or A. The athletes were first recruited into the squad system at age $15.5 \pm 2.3$ years. The frequency distribution of the duration of the squad careers is given in Table 2: The most frequent length of time in the squad system was one year while only a minority of squad careers lasted three years or longer. Duration of squad career correlated only weakly with age of first entry into the squad system ($r = -0.09; n = 2,082$). Accordingly, age of first entry into the squad system and age of exiting correlated very highly ($r = 0.92; n = 1,963$) – the younger the recruitment, the younger the exit.

Table 3 compares the athletes who attained different squad levels with respect to their age of first entry into a squad. The data demonstrate that the higher the attained squad level, the higher was the age of first entering the squad system.

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9 Within the singular sports, the correlation was: athletics $r=0.78$ ($n=498$), cycling $r=0.88$ ($n=327$), field hockey $r=0.86$ ($n=334$), rowing $r=0.86$ ($n=368$), table tennis $r=0.75$ ($n=22$), weight lifting $r=0.91$ ($n=218$), wrestling $r=0.98$ ($n=196$).
Table 2: Frequency distribution of the duration of the squad career (n=2,186)

<table>
<thead>
<tr>
<th>Duration</th>
<th>Proportion of Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>46.7%</td>
</tr>
<tr>
<td>2 years</td>
<td>27.4%</td>
</tr>
<tr>
<td>3 years</td>
<td>13.6%</td>
</tr>
<tr>
<td>4 years</td>
<td>3.7%</td>
</tr>
<tr>
<td>≥ 5 years</td>
<td>8.6%</td>
</tr>
</tbody>
</table>

Table 3: Age of first recruitment into the squad system across athletes attaining different squad levels

Group comparison: $F_{(2, 1370)} = 70.90, p<.01$; all individual group differences (Scheffé-Test) $p<.01$.

<table>
<thead>
<tr>
<th>Attained Squad Level</th>
<th>Age of First Recruitment [years]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
</tr>
<tr>
<td>D Squad (n=1,084)</td>
<td>15.4</td>
</tr>
<tr>
<td>DC and C Squad (n=238)</td>
<td>16.4</td>
</tr>
<tr>
<td>B and A Squad (n=51)</td>
<td>19.2</td>
</tr>
</tbody>
</table>

The annual transitions between the squad levels are displayed in Figure 4. In contrast to the notion of linear squad careers, side-entries at higher stages, downgrades, and the skipping of stages were very frequent. Interestingly, this applied to the Olympians’ careers over the seven years immediately preceding the Olympic Games as well. Out of a total of 12,369 recorded transitions (without Olympians) from one year to the next (Olympians: 597 transitions), 31% (Olympians 49%) represented maintaining the same squad stage, 37% (38%) were upwards transitions, and 32% (13%) were downwards transitions. Among all upwards transitions, 84% (48%) represented entries into the squad system, of which 8% (90%) were side-entries above the designated initial stage D. Among the 16% (52%) upgrades across stages within the squad system, 19% (48%) denoted a skipping of stages. A total of 96% (80%) of all downwards transitions represented expulsions, but there were also 4% (20%) downgrades across squad stages.

Based on the complete sample, among all members of the youth and junior squads D to C in one respective year, 55% were also members in one of the stages D to C in the following year, 44% were no longer in any squad, and 1% progressed to the national senior squad B or A in the following year.

The C squad – representing the wider national junior team – was composed as follows. Only 33% of the squad members had moved up from the stage below, the DC squad, while 38% had skipped directly from the D to the C level and 28% of the members of the C squad had been in no squad in the previous year and side-entered the squad system at the C level. The athletes entering the national senior squads A and B were even more likely to have been in no squad the year before (54%) than to
have progressed from the C (38%), DC (1%) or D squad (7%). Within the subsample of the Olympians, the status “no squad” was almost as frequent as a membership in the A squad, and the status “no squad” was more frequent than all other stages in the last seven years preceding the Olympic Games (Figure 4).

Figure 4: Empirical squad structure – sums of individual annual memberships and transitions between squad levels over seven years. Above: squad file sample without Olympians; below: subsample of Olympians

The size of the rectangles (except above “No squad”) represents the number of squad members at each level and the width of the arrows represents the number of individual annual transitions.

