

Differential Analysis of the Doping Behaviour Templates in Three Types of Sports

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ABSTRACT

Conducted researches recognize various risk factors, as well as protective factors against doping behaviour in different sports i.e. sports disciplines or activities. The main goal of this research was to identify the correlation between selected socio-demographic, health-related, and sports-related predictors with doping factors in three different types of sports, which are (1) highly energetic demanding sports (weightlifting), (2) highly technical demanding sports (racquet sports), and (3) highly tactical demanding sports (sailing). The research consisted of three separate studies, each one of them researching one of the sports. The sample of subjects included altogether 293 athletes, senior level competitors (older than 18 years of age). In total, the sample comprised three homogenous sub-samples, as follows: athletes in highly energetic demanding sports (weightlifters and power lifters; N=27), athletes in highly technical demanding sports (table tennis, tennis and badminton players; N=188), and athletes in highly tactical demanding sports (sailing; N=78). The first study involved weightlifters where we should point out the existence of high doping behaviour. In this study, religiousness was interpreted as the most significant protective factor against doping behaviour, while sports factors are not found to be significantly related to doping. The study involving racquet sport athletes suggests a high risk of doping behaviour among those athletes who observe doping behaviour in their sport. We noticed low levels of athletes' trust in their coaches' and physicians' opinions on doping issues. This is an issue which should be researched in the future, because the underlying cause has not been studied as yet. Briefly, it seems that either the athletes are not convinced of their coaches'/physicians' expertise regarding doping issues, and/or they do not believe in their good intentions. It is particularly important, as the previous research has shown that with the increased trust in coaches and physicians, the chance that an athlete will use doping decreases. As expected, it is characteristic for sailing that it has a low likelihood of potential doping behaviour, although the consumption of dietary supplements is high. Substance abuse in sports spreads beyond those that enhance athletic performance. All of these issues should be studied in more detail in the future and, if appropriately validated, incorporated into anti-doping intervention programs.

Key words: dietary supplements, performance enhancement, substance use, athletes

Introduction

In the most common description, doping is defined as the occurrence of one or more anti-doping code violations, mostly observable by presence of a prohibited substance or its metabolites or markers in an athlete's specimen¹. The use of doping is often related to serious health problems^{2,3} and even death⁴. Whereas dietary supplements (DSs) should be considered a logical and natural consequence of athletes' increased physical demands^{5,6}, doping is deemed unethical for performance enhance-

ment⁷. However, the sports community is often concerned about DSs being contaminated with doping substances. In short, doping agents (i.e. substances directly prohibited by the World Anti-Doping Code) have been traced in some DSs⁸⁻¹³. Such incidences understandably raise concerns about DSs in general.

Current anti-doping perspectives place special emphasis on doping prevention. It is generally recognized that doping behaviour should be inhibited before it oc-

curs, similar to preventing the abuse of other substances, such as cigarettes, alcohol and/or drugs¹⁴. Therefore, for the last couple of years, scientific efforts have been oriented towards investigating the protective/risk factors of the current and potential doping use (doping behaviour) in sports. The self-perception that doping is present in sports was one of the most important factors influencing doping behaviour in various athletes of both genders, which is consistent with recent findings concerning athletes' perceptions of performance-enhancing-substance »user and non-user prototypes«¹⁵⁻¹⁷. Recent studies have highlighted the need for a more detailed research of dietary supplements (DS) as a potential gateway to doping¹⁸; however, depending on the type (individual team, contact, non-contact, etc.), physiological basis (aerobic, anaerobic, mixed, etc.), and the overall social and cultural background (rich *vs.* poor, popular *vs.* non-popular, etc.), each sport was recognized as being unique with respect to factors that influence past, present and future doping among the athletes. From the more recent literature, it is evident that authors strongly debate the knowledge about doping (i.e. awareness of health risks of doping behaviour) as being a possible factor that influences doping behaviour^{16,19}.

The problem and the main goal of this review study was to observe and compare the doping behaviour templates and potential influence of different predictive/risk factors of doping behaviours in three groups of individual sports, specifically sailing (sport of high tactical demands), weightlifting (sport of high energetic demands), and racquet sports (sports of high technical demands).

