Addicted to High Performance Sports – A Rational Behavior?

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Abstract: Many athletes invest a tremendous amount of their time practicing sports in order to succeed in sporting competitions of high performance sports. This paper examines the question whether they can be described as addicts, whose behavior is instrumentally rational. In order to answer this question, the paper reviews the existing empirical evidence on rational addiction models and applies the core characteristics of consumption dependency of Becker and Murphy’s model. The data were collected with a whole-population survey (in a cross-section design), addressed to athletes who were members of one of the 31 participating (out of 33 existing) Austrian national governing bodies. The results show that 19 % of these athletes can be described as rational addicts. Compared to the relative proportion of maximally nationally successful elite addicts, the relative proportion of internationally successful elite addicts who have not started their training among other internationally successful elite addicts before they turned 10 years old proves to be significantly higher (p=.039, n=34). Based on this first-time attempt to use the core assumption of intertemporal consumption dependency of the rational addiction theory for high performance sports, we argue that athletes can, in part, be described as rational addicts. Within the production network of sporting success several forms of individual instrumental rationalities seem to occur, which should further encourage a discussion on how these rationalities are balanced or maybe rationalized within the network. The results emphasize the necessity of expanding existing evaluations of high performance systems in the field of sports.

Keywords: Rational addiction, Practice, Sport expertise, Rationalization, Sports organization, National governing body

JEL Classifications: D83, D99, Z20

Abbreviations: Int.suc.= internationally successful; Max.nat.suc.= maximally nationally successful; NGB = national governing body; RAM-BM = rational addiction model of Becker and Murphy
1. Introduction

Can athletes, investing a tremendous amount of their time in practicing sports in order to succeed in competitions of sports, be described as addicts whose behavior is instrumentally rational\(^1\)? At first sight, this seems to be counter-intuitive because addiction is generally considered to be an undesirable condition and as such frequently branded as something harmful. Similarly, addictive behavior is often stigmatized as irrational. Despite these facts, sports are often labeled as something beneficial. Especially the practice of high performance sports is often considered as thoughtful, planned and therefore a rational act. There is a lot of scientific literature that deals with practice patterns of development and the relevance of different (intended) supportive institutional elements leading to the highest level of success. However, this literature clearly questions the above-mentioned argument concerning the (instrumental) rationality of high performance sports: more than 80% of variance in an athletic performance cannot be explained by deliberate practice, applied institutionalized regulatory instruments have been criticized as being ineffective, and practice patterns of development leading to the highest (individual/collective) level of success still remain a subject of debate (e.g. Güllich & Emrich, 2014; Macnamara, Hambrick, & Oswald, 2014).

However, rationality is always subjective by definition of the rational choice theory. In their model of rational addiction, Becker and Murphy (1988) show that addiction can be explained within the framework of rational choice theory, meaning that addiction might be understood as rational and therefore not as irrational behavior per se. In section 2 of this paper, we further analyze the model mentioned above, demonstrating that one should be careful with labeling goods as being beneficial or harmful. For this first-time application of the RAM-BM\(^2\) on high performance sports, we will follow the seemingly established view or belief that high performance sports are always\(^3\) something beneficial. Therefore, our paper pursues a twofold aim: applying the RAM-BM on high performance sports for the first time and answering the question whether addicts are more successful than non-addicts. On the one hand, the first aim requires us to show what is meant by the central concepts of this theoretical approach (chapter 2.1). On the other hand, we have to clarify our reasons for believing in the model or not, as no current systematic review could be found yet. The discussions will not only underline the importance of our intensive theoretical considerations, but will in turn enable us to operationalize (section 4) the difficult question of whether athletes can be described as rationally addicted to sports. We would like to point out that our considerations are also concerned with the question whether athletes behave as if the fundamental idea of RAM-BM were true, even if it is actually false. In terms of this article, this would mean that it is certainly not possible to raise further claims about any causal insights (Rogeberg & Melberg, 2011).

Due to the operationalization of addiction used in this paper, central assumptions of the time-economic motives (Vaeyens, Güllich, Warr, & Philippaert, 2009) incorporated in a production network’s technocratic regulatory instruments will be touched. This is also shown in a later chapter (3) on the product sports and their “production” (using Austria as an example). In other words, this

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\(^{1}\) For instrumental rationality we are going to follow Thompson’s (1967) definition in our study, therefore assuming crystallized desirabilities (for the network) but incomplete beliefs, the latter meaning that uncertainty with the means occurs.

\(^{2}\) Although we are going to relieve some of the strict assumptions of the original pathbreaking approach, we seem it to be appropriate to label it as an application of RAM-BM, as we follow its fundamental idea.

\(^{3}\) This means at least without considering for whom and in which time spans. But even if we are just considering the time period of athletes’ active/sportive career, there seems to be a high chances for serious injuries which should be taken into account. Therefore the beneficial characteristic of high performance sports has to be questioned.
paper deals with a second form of rationality: the effectiveness of assumptions underlying regulatory instruments in regard to their proclaimed goal on the individual athlete level. The results as well as their discussion, the study’s limitations and arising future questions will be shown in section 5. Finally a conclusion will be drawn (section 6).