The frequencies of downgrades and total interruptions of the squad careers are broken down across different durations of observation periods (from first entry until exit) in Table 4: The frequency of discontinuities increased with growing time periods. In addition, the frequencies of these discontinuities were compared within con-
stant observation periods across athletes attaining different squad levels. The frequency of discontinuities was higher among athletes achieving higher squad levels (Table 4). Consistent with Table 4, data from the Olympians also revealed discontinuities in 57% of the cases (28% interruption, 25% downgrade, 4% both) in the last four years immediately preceding the Olympic Games.

Most notably, the total annual number of entries into and exits out of the complete squad population was much higher than that conceptualised in the concepts of the various sport federations. While the conceptualised annual turnover of squad members is 23% (DSB, 1995, see Figure 2), our data showed that the actual turnover rate was in fact 44% per year (range 42% to 46% across the individual years). This means, for example, that after a period of 3 years, only ~17% of all squad members were identical with the initial squad population, and only ~3% after 6 years.

Table 4: Discontinuities during squad careers across different durations of the observation period (entrance until exit) and across attained squad levels.

Comparisons across attained squad levels within constant durations of observations over four years because this is the shortest period within which each of interruption, downgrade, and both may occur, while this interval allows for an inclusion of a maximal number of cases in the analysis. Within observation periods of five years, the total frequencies of discontinuities across attained squad levels were squad D 28%, DC/C 66%, B/A 83% ($\chi^2=23.6, df=2, p<.01$).

<table>
<thead>
<tr>
<th>Discontinuity</th>
<th>Of these: Type of Discontinuity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td><strong>Duration of Observation Period</strong></td>
<td></td>
</tr>
<tr>
<td>3 years ($n=737$)</td>
<td>19.0%</td>
</tr>
<tr>
<td>4 years ($n=455$)</td>
<td>38.9%</td>
</tr>
<tr>
<td>5 years ($n=266$)</td>
<td>45.1%</td>
</tr>
</tbody>
</table>

Total Discontinuity: $df=2, \chi^2=87.3, p<.01$

**Attained Squad Level (four years observation period)**

<table>
<thead>
<tr>
<th>Squad Level</th>
<th>Discontinuity: Type of Discontinuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squad D ($n=113$)</td>
<td>23.9%</td>
</tr>
<tr>
<td>Squad DC/C ($n=91$)</td>
<td>56.0%</td>
</tr>
<tr>
<td>Squad B/A ($n=55$)</td>
<td>67.3%</td>
</tr>
</tbody>
</table>

Total Discontinuity: $df=2, \chi^2=35.1, p<.01$
Athlete survey

Table 5: Comparisons between users and non-users of athlete services at \( t_1 \) with regard to injuries at \( t_2 \) (upper section), training interruptions due to other (non-physical) reasons at \( t_2 \) (middle section), and to the development of their success from \( t_1 \) to \( t_2 \) (lower section).

Case frequencies are given in brackets in order of the columns. PA = Performance Analysis. Development of success is expressed as rank within the sample (Mean ± SD) at \( t_1 \) and \( t_2 \).

The \( \alpha \) level was set at \( p<.0063 \) for group comparisons with regard to injuries at \( t_2 \) and at \( p<.0056 \) for group comparisons with regard to the development of their success from \( t_1 \) to \( t_2 \) based on Bonferroni corrections (\( \alpha'=\alpha/k \)). All group differences in injuries at \( t_2 \), interruptions of training at \( t_2 \), success at \( t_1 \) and at \( t_2 \), and in development of success from \( t_1 \) to \( t_2 \) are not significant.