Materials and Methods

Sample

The sample of subjects included altogether 293 athletes, senior level competitors (older than 18 years of age). In total, the sample comprised three homogenous sub-samples, as follows: athletes in highly energetic demanding sports (weightlifters and power lifters; N=27), athletes in highly technical demanding sports (table tennis, tennis and badminton players; N=188), and athletes in highly tactical demanding sports (sailing; N=78). The sample data were collected in Croatia (sailors), Slovenia (athletes in racquet sports), and Bosnia and Herzegovina (weightlifters and power lifters). When the samples were chosen, it was observed that the groups do not differentiate in the competition level, i.e. in the quality, and that athletes to be included in the sample would be exclusively participants in individual sports, because this way decreases the potential environmental influence on doping behaviour (e.g. opinions of an individual about the damage that his doping behaviour can do to his teammates). Moreover, all athletes from the sample are senior level athletes (older than 18 years of age).

Methods

Testing was done by using the Questionnaire of Substance Use (QSU), an instrument previously developed

and validated with regard to reliability (89–93% of subjects responded equivalently within the test-retest design), while the validity was proven by an appropriate level of discriminative validity for different groups of subjects^{20–22}. The basic QSU includes questions about attitudes toward DSs, doping factors, socio-demographics, and sport-specific factors. The sport-specific factors were modified specifically for three groups of the sports studied. The socio-demographic data included age, gender, religiousness, and educational level.

DSs and doping factors were studied through questions about the subject's self-determined knowledge about DSs and doping (two separate questions, self-assessed on a five-point scale ranging from »I have no knowledge at all« to »Excellent«), the athlete's opinion about doping practices in sailing (a four-point scale from »I do not think doping is used« to »Doping is often used«), potential doping habits (a four-point scale from »I do not intend to use doping« to »I'll use it if assured it will help me«), trust in coaches regarding doping and trust in physicians regarding doping (both »Yes/No« questions), the number of times a participant has undergone doping testing (a four-point scale from »Never« to »More than five times«), and a personal opinion on penalties for doping offenses (a five-point scale from »Doping should be allowed« to »Lifelong suspension«). DS usage was assessed using the response to one main question (possible responses were »Yes«, »From time to time«, and »No«) and separate responses for the consumption of vitamins and minerals, carbohydrates, proteins, Isotonix, recovery supplements, energy bars, and other DSs. For all the DSs, we offered four-point scales (»No«, »Sporadically«, »Often«, »Regularly«). In addition, we asked the athletes who was their primary source of information about DSs (possible answers included a coach, physician, friend, and oneself), and for those who did not consume and/or only sporadically consumed DSs, the reason why they did not use DSs, if applicable (the answer options were »I don't think it will be useful; I have a proper diet«; »I don't have sufficient knowledge to use DSs«, »The price is too high«, »I don't think DSs are healthy«).

Statistics

Counts (frequencies) and proportions were calculated for all of the data. Because of the measurement levels present in the data, a nonparametric Kruskal-Wallis ANOVA test^{23,24} was applied to establish differences between (a) the athletes competing in the Olympic classes and those competing in the non-Olympic classes, (b) single- and double-crew athletes, and (c) athletes and coaches for each of the ordinal variables. Analysis of variance (ANOVA) was used to determine differences in parametric variables (age, sports experience) between groups. Spearman's Rank-order Correlation was used for sports factors, socio-demographic variables, DSs, and doping factors (only for ordinal variables). Separate correlation analyses were used for coaches and athletes.

This research actually comprises three homogenous studies dealing with the problem of researching in three

TABLE 1
MAIN FINDINGS OF THE STUDIES

Sport	Main Findings	Factors of Influence on Doping Behavior	
		Protective Factors	Risk Factors
Sailing	high dietary supplementation; low doping likelihood; low belief that doping is present in sailing; high trust in coaches about doping issues	Not established	Not established
Weight lifting	high dietary supplementation; high doping behavior; high belief that doping is present in sport, high trust in coaches about doping issues	Religiosity and paternity	belief that doping is present in sport
Racket sports	medium dietary supplementation; medium doping likelihood; medium belief that doping is present in sport; low trust in coaches about doping issues	High sport achievement	belief that doping is present in sport; poor sport achievement

different sub-samples. The first study researches weightlifters (energetically demanding sports)²⁵, the second study researches racquet sports (technically demanding sports)¹⁵, and the third study is related to athletes in highly tactically demanding sports (sailing)¹⁶.

