Original Research

Use of Sports Science Knowledge by Turkish Coaches

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ABSTRACT

International Journal of Exercise Science 8(1) : 21-37, 2015. The purpose of this study is to examine the following research questions in Turkish coaching context: a) What are coaches' perceptions on the application of sport science research to their coaching methods? b) What sources do coaches utilize to obtain the knowledge they need? c) What barriers do coaches encounter when trying to access and apply the knowledge they need for their sport? In addition, differences in research questions responses were examined based on gender, years of coaching experience, academic educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid for coaching. The participants were 321 coaches (255 men, 66 women) from diverse sports and coaching levels working in Ankara. The questionnaire "New Ideas for Coaches" by Reade, Rodgers and Hall (2008) was translated, adapted into Turkish, and validated for the current study. According to our findings among Turkish coaches, there is a high prevalence of beliefs that sport science contributes to sport (79.8%);however, there are gaps between what coaches are looking for and the research that is being conducted. Coaches are most likely to attend seminars or consult other coaches to get new information. Scientific publications were ranked very low by the coaches in getting current information. The barriers to coaches' access to sport science research are finding out the sources of information, being able to implement the sport science knowledge into the field of coaching, lack of monetary support in acquiring knowledge, and language barriers. Also, differences in perceptions and preferences for obtaining new information were identified based on coaches' gender, coaching contexts (i.e., professional-amateur), coaching settings (i.e., team/individual), and their other demographic characteristics (i.e., coaching experience, coaching educational level, and coaching certificate level). Future coach education programs should emphasize the development of coaches' competencies in identifying and accessing eligible sports science knowledge sources and lack of money for acquiring information while also tailoring the messages based on differences in coaching contexts, coaching settings, and coaches' demographic characteristics so as to ensure successful knowledge transfer.

KEY WORDS: Coach education, knowledge transfer, sport science

INTRODUCTION

Coaching is a very multifaceted process which prompts coaches to continually develop their knowledge and skills to keep up with their ever-changing surroundings (5, 22). A coach need to improve his/her athletes' performance and possess acumens in a variety of situations while undergoing a countless number of tasks but the main role is to develop and improve the performance of teams and individuals (15, 21).

To achieve this aim, coaches need to apply various types of knowledge to make decisions and solve problems effectively. Cote and Gilbert defined effective coaches as individuals who can consistently apply their professional, interpersonal, and intrapersonal knowledge to improve athletes' competence, confidence, connection and character in specific coaching context (4). Therefore, coaches need to continuously develop their knowledge in their sport to realize successful coaching process irrespective of the coaching contexts they belong to.

In the coaching literature, there are ample studies, which revealed the ways coaches obtain coaching knowledge. Most of the studies conducted in elite sport context were usually in favor of informal learning situations for coach development (1, 2, 9, 12, 24). This situation is not different in participation oriented coaching context whereby the participation in sport for health related fitness and enjoyment are welcomed (7, 9, 10, 19). Also, research supports that beside the formal ways, coaches obtain knowledge by utilizing experiential knowledge and reflection (5, 12, 23, 26, 27).

More recently, the ways coaches obtain new scientific knowledge has been a matter of debate (20, 24, 25). Recent research indicated that the issue of transferring sport science knowledge to coaches has been difficult. Coaches are the intended beneficiaries of the outcomes of a large proportion of sport science research (11). However, it has been perceived by coaches and researchers that a knowledge gap is present between them. In other words, there are incongruence between what sport research produce and the areas of knowledge that coaches need (21, 24, 25, 28). Besides the incongruence, several studies indicated critical barriers to coaches when obtaining sport science knowledge. Lack of time and fund to reach and read the scientific journals, lack of direct access to sport scientists, and poor understanding of academic language which was used in the scientific publications were among the barriers (18, 20, 24, 25).

Recent studies aimed at bridging the 'knowledge gap' between sport scientists and coaches have illustrated significant positive impacts in transmitting relevant scientific knowledge to the coaches and the athletes (16, 17, 18). Therefore, pointing out coaches' new knowledge needs in unique coaching cultures may lead to making more appropriate adjustments between coaches and sport scientists to ensure effective knowledge transfer (21, 24, 25, 27).

Previous studies have examined knowledge transfer from sport sciences to coaching practices in Australia (28), Canada (7, 24, 25), Portugal (21), and UK (20) contexts. These studies indicate that coaches perceive sports science research to have limited relevance in their coaching settings. Interestingly, some of these studies also indicated that both coaches and researchers accept the importance of sport science research in providing better coaching for athletes (24, 25, 28). However, Reade et al. reported that coaches usually get new ideas from other coaches or coaching clinics and seminars, but not from sport scientists (25). Mesquita et al. also found that coaching experience and coaching certification level did not differentiate coaches' perceptions and preferences for knowledge sources (21).