2. On the Theory of Rational Addiction and Its Model(s)

To begin with, we will only use a simplified version of the RAM-BM instead of showing its whole formal derivation, as this will suffice to deduce central conditions.

2.1 Basic principles of the RAM-BM

Until the 1980s, the estimation of demand for addictive commodities like cigarettes or alcohol was done solely via static models, thereby not allowing past consumption to influence the individual’s decision of his current consumption (Laporte, 2006). According to Douglas and Hariharan (1994), subsequent models can be classified into two broad categories. Although this distinction has some weaknesses (e.g. differences in defining myopic behavior, cf. e.g. Fehr & Zych, 1998; comparable problems appear with lack of self control), it seems to be useful for our further discussion. On the one side, a group of “irrational addiction” models exists, which by itself falls into two categories: first, models which assume that the consumer is myopic, and second, those taking the consumers’ irrational behavior as for a lack of self-control (O’Donoghue & Rabin, 1999).

On the other side, there are also models on “rational addiction”, which we will focus on in the following. Criticized from the beginning for their “surrelastic” assumptions, these models originate from Stigler and Becker (1977). Drawing upon the literature of rational habit formation, Becker and Murphy (1988) model a consumer’s addiction as a rational process. They suggest viewing the consumption of an addictive good as an individually optimal behavior in which the individual, not only as in the case of myopic (and as defined above irrational) behavior, considers a “stock of ‘consumption capital’” (Becker & Murphy, p. 677), but also incorporates future consequences in his decision. By assuming the individual’s preferences as being intertemporally consistent through his lifetime, it becomes possible for Becker and Murphy (1988) to explain addictive behavior in a rational choice framework. We are now going to briefly introduce the central arguments of the RAM-BM by referring to the “simplified” model of Fehr and Zych (1995).5

As mentioned above, the utility (u_t) of a person at any point of time does not only depend on the consumption of the addictive good in the present period (c_t), but also on the amount of its past consumption, which is expressed by the existing stock of consumption capital in t (S_t):

\[ u_t = u(c_t, S_t), \quad t = 1, \ldots, T \]  

(1)

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4 We would like to clearly differentiate between this test and the question of effectiveness of assumptions of technocratic regulatory instruments used in the production network of sporting success to reach the proclaimed goal of the network. In the case of Austria (Barth, 2015) as well as Germany (Emrich & Güllich, 2005), this goal is settled on a collective level, but the interventions used in sports development and promotion programs are arranged at the level of individual athletes. This might represent a mix of two different forms of rationality.

5 We consider using this simplified version as appropriate for our aim, as we are not going to test the RAM-BM but to use its central proposition to deviate the operationalization used for our empirical study. We also think it to be appropriate as the main emphasis of this article is on the praxeologically side, and therefore should also account for “non-economic” readers.
It is assumed that the consumption \( (c_t) \) happens at the beginning of the period so that \( u_t(c_t, S_t) \) also accrues at the period’s start. The development of the mentioned stock of consumption capital can be described as follows:

\[
S_{t+1} = (1-\delta)S_t + c_t, \quad t = 1, \ldots, T.
\]  

(2)

in which \( \delta \) is the discounting rate. The initial stock of the consumption capital shall be \( S_1 \), \( T \) the lifetime of the individual and \( \sigma \) the constant time-preference. Therefore, we get the overall benefits for a person discounted to the period \( T \) as follows:

\[
U_t = \sum_{t=1}^{T} (1 + \sigma)^{T-t+1} u(c_t, S_t).
\]  

(3)

Since a rational person always tries to maximize his utility to his budget constraint (Becker & Murphy, 1988), we now have to take a look at this constraint.

Comparable to the assumption mentioned above, it is assumed that the assignment of both income \( (w) \) and consumption \( (p_t c_t) \) occur at the beginning of the period. With \( A_t \) as the asset at the beginning of period \( t \), \( r \) as the interest rate in a capital market under perfect conditions, \( p \) as the constant price of the good and \( t \) as the constant income, the asset development can be illustrated by the following equation:

\[
A_{t+1} = (1+r)(A_t + w - p c_t), \quad t = 1, \ldots, T.
\]  

(4)

The parameters \( \delta, p, r, \sigma, w, T, S_1 \) and \( A_t \) are constituted exogenously. A rational person now chooses the consumption path, which maximizes his utility if we take into account the given constraints in formula (2) and (4) as well as the non-negative definiteness \( (\geq 0) \) of the terms \( c_t \) and \( A_{t+1} \).

Following the utility function in equation (1), it is possible to identify some core characteristics of addictive goods with respect to the RAM-BM:

(1) Tolerance effect: “Tolerance means that the given levels of consumption are less satisfying when past consumption has been greater” (Becker & Murphy, p. 682). Formally, \( \partial u_t / \partial S_t = u_S < 0 \).