### INJURY at \( t_2 \)

<table>
<thead>
<tr>
<th>Athlete Services</th>
<th>Subsample No Injury ( t_1 )</th>
<th>Subsample Injury ( t_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Users ( t_1 )</td>
<td>Non-Users ( t_1 )</td>
</tr>
<tr>
<td>PA Biomechanics (( n=28, 51; 86, 64 ))</td>
<td>57%</td>
<td>39%</td>
</tr>
<tr>
<td>PA Exercise Sci. (( n=35, 44; 89, 61 ))</td>
<td>60%</td>
<td>34%</td>
</tr>
<tr>
<td>PA Sport Med. (( n=48, 31; 95, 55 ))</td>
<td>48%</td>
<td>42%</td>
</tr>
<tr>
<td>Med. – General (( n=51, 22; 114, 27 ))</td>
<td>45%</td>
<td>50%</td>
</tr>
<tr>
<td>Med. – Orthop. (( n=36, 33; 102, 36 ))</td>
<td>50%</td>
<td>46%</td>
</tr>
<tr>
<td>Medicine – Intern. (( n=19, 39; 60, 65 ))</td>
<td>47%</td>
<td>49%</td>
</tr>
<tr>
<td>Physiotherapy (( n=48, 29; 124, 22 ))</td>
<td>48%</td>
<td>41%</td>
</tr>
<tr>
<td>Nutr. Counselling (( n=14, 63; 36, 107 ))</td>
<td>43%</td>
<td>48%</td>
</tr>
</tbody>
</table>

### TRAINING INTERRUPTION due to NON-PHYSICAL REASONS at \( t_2 \)

<table>
<thead>
<tr>
<th>Athlete Service</th>
<th>Users at ( t_1 )</th>
<th>Non-Users at ( t_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Training Interruption at ( t_1 )</td>
<td>Training Interruption at ( t_2 )</td>
</tr>
<tr>
<td>Career Counselling (( n=45; 195 ))</td>
<td>19%</td>
<td>12%</td>
</tr>
</tbody>
</table>

### DEVELOPMENT of SUCCESS from \( t_1 \) to \( t_2 \)

<table>
<thead>
<tr>
<th>Athlete Services</th>
<th>Users at ( t_1 )</th>
<th>Non-Users at ( t_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank ( t_1 )</td>
<td>Rank ( t_2 )</td>
</tr>
<tr>
<td>PA Biomechanics (( n=116; 126 ))</td>
<td>108 ± 70</td>
<td>→</td>
</tr>
<tr>
<td>PA Exercise Science (( n=126; 116 ))</td>
<td>112 ± 74</td>
<td>→</td>
</tr>
<tr>
<td>PA Sport Medicine (( n=143; 99 ))</td>
<td>111 ± 70</td>
<td>→</td>
</tr>
<tr>
<td>Medicine – General (( n=167; 49 ))</td>
<td>114 ± 71</td>
<td>→</td>
</tr>
<tr>
<td>Med. – Orthopaedics (( n=139; 69 ))</td>
<td>117 ± 71</td>
<td>→</td>
</tr>
<tr>
<td>Medicine – Internal (( n=79; 105 ))</td>
<td>118 ± 67</td>
<td>→</td>
</tr>
<tr>
<td>Physiotherapy (( n=173; 52 ))</td>
<td>109 ± 71</td>
<td>→</td>
</tr>
<tr>
<td>Nutritional Counselling (( n=50; 173 ))</td>
<td>104 ± 71</td>
<td>→</td>
</tr>
<tr>
<td>Career Counselling (( n=44; 198 ))</td>
<td>128 ± 68</td>
<td>→</td>
</tr>
</tbody>
</table>
Analyses comprised a total of 26 group comparisons between users and non-users of athlete services (users vs. non-users of eight service disciplines with regard to injuries at $t_2$ within the subsamples with and without injury at $t_1$; users vs. non-users of career counselling with regard to training interruptions due to non-physical reasons at $t_2$; users vs. non-users of each of the nine service disciplines at $t_1$ with regard to the subsequent development in their success from $t_1$ to $t_2$). As shown in Table 5, no significant effect of the use of any athlete service on the subsequent probability of discontinuities in the training process or on the subsequent development of success was revealed. Analyses within each of the analytical sport categories (Güllich & Emrich, 2012) of cgs ($n=114$), game ($n=44$), martial arts ($n=33$), and artistic composition sports ($n=24$) confirmed these findings (no analysis, however, relative to injury at $t_2$ within sport categories because of too small cell occupations within games, martial arts and composition sports). More detailed examinations included inter-individual differences in the intensity of the use of the athlete services and the frequency and duration of reduction or interruption of training due to injuries or due to other reasons. These analyses revealed no significant effect of the use of athlete services, either.