There is limited knowledge on coaches' perceptions and access to sports science knowledge from other cultures. Moreover, it is unclear what effects years of coaching, gender, educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid have on coaches' perceptions and access to sports science knowledge.

The aim of this study, therefore, is to examine Turkish coaches' perceptions and access to sports science knowledge as related to the following research questions; a) What are coaches' perceptions on the application of sport science research to their coaching methods? b) What sources do coaches utilize to obtain the knowledge they need? c) What barriers do coaches encounter when trying to access and apply the knowledge they need for their sport? In addition, differences in gender, years of coaching experience, coaches' academic educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid for coaching are examined for each research question.

METHODS

Participants

Initially, permission was granted from the authors of the original survey to use it in this study. After that, approval of the Research Ethics Committee of Middle East Technical University was obtained prior to the data collection. Then, coaches' work settings were visited by a researcher. In total, 343 coaches were invited to participate in the study with 93.6% of coaches successfully completing the questionnaire. Coaches' work settings were visited by a researcher who administered and collected the surveys. The total time for the completion of the questionnaire was approximately 20 minutes, and no incentives were given to the coaches as a result of their participation in the study.

In total, 321 coaches completed the questionnaire. Out of them, 66 were women (21%), and 255 were men (79%). The coaches' mean age was 34.6 (SD = 9.1) years; and they represent 14 different sports including artistic gymnastics (n = 22), badminton (n = 18), basketball (n = 42), boxing (n = 10), football (n = 34), handball (n = 13), kickboxing (n = 20), swimming (n = 13), taekwondo (n = 14), tennis (n = 22), track and field (n = 34), volleyball (n = 50), weight lifting (n = 11), and wrestling (n = 18). Participants' additional coaching characteristics are included in Table 1.

Table 1. Coaching characteristics of study participants.

Variable	Category	N (%)
Coaching experience	0-5 years	120 (37.4)
	6-15 years	138 (43.0)
	15 + years	63 (19.6)
Educational level	High school/below	85 (26.5)
	Undergraduate	196 (61.1)
	Graduate	40 (12.5)
Coaching certificate level	Low: 1 & 2 levels	168 (58.5)
	High: 3, 4 & 5 levels	115 (40.1)
Type of sport	Individual sports	182 (57.0)
	Team sports	139 (43.0)
Professional status	Paid	265 (83.0)
	Unpaid	56 (17.0)

Protocol

An adapted version of New Ideas for Coaches Questionnaire (24) was used for data collection. The original English questionnaire examines knowledge transfer issues between sport scientists and coaches

using closed and open ended questions with Likert type and ranking responses (See 24). For the purpose of cultural adaptation of the original questionnaire to Turkish coaching context, three approaches were used. Firstly, a standard translation - back translation procedure was applied. Then, six PhD experts in sport sciences and coaching evaluated and aligned the constructs of the translated questionnaire with the three main questions of the study. Finally, after the experts' approval, a cognitive interview procedure was carried out with a group of coaches. Then the Turkish version of the questionnaire was finalized.

"Cognitive interview" process is a diagnostic tool for pre-testing survey instruments such as questionnaires (3). It is a method that allows for in-depth analysis of individual items of a questionnaire (6). This method tests the validity of verbal reports based on the respondents' thought process (6); and it has roots in the cognitive theory of Herbert Simon and his colleagues (8). The cognitive interviews were conducted with ten respondents and the same interviewer. The respondents were coaches from ten different sports and a variety of coaching certificate levels. Findings from the cognitive interviews allowed researchers to discover ways to improve the validity and reliability of the survey items by spotting possible inaccurate responses that the participants have given through misunderstanding of each question, forgetting crucial information, making flawed inferences by mapping irrelevant memories, or reporting with social desirability response bias.

Statistical Analysis

The survey includes both quantitative and qualitative questions. Quantitative data were analyzed using descriptive statistics. The differences in perceptions between groups were determined by using Chi-square analyses ($p<.05$). Coaches' demographic variables are "coach gender", "coaching context" (i.e., professional-amateur), "coaching setting" (i.e., team/individual), "coaching experience", "coaching educational level" (i.e., high school & below, undergraduate, graduate), and "coaching certificate level". The variable coaching certificate level was categorized into two groups as "low level coaches" (1st and 2nd levels) and "high level coaches" (3rd to 5th levels). The variable years of coaching experience was categorized into three groups as: "0-5 years", "6-15 years", and "15+ years". We considered the time required to obtain a coaching certificate level when deciding these three categories.