Stigler and Becker (1977) refer to such goods as harmful. The greater the consumption has been in the past, the higher it must be in the present in order to reach a certain level of utility. Therefore, we can have beneficial goods only if the marginal utility of time allocated to a good is raised by an increase of this good’s stock capital (Stigler & Becker, 1977). In this case, practicing (e.g. music or sports) does not only mean the realization of actual utility, but can also be considered an investment for realizing future utility.

(2) Reinforcement effect: “Reinforcement means that greater current consumption of a good raises its future consumption” (Becker & Murphy, 1988, pp. 681–682): \( \partial C_t / \partial S_t > 0 \). This reinforcement is based on the concept of “adjacent complementarity”.

(3) Adjacent complementarity: Introduced by Ryder and Heal (1973), this concept “means that the past consumption of an addictive good raises the marginal utility of current consumption of that good. Equivalently, it implies that the consumption levels of an addictive good at different points of time are complements i.e. level of consumption of an addictive good in period \( T \) affects consumption level in period \( T + 1 \) and is affected by consumption level in period \( T - 1 \)” (Biltagy, 2014, p. 44). The adjacent complementarity condition can be written as: \( \partial^2 u_t / \partial c_t \partial S_t = u_{Ss} > 0 \).

Based on these central conditions, N.N. (n.d.) deduced two ideal types of potential addictions:

(1) Addiction caused by harmful goods: Goods that are easy to consume and habituate to but also show a tolerance effect are called harmful goods.
(2) Addiction caused by complex goods: Complex goods only generate a low level of pleasure at the beginning of consumption. However, the pleasure increases with growing expertise and experience. Such goods frequently require a person’s own contribution (uno-actu principle). Gaining experience demands time and usually financial investments. As shown above (Stigler & Becker, 1977, p. 79), “focused training process” (N.N., n.d.) is referred to as “beneficial addiction”.

As stated in the beginning, addiction is often considered an undesirable condition, excluding beneficial addiction. Such a conception of addictions can be found even within the field of economics. For example, Tomer (2001) suggests that there are five features defining addiction (habit, harmful, dependent, carving, withdrawal). These features allow us to distinguish according addictive behavior from other behaviors. According to Tomer (2001), his second characteristic harmful means that no beneficial addictions exist. Yet, as Stigler and Becker (1977, p. 81) have pointed out, their distinction is operational. They clarify that the characteristic “harmful” only implies that the derivative of utility for consumption capital is negative (see core characteristic (1) above), “and not that the addiction harms others, nor, as we have just indicated, that it is unwise for-addicts to consume such commodities” (Stigler & Becker, 1977, p. 81). To avoid any misunderstandings, the authors of this paper would like to add that this is not supposed to be a judgement of wrong and right or better and worse in terms of defining addiction. It is only meant to call attention to the fact that criticism of models can simply be based on different conceptions and understandings of what an addiction is.

After discussing the central assumption of the RAM-BM and deducing the inherent main characteristics, we will now address the question whether we have good reasons to believe in this model.

2.2 Rational addiction models: criticism, improvements and empirical evidence

As mentioned above, the RAM-BM has always been criticized. One of the main objects of criticism is the forward-looking behavior that has been modeled as perfect in the RAM-BM. This criticism concerning the assumption of perfect foresight is mentioned by many authors such as Gruber and Köszegi (2001), Orphanide and Zervos (1995, 1998) or Rogeberg and Melberg (2011). A difficulty of the RAM-BM is that the rational consumer with perfect foresight would never end up at a high level of consumption. Becker and Murphy suggest handling this problem by assuming the consumer’s life to be disturbed by unforeseen life-crises (Skogs, 1999). Skogs (1999) expresses the idea that the consumer takes a calculated risk.

Hence, it becomes clear that the assumption of intertemporal consistent/time-stable preferences is another major point of criticism. For more details on criticisms of the model and empirical findings on time preferences, please confer e.g. Davis (2013), Leland (2010) or Shane, Loewenstein, and O’Donoghue (2002). There are also several challenges on the methodological side of testing the rational choice theory (e.g. using aggregated data, the problem of reporting errors) (Cawley & Ruhm, 2011).

The above-mentioned criticism on the RAM-BM clearly questions the validity of the model even before its empirical testing. From this point on, there are two possible solutions: either to dissociate oneself from the whole model or to develop and enhance it (e.g. by relaxing some of the assumptions).

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6 In explaining the term harmful, Tomer (2001, p. 245) made the following specific provision: “Second, it is harmful, that is, it is a bad habit. Consuming the addictive commodity is expected to result in significant negative side effects of a psychological, social or physical nature. For example, excessive, prolonged consumption of alcohol is expected to cause cirrhosis of the liver and damage to family and work relationships, among other things.” Later in his paper he describes harmful as being a hallmark of addiction (Tomer, 2001).
These remarks show that both paths have been treated in the past. We do not intend to go any further into the dissociation and its arguments, but the interested reader may refer to the references in this case. Also, we do not want to go into details regarding the model’s enhancements. As far as the developments are concerned, we recommend the following sources: Gruber and Köszegi (2001), Demuynck & Verriest (2013), Gil-Lacruz & Gil-Lacruz (2013).