Results

Taking into account a large number of data processing, only the most important data were singled out for the purpose of this study. For a more detailed insight into the results, we suggest to refer to the studies^{15,16,25}.

Results obtained from the sub-sample including weightlifters and power lifters show a frequent use of doping (more than half of the athletes regularly use doping). Among various methods of administration dominates the oral administration, i.e. pills (37%), while 14% of subjects administer doping intramuscularly, i.e. by injection, as well as the combination of the two methods. More than half of the subjects believe that doping is regularly used in their sport, while only 22% of subjects would not take doping unless it would ensure them a better performance without negative effects on health.

Results of the sub-sample including athletes in highly technically demanding sports (tennis, table tennis, badminton) showed that there are no differences among those sports in respect of doping factor, although 10% of badminton players said that they would take doping if that ensured a better performance without negative effects on health, while 15% of table tennis players and 24% of tennis players would take doping products under the same conditions. However, 5 to 10% of male athletes pointed out that they would take doping regardless of its harmful effect. More than 80% of tennis and table tennis players, as well as 60% of badminton players do not trust their physician when it comes to doping issues. Although alarming, these results were actually not surprising, because the same problem was noticed in some previous studies²¹. Considering gender differences, women are generally less focused on potential doping behavior and trust more their coaches regarding doping issues, which

also has to be taken into consideration when creating anti-doping programs.

In the sailing sample, potential doping behaviour is very low among the subjects, where only one athlete said that he/she might take doping substances in the future. This can primarily be related to the fact that sailing is a sport which is not hit by doping problem (for example, as *per* annual laboratory statistical data published by the World Anti-Doping Agency, there were only 4 positive results found in sailing in 2011, but also because athletes from this sample do not believe that doping is present in sailing. Results of self-assessment of knowledge on doping showed that the level of subjects' knowledge is under average. The opinion about penalties for doping offenses tends to the rigid ones, including a lifelong suspension from competition.

Discussion

Tendency to use doping

From the results of all three studied sub-samples, one can notice that there is an extremely different tendency to use doping, which is related to the fact that doping is used in most cases in order to enhance athletic performance. For example, steroids are used to increase muscle mass, and with that to increase energy-generating muscle capacities, whereas for example erythropoietin is used to increase the production of red blood cells, i.e. to increase the oxygen intake²⁶. Considering that athletes from any of the studied samples did not or would not use doping to increase the oxygen intake, the only ones who have direct need to enhance performances by increasing energetic capacities are weightlifters and power lifters. In this sample, the use of doping substances is in fact the result of facts that they practice a sport in which the energy production capacity of muscles (and not technique, motor knowledge, or tactical skills, etc.) is the primary factor of success; therefore this is exactly the reason why these athletes decide to use doping substances. The results for the use of doping in this sub-sample are in this respect in conformity with the anticipated, because the

frequent use of doping in weightlifting and powerlifting is documented in many researches²⁵. High incidence of use can also be seen in annual laboratory statistical data published by WADA (which also recognized this problem among weightlifting and powerlifting athletes.

On the other hand, the results obtained in the sailing sample are completely the opposite. More specifically, sailing is an energetically demanding sport, but by training over many years one reaches energetic capacities which are perfectly sufficient for an athlete to be a successful sailor. However, energetic capacity is not what differentiates sailors in their success, but it is their distinguishing sailing knowledge, because sailing is such a sport in which an athlete cannot achieve results without the extremely high level of specific knowledge. Unlike weightlifting, where one can influence the results by increasing energetic capacity, sailing is so complex in terms of tactical demands (feeling for wind, waves, changes of weather conditions, sailing competition areas, etc.), that it is logical for sailors not to tend to take doping products, since they know that the use of doping cannot influence their competition performance and are aware of the fact that, in that respect, theoretically speaking, doping is useless. Furthermore, 60% of sailors recognized doping as an issue of fairness in sports, rather than as behaviour which endangers health, while Olympic-class athletes reported lower possibility of using doping in relation to their non-Olympic colleagues. Probably due to that reason, sailors are not willing to take the risk of being caught at doping control and then discredited, therefore they do not express tendency to use doping.