Qualitative questions were analyzed using "summative content analysis" method (13). Initially, keywords were counted in the content, and then, underlying content of the questions was interpreted.

RESULTS

Research question 1. What are coaches' perceptions on the application of sport science research to their coaching methods?

The coaches' perceptions on the application of sport science research to their coaching methods were examined by asking questions on 1) when coaches look for new ideas, 2) coaches' views on the contribution of sport science research to new ideas, 3) specific topics that coaches are looking for relating to new ideas, 4) coaches'

Table 2. Topics coaches look for when seeking new ideas

Topics	Number of Coaches Most Likely to Seek n (%)	Number of Coaches Least Likely to Seek n (%)
Drills special to sport	71(22.1)	18 (5.6)
Mental training and preparation	60 (18.7)	15 (4.7)
Fitness/Conditioning	54 (16.8)	25 (7.8)
Individual skill development	46 (14.3)	10 (3.1)
Team building/cohesion *	43 (13.4)	98 (30.5)
Tactical/strategy	22 (6.9)	27 (8.4)
Injury prevention/recovery *	13 (4.0)	87 (27.1)
Nutrition *	12 (3.7)	41 (12.8)

* Significant group differences by type of sport (p<.05)

perception on the field of sports science research that contributes to coaching in their sport, and 5) coaches views on the relevance of sport science research to their own practice. Finally, potential differences in coaches' responses were examined by gender, years of coaching experience, academic educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid for coaching.

According to the findings, 88.2% of the coaches (n = 283) were always looking for new ideas, whereas 11.8% of the coaches (n = 38) look for new ideas when their athletes are not performing well. A clear majority of the coaches (n = 256, 79.8%) stated that sport science research contributes to new ideas in their respective sport, whereas 12.1% were not sure (n = 39). However, 8.1% of them did not perceive sport science to contribute to new ideas (n = 26).

To determine whether any of the demographic variables (i.e. gender, years of coaching experience, academic educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid for coaching) influenced how coaches responded to the item, Chi-square analyses were undertaken. Unpaid (amateur) coaches (n = 11; 19.6%) were more likely to look for new ideas when their athletes do not perform well than paid (professional) coaches (n = 27; 10.2%) (χ^2 (1) = 4.0, p<.05). No significant differences were identified with regard to coaches' gender, years of coaching experience, academic educational level, coaching certificate level, coaching team or individual sports for this question (p>.05).

When asked to rank the topics that they look for new ideas on an 8-point scale from "most likely" = 8 to "least likely" = 1 (Table 2), the coaches responded that they were mostly looking for new ideas in the areas of "drills special to sport" (22.1%), "mental training and preparation" (18.7%) and "fitness and conditioning" (16.8%). On the other hand, in the areas of "tactical/strategy" (6.9%), "injury prevention/recovery" (4.0%) and "nutrition" (3.7%), coaches were looking for new ideas at the least (Table 2).

Table 3. Coaches' perceptions on the contribution of sports science research to coaching in their sport.

Area of Sport	Strongly Agree	Agree	Partly Agree	Disagree	Strongly Disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Mental training and preparation	143 (44.5)	125 (38.9)	47 (14.6)	5 (1.6)	1 (0.3)
Team building/cohesion	100 (31.2)	113 (35.2)	75 (23.4)	21 (6.5)	7 (2.2)
Drills special to sport	176 (54.8)	102 (31.8)	33 (10.3)	6 (1.9)	2 (0.6)
Individual skill development	165 (51.4)	118 (36.8)	28 (8.7)	8 (2.5)	0 (0.0)
Tactical/strategy	133 (41.4)	111 (34.6)	57 (17.8)	16 (5.0)	2 (0.6)
Nutrition	164 (51.1)	93 (29.0)	50 (15.6)	9 (2.8)	5 (1.6)
Fitness/conditioning	213 (66.4)	82 (25.5)	20 (6.2)	5 (1.6)	1 (0.3)
Injury prevention and recovery	151 (47.0)	114 (35.5)	44 (13.7)	6 (1.9)	6 (1.9)
Understanding today's athletes	99 (30.8)	111 (34.6)	82 (25.5)	16 (5.0)	13 (4.0)

* Significant group differences by coaching certificate level (p<.05)

To determine whether any of the demographic variables influenced how coaches responded to the item, Chi-square analyses were undertaken. Chi-square analyses revealed significant differences between the types of sport (team, individual) variable and the topics that coaches are looking for new ideas. Team sport coaches (n = 33; 23.7%) were more likely to look for new ideas in the area of "team building / cohesion" than individual sport coaches (n = 10; 5.5%) (χ^2 (7) = 117.68, p<.05). In the area of "nutrition", individual sport coaches (n = 28; 20.1%) were more likely to look for new ideas than team sport coaches (n = 13; 7.1%) (χ^2 (7) = 23.09, p<.05). Team sport coaches (n = 49; 35.3%) were found to be less likely to look for new ideas than individual sport coaches (n = 38; 20.9%) in the area of "injury prevention/recovery" (χ^2 (7) = 15.255, p<.05). No significant differences were identified with regard to coaches' gender, years of coaching experience, academic educational level, coaching certificate level and professional status for this question (p>.05).