As already shown in the context of criticism where the RAM-BM is concerned, it should be mentioned that there are several attempts to model addiction (within the utility maximizing framework as well as outside of it) which clearly deviate from the core assumption(s) of the RAM-BM (e.g. Drugeon & Wigniolle, 2007; Dynan, 2000). With regard to the central problem of this paper, we would like to explicitly point to an interesting advancement. By employing the revealed preference methodology, Demuynck and Verriest (2013) try to apply their strong assumption to the framework of Becker, Grossman, and Murphy (1994). The authors extend the life-cycle model of Browning (1989) by generalizing the intertemporal consumption dependence underlying the addictive behavior. This could not only be an interesting approach to the objective problem of this article but also to the decision problems athletes are confronted with over their whole life cycle, especially in respect to post-retirement athlete careers.

Delving into Gruber and Köszegi’s (2001) take on this brings out other problems. Ida (2010, p. 174) calls this approach “irrationality (or bounded rationality)” while Aristei and Pieroni (2010) state that the authors incorporate time-inconsistent preferences into the rational addiction model and Kan (2007, p. 63) says the model has been “modified”. This shows that the authors seem to have different understandings and requirements of the concept of rationality. Subsequently, this makes it necessary for us to clarify what we understand as rational. Also, different models under the term “rational addiction model” have been tested, which makes comparisons even more complicated. Today, the theory of rational addiction is illustrated by different models and variants (Rogeberg & Melberg, 2011). The reason for explicitly pointing this out is that neither rationality nor addiction have been defined contrary to or in accordance with these models labeled as “rational addiction”. In addition, we cannot actually speak of “the rational addiction” model and its test. We should also mention that the theory of rational addiction at least allows us to derive several hypotheses. In addition to testing them, different ways of operationalization as well as methods of analysis are possible. As can be seen, there are several problems which have to be taken in account when reviewing the existing literature and evaluating the empirical evidence on rational addiction. To do this in a systematical way would be beyond the scope of this paper since we only focus on answering the question whether there are good reasons for using this theoretical approach. The detailed results of our analyses of studies testing for rational addiction can be seen in the appendix.\(^7\) We will now briefly describe our central findings in the following.

First, our analysis reveals that smoking was the main object of interest. Second, most of the studies used data from the US market. Third, it can be said that there is mixed evidence for the theory of rational addiction. Considering all these facts, there seem to exist (good) reasons to apply the model, more precisely one of its core concepts, the intertemporal consumption dependency (N.N., n.d.). In the field of sports, it can be noted that we found only three studies which investigate this well, but all of those three studies deal with its passive form (attendance). Wicker, Breuer and Pawlowski (2010) as well as Alfs (2014) actually used Stigler and Becker’s theoretical approach of consumption capital (Stigler & Becker, 1977), but their remarks leave open if they understand sports as a possibly addictive good, although Alfs (2014) directly refers to harmful and beneficial addictions. Both articles do not deal with high performance sports. Addiction to recreational sports

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\(^7\) 12 studies were published between 1991 and 2000, 34 between 2001 and 2010, 12 articles were published after the year 2010 and one reviewed study is an unpublished manuscript.
3. Some Thoughts on Sport as a Good and Its “Production” (in Austria)

In this section, we will have a brief look at the good and its “production”. It is first necessary to clarify exactly what is meant by talking about sports and their “production”, namely high performance sports that are organized in sports clubs with the aim of sporting success. However, this notion is not restricted to elite-level sports, meaning that youth sports are part of our “operational definition”.

How international elite sporting success can be achieved is a central question in elite sports (Moesch, Elbe, Hauge, & Wikman, 2011). Its production process can be characterized in both Austria and Germany as a “production network” (“Produktionsverbund”) with the aim of maximizing the elite-level sporting success of a nation (on the collective level). Such a network requires a high level of coordination, which is performed via institutionalized coordination instruments. These technocratic regulatory instruments try to achieve the mentioned aim at a collective level and are

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8 As mentioned above, we will pick up this question again in our discussion, which should stress the importance and the relevance of raising questions in this context.
based on interventions at the individual level of the athletes (Barth, 2015; Emrich & Güllich, 2005). Although this entanglement is per se problematic, we do not want to stress this argument any further in this article, which means that our results should not be interpreted as testing at the collective level.

These talent identification and development models “focused on applying current motor performance and/or competitive success as the main or only selection criterion” are principally based on economic motives (Vaeyens et al., 2009, p. 136). Emrich and Güllich (2005) (for Germany) as well as Barth (2015) (for Austria) examined the main principles in terms of their effectiveness at the individual athlete level and their results at least query the effectiveness of applied technocratic regulatory instruments.