Discussion
The present study comprised a longitudinal analysis of squad careers and the effects of athlete support services in German elite sports. The central findings can be summarised as follows:

1. The squad system was characterised by very high permeability at all stages, and by a very high annual turnover of its members.

2. Most squad careers were very short. The younger the age of recruitment into the squad system, the younger the age of exiting the system. Further, the higher the level of squad the athletes eventually reached, the higher was the age of the athlete’s first recruitment into the squad system.

3. Longer squad careers mostly exhibited a non-linear succession through the squad levels, and discontinuities were very frequent. The probability of occurrences evoking downgrades or interruptions in a squad career increased with growing duration of the athlete’s involvement in the squad system. However, the results did not suggest that career discontinuities lead to decreased development in success; on the contrary, career discontinuities were more frequent in more successful careers.

4. The use of athlete support services did not lead to a significant reduction of interferences in the training process or to a significantly more positive development of the users’ success.

The findings clearly suggest that the composition of the collective of successful senior performers was the result of recurrent procedures of selection, de-selection and
replacement of squad members during all age periods (*collectivistic* approach) rather than a result of the facilitation of the long-term progress of the individual performances of the included athletes through beneficial effects of the support interventions applied to them (*individualistic* approach). This does not imply that long-term membership in athlete support programmes was not possible or did not occur. However, most squad members were replaced within a short time by other athletes who had developed more successfully outside the support system. The observations suggest that most of the young athletes who are recruited at a particularly early age do not become successful senior performers, and that most of the successful senior athletes were not included in the support system at a particularly young age. In other words, the population of athletes supported at a young age and the population of successful senior athletes are far from identical and, in fact, are widely disparate.

The results raise two questions of particular interest.

1. *At the individual* athlete level: What are the reasons for the lack of the expected relative stability of squad membership and for the lack of the expected beneficial effects of the athlete-related interventions?

2. *At the collective* level of the organisations: What are the reasons for the deviation between the organisations’ level of decisions and actions and the level of their self-display?

With respect to (1) – the level of the individual athlete – several observations are in order. *First*, athletes in high-performance sport make sizeable investments and they consume resources in their sporting involvement (time, effort, their body). At the same time, they must satisfy time demands and interests external to sport (education, professional occupation, family, friends, hobbies, etc.). Also, it is typical for the high-performance system that athletes attempt to come increasingly close to the margin of their individual stress-tolerability (mechanical, physiological, social, psychological) over many years while attempting not to exceed it. We contend that successful long-term careers require careful balancing between time consumed in sport and time demands external to sport, as well as balancing the strain induced by training and competition with individual stress-tolerability over extensive periods.

Membership in support programmes is on the one hand expected to provide (presumably) facilitative interventions, but on the other hand may also induce unintended dysfunctional consequences for the athlete. Selection of athletes for the federations’ squads is mainly based on their current performance/success. Membership in each stage of the squad system is limited to only a narrow age range. Further, the number of squad places decreases with each stage (see Figure 2), and the level of performance and/or success required for selection at each subsequent stage increases. From the athlete’s and coach’s perspective, the chance to participate in the support system requires advanced athletic achievements already at a young age and
Individualistic and Collectivistic Approach in Athlete Support Programmes

subsequent continuous annual placing among the most advanced performers. Thus, the support system may already induce an acceleration of the athletic development of many young competitors during the age period preceding the initial selection for squad membership. From that pool of young competitors, the squad system selects the most advanced performers who have mostly already invested comparatively large resources (time, effort, money) in their sport by starting their training at an early age, specialising early, and reinforcing an intensified specific practice regimen (Güllich & Emrich, 2012; cf. also Vaeyens et al., 2009, for a review). Once the young competitors are recruited into the support system, the programmes pursue further acceleration of their athletic development through further expansion and intensification of their involvement in training and competitions. In addition, the athletes are expected to participate in interventions such as clinics, performance assessments, training monitoring, and appointments with specialists including physicians, physiotherapists, and diverse counsellors (e.g. nutritional, psychological and career counsellors). The increased supply of resources to the athletes leads to an intensified expenditure of individual resources on their part, which may be associated with unintended consequences including increased individual costs as well as increased educational, professional, health-related, and motivational risks (cf. Côté et al., 2009; Gould et al., 1996; Law et al., 2007; Wiersma, 2000).