However, somewhat different results were obtained when analyzing racquet sports. That is to say, racquet sports are sports in which physical injuries are present, therefore it is not rare that a conviction that they can be improved by taking illegal substances prevails. For example, the movement typical for tennis, which causes inflammation, can result in shoulder pain (so-called shoulder impingement syndrome). The pain can be allayed with steroids, therefore it can be considered that this group of athletes tends to use doping²⁸ for that specific reason. Moreover, another reason for using doping, in particular concerning table tennis (and a bit less badminton), lies in the fact that Chinese are so extremely dominant in table tennis, that this causes certain frustration with athletes from other countries, thus it is possible that they might look for a solution in that direction. Likewise, the English are very dominant in sailing, however the situation is not that frustrating, because sometimes it also occurs that athletes from other countries produce good results. Tennis has a tendency toward doping usage as well, which can probably be attributed to the competition system itself. More specifically, tournaments are exceptionally tiring and exhausting, because they require travelling around the world from one tournament to another, and in that sense the athletes experience constant exhaustion which can be, theoretically speaking, improved by taking doping substances.

Athletes' trust with regard to doping

One of the significant problems generally recognized in researches concerning doping usage is also the problem of athletes' trust in physicians, but primarily in coaches. That is to say, athletes are nowadays highly devoted in achieving top results. In that process, the relation between athletes and coaches is of an extreme importance. From an educational-sports point of view, it is highly important that athletes have trust in their coaches in every aspect of sports training, as well as in other sport-related factors, as it is also the case with doping. Therefore, it is of great importance to determine in which way athletes behave in relations with their coaches, and whether they trust them or not.

Unlike the other two sub-samples, sailors have extreme trust in their coaches (more than 50% of athletes). The reason is that sailing is performed in specific conditions in which a coach and an athlete are completely alone and separate from the rest of the »world« at competitions as well as in training, therefore such conditions grant a development of a relationship permeated with an athlete's trust in a coach. Furthermore, frequent shared travelling characterized by cohabitation during the trip, additionally contribute to the development of close relations and trust; however, that trust is positive only if the coach has good knowledge on doping. In a case when the coach is not well informed, i.e. gives wrong advice, the athlete can be at risk. Therefore, the institutions should primarily influence coaches by means of preventive measures, because in that way much better results could be achieved.

On the other hand, athletes in racquet sports do not really trust their coaches as a consequence to the fact that athletes from those sports simply do not have any possibility to acquire trust in their coaches. That is to say, racquet sports are held in sports halls or playgrounds where an athlete receives a lot of information from people involved in those sports. Consequently, there is less need for turning to a coach; therefore trust cannot be built, so it is logical that this trust is not recognized even when it comes to doping usage and similar issues. This situation is also typical for similar sports; however, it is even more emphasized in this case, because in racquet sports coaches very often change. This happens because coaches in racquet sports, unlike in sailing, do not raise athletes, therefore all of this results in lack of trust between the coach and the athlete.

Weightlifters trust their coaches, because it is almost impossible that an athlete would take doping without his/her coach knowing about it. As doping directly reflects on the performance, it is impossible for a coach, who is always present, not to notice the athlete's enhanced performance.

Risk factors associated with use of doping

Results obtained from the sub-sample in racquet sport athletes show that a significant number of athletes believe that doping is used in their sport, however there are

no differences among sports in this respect. In line with the development of belief that doping is present in badminton and table tennis, there is also an increased possibility of using doping in those sports. Nevertheless, the correlation between those two variables in tennis is not significant, probably due to low levels of freedom. It is therefore evident that those who are more convinced that doping is present in their sport, have also bigger probability to use doping in the future. This is also confirmed by the results of the sample with weightlifters and powerlifters, as well as results from recently published studies²², so the belief that doping is used in a specific sport should be recognized as a risk factor associated with the use of doping. An explanation for such environmental influence on the behaviour can be found in self-categorization theory²⁹. The theory postulates that an individual is categorized in a group of people which this individual perceives as similar to him/herself, which results in the fact that the individual's feelings, thoughts and behaviour conform to those members of the group which he/she associated with (so-called group prototypes).