4. Materials and Methods

This retrospective study was conducted in a cross-sectional design. The study instrument was a questionnaire covering more than 100 questions. Among other things, the participants were requested to provide information on their “sportive life course” (age intervals used: until the age of 10, 11-14, 15-18, 19-21, and ≥ 22 years) and socio-demographic characteristics. 31 of 33 NGBs including sports that are part of the Olympic program declared their support for this study. Not included in the study were the “Österreichischer Eisschnelllauf Verband” and the “Austrian Sportschützen Fachverband”. With a total of 31 NGBs, a whole-population survey was done.

Because of privacy policies, the postings had to be done by the NGBs in most cases. The period of our survey stretched over August and September of 2008. The athletes got a closed envelope including the questionnaire as well as a self-addressed envelope with “postage will be paid by addressee” printed on it.

The response rate was about 20% (n=452) and after quality control, we had around 340 questionnaires to analyze. The sample was constrained to athletes who had already reached the age limit of juniors according to the international competition regulations of their sports. This brought the sample size down to 291. The subsamples can be described as follows:

<table>
<thead>
<tr>
<th>Table 1 Description of subsamples</th>
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<tbody>
<tr>
<td><strong>Juniors</strong></td>
</tr>
<tr>
<td>Portion (n)</td>
</tr>
<tr>
<td>Distribution between the sexes within groups (♂ : ♀)</td>
</tr>
<tr>
<td>Average age, (M (SD))</td>
</tr>
</tbody>
</table>

First, we have to answer the question whether athletes can be described as addictive in their behavior. In order to be labeled as an “addict” of the complex product sport, an athlete has to fulfill the following two conditions:

(1) The athlete must be training over a time period of at least three age categories.

(2) Throughout his career, the athlete must have at least one (positive) rate of increase in his overall volume of training in two consecutive age categories. In addition, no rate must be zero or negative, except for a reduction due to injury or illness (= unwanted cold turkey). To be judged as an unwanted cold turkey, one of the following conditions has to be given:

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9 For a more detailed description of the subsamples see Barth (2015).
(a) Reduction of training > 30 weeks within an age category
(b) Complete training interruption > 15 weeks within an age category
(c) Reduction of training > 15 weeks and interruption > 7 weeks within an age category

Second, to test for the individual rationality of addiction to a beneficial good, we used the following conditions:

(3) Addicts are forward-looking in their behavior. This assessment was done using the two following statements:

(a) “Whether I do or do not have long-term success depends on coincidences.” (translated from German)
(b) “Whether my sporting career is successful or not is the result of my hard work.” (translated from German)

The athlete had to rate his agreement to these statements on a 6-point Likert-Scale of 1 (I strongly disagree) to 6 (I strongly agree). To be characterized as “forward-looking”, a person had to mark the first question between 1 and 3, the second between 4 and 6.

(4) Sport is considered a beneficial good and a rational person should therefore maximize its utility. With this in mind, at least the following assumption must hold true. Rational addicts are satisfied with their sportive performance in the last 12 months, which means that they mark either a “+1” or a “+2” on a Likert-Scale that asks for their satisfaction with their sportive performance in the last 12 months. The rating was done on a 5-point Likert-Scale (-2 very unsatisfied to +2 very satisfied).

To evaluate if addicts are more successful than non-addicts, we compare the distribution of addicts and non-addicts among int.suc. and max.nat.suc. junior athletes as well as among int.suc. and max.nat.suc. elite athletes. For the methods of group allocations, see Barth (2015).

While the statistical analysis was done with the help of IBM SPSS Statistics 23, the comparison of addicts and non-addicts with regard to their success was made by using the Pearson’s χ²-Test. In both these cases of age-related comparisons between elite/junior addicts and elite/junior non-addicts, we used the Mann-Whitney-U-Test because of lack of normality in at least one comparison group (KS-Test: p < .05) and also lack of homogeneity of variances (Levene-Test: p < .05) or the existence of extreme values. In order to test for homogeneity in the group of elite addicted athletes, we used Fisher’s exact test (Leonhart, 2013). All tests were two-sided. The p-value for significant was set to .05 and to .01 for highly significant.

5. Results and Discussion

Due to the top two conditions for labeling an addict above, 72 of the 206 athletes can be described as addicts. Considering the unwanted cold turkey, two additional athletes are labeled as addicted. This leads to a relative portion of 36%. On the basis of condition 3, 10 of the 74 addicted athletes are classified as not forward-looking in their behavior. In the case of another three athletes, it was not possible to come to a conclusion because of missing data. The second constraint we have brought forward to judge for rationality in the context of a considered (individual) beneficial good was tested with only 60 addicts because one athlete did not rate his satisfaction. 20 addicts athletes marked less than +1. This means that we can describe 40 of 206 athletes (19%) as rationally addicted to sports.