Second, positive correlations of volume and/or intensity of practice with performance/success have been demonstrated over short periods, within youth, and within senior participant samples exhibiting heterogeneous success ranges and/or moderate success levels (e.g. Duffy et al., 2004; Ford et al., 2009; Helsen et al., 1998; Hodges & Starkes, 1996; Law et al., 2007; Ward et al., 2004). However, as noted above, senior world class athletes typically evidenced later specialisation, reduced early intensity of specific practice, higher variability of involvement across different sports, and decelerated athletic development in their respective domain sport during childhood and adolescence as compared to national class performers (Güllich & Emrich, 2012) – i.e. a rather resource-preserving and risk-buffering investment pattern.

Consistent with these observations, document analyses revealed that, among participants in Olympic Summer and Winter Games who had attended Elite Sport Schools, they achieved greater Olympic success the later they had entered these organisations and the shorter their period of involvement had been (Güllich, 2006; this finding was confirmed based on an athlete survey by Emrich et al., 2009).

In conclusion, the career pattern most likely to lead to (early) recruitment into the athlete support programmes and the career pattern most likely to lead to long-term international success are inconsistent and in some respects contrary to each other. In particular, the most successful senior performers have developed without taking part in the early acceleration of their athletic development as induced by the support system. Most of them have progressed outside the support system, and thus
have remained unaffected by its potentially dysfunctional effects over longer periods, presumably following at least partially different (individual) orientations, and have – over the long term – “surpassed” most of the athletes who were supported at a particularly early age.

Table 6: Criteria for the evaluation and funding of the regional federations in Olympic sports in Germany (translation from DSB, 1997b, c, 2005)

<table>
<thead>
<tr>
<th>Criteria of Evaluation</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results in national youth and junior championships</td>
<td>25%</td>
</tr>
<tr>
<td>Results in international youth and junior championships</td>
<td>15%</td>
</tr>
<tr>
<td>Proportion of the regional members of the DC and C squad in the nation-wide DC and C squad</td>
<td>20%</td>
</tr>
<tr>
<td>Proportion of the regional members of the B and A squad in the nationwide B and A squad</td>
<td>10%</td>
</tr>
<tr>
<td>Concentration of athletes in performance centres, local concentration of organisations for the athlete support like Elite Sport Schools (ESS) and Olympic Support Centres (OSC)</td>
<td>5%</td>
</tr>
<tr>
<td>Alignment of the training concepts, competition programmes, athlete support programmes, and squad criteria between the regional and the national federation</td>
<td>5%</td>
</tr>
<tr>
<td>Strategies for talent search and talent promotion in cooperation with schools</td>
<td>5%</td>
</tr>
<tr>
<td>Qualification of the coaches involved in child and youth training</td>
<td>3%</td>
</tr>
<tr>
<td>Performance assessment for the young athletes (sports medicine, exercise science)</td>
<td>2%</td>
</tr>
<tr>
<td>Certification by the umbrella organisation DSB as a “priority sport” in the respective region (amongst others based on athlete services of the OSC, available training facilities, local concentration of squad members, existence of Elite Sport Schools)</td>
<td>10%</td>
</tr>
</tbody>
</table>

With respect to (2) – the collective level of the organisations – the athlete support organisation is subject to the pressure of gaining and maintaining internal and external legitimacy. Its legitimacy, in turn, provides legitimisation to umbrella organisations and governmental administrations, and there is a common collective interest in the legitimacy of the support programmes. This is mainly based on collective confidence in the beneficial effects of the programmes for the improvement of performance and eventual success of the member athletes. However, the structure and culture of the athlete support programmes is shaped only partly by success-related technical and economic demands (technical dimension). It is also shaped largely by expectations from the institutional environment – e.g. other sport organisations and support organisations in the high-performance sport system, the umbrella organisation, governmental departments, the public – that the support system corresponds with common beliefs regarding the configuration of talent support programmes (institutional dimension; cf. Powell, 2007). The rational myth of long-term “productibility” of success currently underlies the ideology of early selection of the most advanced young competitors and their “processing” in a long-term nurturing process, enabling the intensification and expansion of their practice. In the German system, the federations are not only subject to such informal social expectations, but their
formal evaluation – basic to their funding – also includes criteria of correspondence to the standards of the “ideal-type” fashion of talent promotion set by their umbrella organisation (Table 6; DSB, 1997b; 1997c, 2005; DOSB, 2008).