Potential use of doping with sailors does not have a single significant correlation, therefore we cannot even talk about risk factors, since it is obvious that an almost inconsiderable evidence of doping (only one athlete stated that he/she might use doping in the future) precludes the definition of risk factors as such. However, from the sample results in weightlifting and racquet sport athletes, it is obvious that those who recognize their sport as a doping contaminated sport are closer to a decision to use doping.

Protective factors against use of doping

In the sample of weightlifters and power lifters, marital status and family status, together with religiousness, can be considered protective factors against the use of doping. Hence, it can be concluded that more religious parents will avoid any kind of health-risk behaviour, trying not only to protect their health, but also to ensure positive and moral model for their children. Although in literature one cannot find a research which analysed protective factors such as the roles of parents, spouses and religiousness in the context of doping, it was documented that changes in these three social roles contribute in the decrease of the use of substances in general, this with statistical control of other predefined potential effects such as, for example, the age³⁰. At the same time, social roles resulting from family formations have bigger influence in comparison with other social roles, such as, for example, a working role, and the reason for that is in the fact that the transfer to the family role and experiences resulting from it can generate changes in social life and religiousness, both related to changes concerning the use of substances³¹.

On the other hand, as far as racquet sport athletes are concerned, the male part of the sample showed negative correlations (although not significant) in the case of sports experience. It is obvious that older athletes who

have already achieved some results have a negative tendency towards doping substances. Taking into consideration that they have already achieved results without taking doping, it is very likely that they do not want to take risks by taking doping substances, since they have already achieved what they wanted, so the belief that there are no sports achievements without systematic and hard work is probably meritorious for preventing this group of athletes from taking doping substances in the future. This result was also confirmed in some of the previous researches³², therefore in education and prevention programs, the individuals who did not achieve any results should be in particular taken into consideration, because they represent a risk group also in this case. It is interesting that the level of formal education, contrary to some findings in recent studies³², did not show as a protective factor.

In the sample of sailors, we cannot talk about protective factors because, as it was already mentioned, due to the low tendency of the use of substances there are no correlations with potential use of doping obtained. This is because the predictors of doping behavior are above all sport-, but also culture- and gender-specific. In this respect, it should be pointed out that in different sports, sports disciplines and activities there are different correlations, such as sport-, culture- and gender-specific, and it is therefore impossible to define a universal correlation between predictors and criteria, as well as to interpret it at some universal level. It is therefore important to research each and every sport, as well as each and every religion separately.

Conclusion

By using the comparative analysis of obtained results as the basic risk factor for the use of doping, perception of athletes and their belief that doping is present in their sport is recognized. As a rule, it was possible to come to this conclusion only after the completed comparison of results obtained in certain studies. That is to say, causality cannot be determined by certain studies, only correlation. More specifically, although, for example, there is a correlation in weightlifting between those variables (use of doping and belief that doping is being used), this correlation does not necessarily mean that the belief about the existence of doping is the »ticket« for doping behaviour, yet it is possible to justify the fact that an athlete uses doping due to the belief that doping is present in sports. However, the comparative analysis of sports used in this study enabled more objective perception of this problem and bringing out this conclusion.

Another important conclusion, brought after the synthesis of all three studies and comparison with other researches, is related to the trust of athletes and coaches, as well as consequences resulting from that relation. More precisely, prior to this comparative analysis, the author thought, and there were also certain empirical proofs, that the trust in coaches is a strong protective factor in the doping usage and vice-versa (athletes who do not

have trust in their coaches will reach out to doping more often). However, it turned out that sports in which doping is present (weightlifting), as well as completely opposite sports in which doping is not present at all (sailing) are characterized by a high level of trust in coaches. Athletes' distrust in coaches is in fact characteristic for »middle risk« sports (racquet sports). Therefore, it is clear that athletes and their coaches represent one »enclosed system« in which, in case of both positive and negative issues, there are no unknowns. So, for further procedures in doping prevention, it is exceptionally important to work on education of both coaches and athletes, because they normally function as entirety. Probably the biggest area in this respect is still present in sports where athletes' trust in their coaches is practically non-existent. In those sports (these are racquet sports in this research), an athlete can very easily be directed towards the use of doping, and therefore it is extremely important to increase the level of athletes' trust in their coaches.