The results of the comparison of addicts (which means not restricted to rational ones) versus non-addicts regarding their success can be seen in the table 2 below.
Table 2 Comparison of addicted and non-addicted athletes regarding their success in the group of junior and elite athletes

<table>
<thead>
<tr>
<th></th>
<th>Junior</th>
<th>Elite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-addicts (n)</td>
<td>20</td>
<td>46</td>
</tr>
<tr>
<td>Addicts (n)</td>
<td>9</td>
<td>31</td>
</tr>
</tbody>
</table>

For the group of junior athletes, the $\chi^2$-Test shows no significant result ($\chi^2(1, n=106) = .76, p = .382$), but for the group of elite athletes, the $\chi^2$-Test shows that addicts are significantly more successful than non-addicts ($\chi^2(1, n = 100)=11.03, p = .001$). It could be argued that the elite non-addicts are younger and due to their age have not had as many chances to compete as the elite addicts. The results confirm this assumption. Elite non-addicts ($Mdn = 22.7, Iqr = 3.6$) are significantly ($U(66/33) = 689.00, p = .003$) younger than elite addicts ($Mdn = 25.8, Iqr = 7.9$). This means, being addicted to sports could be advantageous for elite-level success, but we have to be aware that there has no distinction been made between the volume of training the athletes have done in their main sport and other sports. Above all, we will have to control for age in comparing the groups in future studies.

Interestingly, the group of elite addicts ($Mdn = 7.8, Iqr = 4.2$) are just as old as the group of non-addicted elite athletes ($Mdn = 8.7, Iqr = 4.7$) when starting their regular training (independent of the kind of sport) in sports clubs ($U(34/66) = 1051.00, p = .605$). Within the group of addicted elite athletes, we can see that int.suc athletes are significantly ($p = .039, n = 34$) overrepresented among non-training athletes if we test the group for homogeneity in terms of the distribution of training and non-training athletes in the age category until 10 years.

The result that int.suc. elite addicts are less likely to train in a sports club in the age category until 10 years than the comparison group of max.nat.suc. elite athletes might lead into the same direction as the results of Moesch et al. (2011). He states that elite athletes had accumulated less training hours in early adolescence in comparison to near-elite athletes, but intensified their training regime during late adolescence. This would speak against one of the main assumptions of the technocratic regulatory instruments used in this article. If further detailed analyses confirm this result, different forms of rationalities as well as interests will have to be considered in the future. As we have shown in the short remarks about sport as a good, the evidence queries the technocratic regulatory instruments regarding their assumptions about the direction of correlation between training volume and sporting success. This brings us to the point of reconsidering the role of intended supportive institutional elements as well.

As the subsidy of sports lowers the cost for an athlete, it might simultaneously create the appropriate framework to get addicted. Believing to work in an effective forward-looking manner while being faced with reduced actual costs of training, an athlete might decide to stay in the system longer as it would be the case if no subsidy existed. As a result, this means a higher and longer investment in time. Assuming the opportunity costs increase over time, we now see that we have to consider a system’s produced deadweight loss if we want to evaluate the work of intended support-

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10 As our success variable is coded to be considered as metric, we are able to control the age in future analyses. Without controlling it, there would still remain justified doubts.

11 An interesting theoretical approach from an economic point of view would be the differentiation between general and specific human capital (e.g. Becker, 1983).

12 It is assumed that early onset correlates positively with long-term success in elite sport (Güllich & Emrich, 2006).
ive institutions. Since we understand the concept of rationality as subjective in this context, we think the term rational is still appropriate.

In fact, it could also be that even a fully informed rational athlete, and the frame conditions which can be found in the production process of sporting success might even speak for this, chooses to continue practicing sports as a rational addict. He would do so although (and he knows) he would end up with a lower level of welfare if we consider high performance sports to be harmful, which should not be excluded yet. If the actual welfare level of consumption is high, which could be done by forward displacement\(^\text{13}\), and the harmful effects\(^\text{14}\) do not show up in the near future, an athlete will carry on consuming because of being “unable to endure the temporary setback needed to take two steps forward” (Skog, 1999, p. 180).

There are several limitations of the study that need to be acknowledged. Regarding the study design, it has to be kept in mind that the data originates from a retrospective cross-sectional study. The operationalization of addiction and rationality could be improved in future research. Regarding the former, this seems to be a restrictive definition because of the relatively long time horizon. Also, not distinguishing between the training volume in the athlete’s main sport and in other sports is a clear limitation considering that general and specific human capital might exist. Concerning the latter, the way of measuring and evaluating the forward-looking behavior and satisfaction could be improved. Considering a good to be beneficial would request an optimization over the life-cycle according to RAM-BM. This was certainly not done by our approach. As a consequence, the question whether sport is a beneficial or harmful good considered over the whole life-cycle remains unanswered. What Becker and Murphy (1988, p. 682) called “tolerance effect” could also be triggered by delayed harmful effects (Skog, 1999), even if we do not violate the assumption of an exponential discount factor.\(^\text{15}\) Not only with regard to the whole life-cycle, the assumption of sport being a beneficial good has to be questioned.\(^\text{16}\) Above all, if we question the beneficial characteristics of sports, we acknowledge that they can be risky sometimes. As e.g. Wilk, Bliese, Kim, Thomas, McGurk, and Hodge (2010), Kelley, Athy, Cho, Erickson, King, & Cruz (2012) or recently Garyn-Tal and Shahrabani (2015) were able to show, exposure to the threat of death/injury corre-

\(^{13}\) We can mention the positive emphasis of youth success also its prediction validity is questioned by empirical evidence (e.g. Allen, Vandenbogaerde, Pyne, & Hopkins, 2015; Barth, 2015; Brouwers, Bosscher, & Sotiriadou, 2012; Emrich & Güllich, 2005).