The nature of the problem of irreconcilable demands is that the support organisations are on the one hand expected to deliver success and on the other hand to correspond to the common ideology of talent promotion. However, the means-end relation between the athlete-related intervention programmes and their success-related effects is not only fraught with uncertainty, but putting the normatively expected “ideal-type” into practice has turned out empirically to be unsuitable for attainment of the goal of senior success. Moreover, the negative correlation between an early inclusion in support programmes and later senior success is economically highly relevant, suggesting that talent support programmes at particularly young ages are dispensable. However, this conclusion would thwart the interests of both the funded and the funding organisations.

The German sport federations and other supplementary support organisations (e.g. Elite Sport Schools, Olympic Support Centres) satisfy the conflicting expectations successfully by uncoupling (at least partly) the organisation’s self-display from its actual behaviour. As outlined by Brunsson (1989), the – intended or unintended – decoupling of talk, decisions and actions may provide a functional solution for organisations that are subject to irreconcilable external and/or internal pressures. The talent-supporting organisations demonstratively display a collective consensus about one model of talent promotion by proclaiming programmes which identify talented athletes at a young age and lead them to later top success through many years of nurture (talk). On the other hand, they factually try out many young competitors and replace them with others over very short periods (action). This technique may be functional in various ways: (1) The organisation demonstrates externally visible correspondence with external social norms and at the same time demonstrates a high level of activity in caring for the young athletes. (2) The number and visibility of successful performers who are not supported by existing programmes – and thus who are antithetical to sustaining confidence in the effectiveness of the organisations – is minimised by rapidly labelling them as squad members and claiming their success as being due to the support programme. (3) Emphasising the notion that enormous volumes of practice are essential for excellent performance facilitates the social construction and legitimisation of the “problem” that many talented young athletes have insufficient time available for practice, which in turn legitimates the costs of extensive respective interventions and of related job positions on the part of the supporting organisation, and also raises the chances for external funding. In this sense, inducing a permanent high-cost situation on the athlete’s part and perpetuating the idea that

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10 Whether other configurations of talent promotion programmes are more suitable to facilitate the individual success development is up to date widely unstudied.
the young athlete requires permanent support may be functional for the organisation. However, the costs are eventually borne by the young athlete, which suggests that the current construction of the athlete support system may presumably be beneficial for the “supporting” organisations rather than for the “supported” athletes.

Relative to the scope of the present findings, we consider that the fluctuation in squad membership presumably arises (at least partly) from the relative instability of success over time, which is a function of the closeness of the differences in performance between the competitors, which is in turn a function of the number of competitors. The broadly developed system of sport clubs in Germany facilitates the massive participation in competitive sports (e.g. Emrich et al., 2001). It may be that the inclusion of members in support programmes is more stable and durable in sports or sport systems with fewer participants and consequently larger inter-individual differences in performance, for example (a) in less popular sports or in smaller countries, (b) in sports that are limited to relatively few locations due to geographic (e.g. alpine skiing, kayak, rowing, snowboard, windsurfing etc.) and/or technical requirements (facilities, equipment; e.g. bob sledding, ski jumping, track cycling etc.) that exceed the financial capacity of most sport clubs (cf. Flatau & Emrich, 2011), and/or (c) in sport systems in which a concentration of athletes in centralised performance centres goes along with the socially constructed limiting of alternative opportunities for involvement in high-performance sport outside these centres. However, lower member fluctuations in these cases would indicate neither more accurate talent identification nor higher effectiveness of programme interventions, but would rather follow from larger inter-individual differences in performance (a to c) and/or from a restriction of competitors external to the support organisations and large exclusivity of the opportunity to participate in high-performance sports exclusively in the performance centres (b, c; cf. Flatau & Emrich, 2011).

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DOSB (2010). *Nachwuchssleistungssport* [High-Performance Youth Sport]. Frankfurt/Main: DOSB.


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