The third conclusion, provided by the comparative analysis, is the one related to getting a picture of athletes' standpoints. That is to say, when an isolated study on racquet sport athletes was observed, it could have been concluded that these athletes, in a large number, were convinced that doping existed in their sport. However, only after comparing the results with other sports (weightlifting), a real picture on athletes' perception was

obtained. That is to say, with an isolated monitoring of only one group, it was not possible to determine a real picture about this and other problems.

Dietary supplements should not be considered as a »ticket« to the doping behaviour, which is suggested by some researches. The comparative analysis indicated an extremely high use of dietary supplements in doping contaminated sports, as well as in those where doping practically does not exist. Dietary supplements are essentially a method to compensate deficiencies in everyday nutrition which can be conditioned by different backgrounds. In case of doping contaminated sports, it seems that this occurrence is conditioned by the high energetic demand. In those cases, doping behaviour is not a »more advanced form« of dietary supplements, but both result from the fact that the athlete's success or result depend on energetic capacity. This was confirmed only after the comparative analysis. Dietary supplements are extremely high in sailing as well, however it is not followed by doping behaviour. The reason for it is the fact that dietary supplements in sailing are the consequence of characteristic methods of training and competition (long stay at open sea, inaccessible conventional food, long journeys, etc.), and is as such a necessary supplement to conventional food. If dietary supplements were the »ticket« to doping, the same would be noticed in sailing as well.

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DIFERENCIJALNA ANALIZA OBRAZACA DOPING PONAŠANJA U RAZLIČITIM SPORTSKIM AKTIVNOSTIMA

SAŽETAK

Provedena istraživanja prepoznaju različite faktore rizika, kao i protektivne faktore ponašanja vezana uz doping u različitim sportovima, odnosno sportskim disciplinama ili aktivnostima. Temeljni cilj ovog istraživanja bio je utvrditi korelaciju odabranih sociodemografskih, zdravstvenih i sportskih prediktora s faktorima dopinga u trima različitim vrstama sportova: (1) sportovima visoke energetske zahtjevnosti (dizanje utega), (2) sportovima visoke tehničke zahtjevnosti (sportovi s reketom) i (3) sportovima visoke taktičke zahtjevnosti (jedrenje). Istraživanje se sastojalo od triju zasebnih studija, od kojih svaka istražuje jedan od sportova. Uzorak ispitanika uključivao je ukupno 293 sportaša, natjecatelja seniorske razine (starijih od 18 godina). Ukupno, uzorak je obuhvaćao tri homogena subuzorka: sportaše iz sportova visoke energetske zahtjevnosti (dizači utega i powerlifting sportaši; N=27), sportaše iz sportova visoke tehničke zahtjevnosti (stolnotenisači, tenisači i igrači badmintona; N=188), te sportaše iz sportova visoke taktičke zahtjevnosti (jedriličari; N=78). U prvoj studiji koja je uključivala dizače utega, treba istaknuti prisutnost visoke razine ponašanja vezanog uz doping. U toj studiji, religioznost je interpretirana najznačajnijim protektivnim faktorom ponašanja vezanog uz doping, dok kod sportskih faktora nije pronađena značajna povezanost s dopingom. Studija koja je uključivala sportaše sportova s reketom upućuje na visok rizik ponašanja vezanog uz doping među onim sportašima koji opažaju ponašanje vezano uz doping u svom sportu. Primijećene su niske razine povjerenja sportaša s obzirom na mišljenja njihovih trenera i liječnika o pitanjima dopinga. Taj bi se problem u budućnosti trebao istražiti, jer ishodišni uzrok još nije bio predmetom istraživanja. Ukratko, čini se da sportaši ili nisu uvjereni u ekspertizu svojih trenera/liječnika s obzirom na pitanja o doping, i/ili nemaju povjerenje u njihove dobre namjere. Naročito je važno, a što su i prijašnja istraživanja pokazala, da se sukladno povećanju povjerenja u trenere i liječnike smanjuje vjerojatnost da će sportaš uzeti doping. Kao što je i očekivano, za jedrenje je karakteristična niska vjerojatnost potencijalnog doping ponašanja, unatoč visokoj konzumaciji prehrambenih suplemenata. Zloupotreba supstanci u sportu širi se izvan onih koje pospješuju sportsku izvedbu. Sva ova pitanja trebala bi se detaljnije istražiti u budućnosti, te uz odgovarajuću validaciju, inkorporirati u anti-doping intervencijske programe.