\(^{14}\) For instance the possible negative effects on athletes’ health as well as on their post-retirement athlete career.

\(^{15}\) Krumer, Shavit, and Rosenboim (2011) made an interesting contribution to the time preference of professional athletes. The authors were able to show that these athletes “discount time more heavily than non-athletes, indicating that athletes were less willing to postpone receipt or payment than non-athletes” (Krumer et al., 2011, p. 546). First, as Krumers and colleagues sample was restricted to professional athletes, it would be interesting to compare the time preferences of elite athletes and young athletes. Second, as our questions refer to sports and the questions of the above-mentioned article to hypothetical questions on investments, it would be interesting to see if there are differences concerning the object of evaluation.

\(^{16}\) In answering this question, we have to distinguish between evaluations of athletes and a normative evaluation. Although only the first one is of interest for this article, answering the second one is without any doubt of high importance for practical considerations. A clarification of the first question mentioned seems to be of high importance as we could use a modified version of the utility function of the RAM-BM model if sport is not considered a beneficial good. In this context, we want to explicitly thank a reviewer for his valuable contributions.
lates with risky behavior. This clearly casts doubt on the assumption of stable preferences. It would therefore be interesting to see how the threat of injury as well as the injury itself influence risky behavior and time-preferences of athletes.

Other central questions for future research might be the following: What do the different stakeholders in the production network believe about the production process of elite sports? Do they judge success as being positively related at all age levels and in which level of success are they interested? What do they know about the empirical evidence? As these systems seem to be very resistant, how are beliefs protected against evidence? Especially in the context of sports, Frank (2007) brings forward an interesting idea by discussing the rational additional model of consumption lock-in. Expressed simply, it deals with the transfer of personal taste from the parents to their kids. Besides this individual level of positive feedback, the article discusses the social as well as the firm- and market level of positive feedback and the possibility of path dependency or even perhaps locked-in situations. Another question arising from dissolving the assumption of stable preferences is whether time-preferences have an impact on behavior or if behavior alters the people’s time-preferences. As mentioned above, several questions about opportunity costs or the transfer of human and social capital are connected to this topic as well. Last but not least, we should ask if (high performance) sport is a beneficial or harmful good.

6. Conclusion

It becomes clear that all the limitations mentioned above put a strain on our empirical results. Although this may be true, this is the first step in applying the rational addiction theory to a high performance system in sports. Our findings suggest that there seem to be athletes who can be labeled as rationally addicted to sports. From a praxeological point of view, our results show that elite athletes that are addicted to sports are more successful than those elite athletes who are not. Nevertheless, it has to be taken into account that addicts were significantly older compared to non-addicts at the time of the survey. Interestingly, within the group of addicted elite athletes, int.suc. athletes are less likely to train within the age category until 10 years than max.nat.suc. athletes.

In challenging the used technocratic regulatory instruments, which seem to be quite persistent despite of contradicting evidence, we opened up the discussion for another “form” of rationality – the rationalities that are established on the network by claims coming from their environments, which by themselves are based on what is considered to be a technical-rational solution or not. Considering these rationalities should preserve us from not only discussing rationality in the sense of the production function but also in terms of the legitimating function of institutional elements. According to Meyer and Rowan (1977), it is the latter that protects the flow of resources and ensures the survival of the organization. As these rationalities may be conflicting, a way to balance them is to establish highly rationalized myths (basically Meyer & Rowan, 1977).

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18 We want to emphasize, that there might exist several realities in the environments (plural!) of organizations (see fundamentally Berger & Luckmann, 2012; Meyer & Rowan, 1977).
19 Such a consideration seems to be appropriate as well as sufficient if we consider that the central organizations for developing and promoting sports in Austria have the form of non-profit organizations. Furthermore, the proclaimed aim is a product with a high amount of uncertainty. The “production” is characterized by a hardly possible measurement of network members’ contribution to the quality of products (see basically Barth, 2015; Emrich & Gülich 2005).
These thoughts on existing rationalities in the production network of sporting success, which are concerned with achieving success at the level of individual athletes can be illustrated as follows in Figure 1.

**Figure 1** Rationalities in the production of sporting success – practicing sports and its (believed) correlation for sporting success at the individual athlete’s level

This requests further efforts (studies done at the individual level) to better understand what is happening within the network. More research and information on the topic is also needed to avoid being dazzled by rhetorical efforts that emphasize the consensus of interests among members of the production networks of sporting success. The RAM-BM proved to be an appropriate model for shedding new light on existing problems, but it should not go unnoticed that several other economic (e.g. organizational) theories can make a valuable contribution. Evaluations accounting for the opportunity costs and deadweight loss, which may be produced by member organizations and institutions used in high performance sports systems, have to be done at the collective level. Such evaluations emphasize the necessity of longitudinal analysis encompassing post-retirement athlete careers. Above all, further analysis at the collective level should be done by applying appropriate strategies of analysis.

In addition, the application of the rational addiction theory not only raises questions within the field of sports but also contemplates whose answers can contribute to the further development of economic theories in the context of resistance.

One of the greatest values of applying the theory of rational addiction to a high performance system in sports is that it brings new questions to light. Future research should concentrate on how an organization like the network we are talking about can strengthen its beliefs. In other words, it should investigate the ways that might lead to wanted or unwanted “institutionalized” lock-in situations.
References


~ 17 ~


[78] N.N. (n.d.). *Obsessive passive sports consumption - is the addiction to stadium football rational?* Unpublished manuscript.


## Appendix: Table A1. Studies testing rational addiction (Supporting; Not supporting; Supporting/not supporting = evidence not clear)

<table>
<thead>
<tr>
<th>Source</th>
<th>Goods/commodities</th>
<th>Nation data analyzed</th>
<th>Supporting/not supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahn &amp; Lee, 2007</td>
<td>Sport Attendance, Major League Baseball</td>
<td>US</td>
<td>Supporting</td>
</tr>
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<td>Arcidiacono, Sieg, &amp; Sloan, 2007</td>
<td>Drinking and smoking</td>
<td>US</td>
<td>Supporting</td>
</tr>
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<td>Arlert &amp; Paroni, 2010</td>
<td>Tobacco, Alcohol</td>
<td>Italy</td>
<td>Supporting</td>
</tr>
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<td>Aud &amp; Grootendorst, 2004</td>
<td>Cigarettes and non addictive goods</td>
<td>Canada</td>
<td>Not supporting</td>
</tr>
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<td>Baltagi &amp; Geishecker, 2006</td>
<td>Sport Attendance, US (MLB) and Korea (KPBL)Alcohol</td>
<td>Russia</td>
<td>Not supporting</td>
</tr>
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<td>Baltagi &amp; Griffin, 2001</td>
<td>Cigarette smoking</td>
<td>US</td>
<td>Supporting</td>
</tr>
<tr>
<td>Bask &amp; Melkersson 2004</td>
<td>Alcohol and smoking Cigarettes</td>
<td>Sweden</td>
<td>Supporting/not supporting</td>
</tr>
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<td>Becker et al., 1994</td>
<td>Cigarette smoking</td>
<td>US</td>
<td>Supporting</td>
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<td>Binder &amp; Coad, 2013</td>
<td>Alcohol (liquor)</td>
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<td>Supporting</td>
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<td>different (objective) conditions of bad health affect</td>
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<td>Blondel, Llobet, &amp; Rinaudo, 2007</td>
<td>Drugs</td>
<td>France</td>
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<td>Breteteville-Jensen &amp; Basse, 2003</td>
<td>Heroin</td>
<td>Norway</td>
<td>Not supporting</td>
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<td>Cameron, 1997</td>
<td>Cigarette smoking</td>
<td>Greece</td>
<td>Not supporting</td>
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<td>Cinemas</td>
<td>United Kingdom</td>
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<td>Cigarette smoking</td>
<td>US</td>
<td>Not supporting</td>
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<td>Chaloupka, 1991</td>
<td>Cigarette smoking</td>
<td>US</td>
<td>Supporting</td>
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<td>Chen, Lin, 2012</td>
<td>Cigarette smoking</td>
<td>US</td>
<td>Supporting</td>
</tr>
<tr>
<td>Collet, Lapparent, &amp; Hivert, 2015</td>
<td>Car usage</td>
<td>France</td>
<td>Supporting</td>
</tr>
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<td>Conover &amp; Scrimgeour, 2013</td>
<td>Alcohol</td>
<td>New Zealand</td>
<td>Supporting/not supporting</td>
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<td>Cotti, Dunn, &amp; Telft, 2013</td>
<td>Health Risk Behavior</td>
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<td>Supporting</td>
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<td>Fehr &amp; Zych, 1998, 2008</td>
<td>Experiment with undergraduate Students</td>
<td>(Vienna)</td>
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<td>TV-Consumption</td>
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<td>Supporting</td>
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<td>Gil-Lacruz &amp; Gil-Lacruz, 2013</td>
<td>Pacifier use</td>
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<td>Harris, Ramful, &amp; Zhao, 2006</td>
<td>Alchohol</td>
<td>Australia</td>
<td>Supporting</td>
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<td>Indonesia</td>
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<td>Japan</td>
<td>Supporting</td>
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<td>Supporting</td>
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<td>Supporting (differentiation of level of consumption)</td>
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<td>Lebeuga, 1999</td>
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<td>Yang, 2016</td>
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