The coaches responded to the 5-point Likert type question, which examines their perceptions as to the field of sport science research that contributes to their sport. When the coaches aggregated responses of "strongly agree" and "agree" were considered, coaches were found to perceive that the areas of "fitness and conditioning", "individual skill development", and "drills special to sport" are contributing more substantially to new ideas in their sport (Table 3). Chi-square analyses revealed that low level coaches (1st and 2nd levels) (n = 46; 27.2%) were more likely to agree that sport science research contributes to "understanding today's athletes" compared with their high level (from 3rd to 5th level) counterparts (n = 19; 16.5%) (χ^2 (4) = 12.39, p<.05). No significant differences were identified with regard to the coaches'

Table 4. Coaches' perception on the relevance of sport science research to their coaching.

Item	Strongly Agree n (%)	Partly Agree n (%)	Partly Disagree n (%)	Strongly Disagree n (%)
There is no sport research being conducted in my sport specifically *	39 (12.1)	68 (21.2)	56 (17.4)	139 (43.3)
The research being done is not relevant to the problems that athletes and coaches in my sport encounter *	34 (10.6)	104 (32.4)	93 (29.0)	78 (24.3)

* Significant group differences by coaches' educational level and type of sport (p<.05)

gender, years of coaching experience, academic educational level, type of sport and professional status for this question (p>.05).

Coaches responded to two items related with the relevance of sport science to their practice. Majority of the coaches disagreed with the statement "there is no sport research being conducted in my sport specifically"; however, a reasonable number of coaches agreed partially (n = 68) and strongly (n = 39) with the statement. More than half of the coaches strongly and partially disagreed with the statement "the research being done is not relevant to the problems that athletes and coaches in my sport encounter", whereas a reasonable number of coaches agreed with the statement (Table 4).

To determine whether any of the demographic variables influenced how coaches responded to the items regarding how coaches perceive sport science research, Chi-square analyses were undertaken. Graduate degree coaches (n = 25; 67.6%) were more likely than their low-level counterparts (i.e., undergraduate degree and high school and below degree coaches) to rate themselves as 'strongly disagree' in the statement "There is no sport research being conducted in my sport specifically" (χ^2 (8) = 38.07, p<.05). Graduate degree coaches (n = 11; 29.7%) were also more likely to disagree with the statement "The research being done is not relevant to the problems that athletes and coaches in my sport encounter" (n = 16; 17.8%) (χ^2 (8) = 23.11, p<.05). Team sport coaches (n = 88; 63.3%) were more likely than individual sport coaches (n = 51; 28.0%) to agree that there is sport science research being conducted in their sport specifically (χ^2 (4) = 44.49, p<.05). Team sport coaches (n = 33; 23.7%) were less likely than individual sport coaches (n = 71; 39.2%) to agree that the research being done was not relevant to the problems that athletes and coaches have in their own sports (χ^2 (4) = 13.28, p<.05). No significant differences were identified with regard to gender, years of coaching experience, coaching certificate level and professional status for this question (p>.05).

Research question 2. What sources do coaches utilize to obtain the knowledge they need?

Table 5. Coaches' ranked ideal sources and current sources of knowledge.

Item	Knowledge Sources	n (%)
Coaches' preferences for ideal knowledge sources	1. Asking sport science researchers/academics	72 (22.4)
	2. Communication with other coaches directly	46 (14.3)
	3. Looking at web sites special to sport	41 (12.8)
	4. Watching videos	35 (10.9)
	5. Participating in seminars and conferences	35 (10.9)
	6. Watching elite competition live or on TV	29 (9.0)
	7. Reading books	19 (5.9)
	8. Reading peer-reviewed articles in academic journals	18 (5.6)
	9. Participating in online discussions	8 (2.5)
	10. Reading magazines	5 (1.6)
Coaches' current sources of getting new sport science knowledge	1. Seminar or presentation by sport researchers	145 (45.2)
	2. Personal communication with other coaches	93 (29.9)
	3. Other-unidentified	27 (8.4)
	4. Personal communication with sport researchers	26 (8.1)
	5. Summary of research findings in newsletters or magazines	20 (6.2)
	6. Peer-reviewed articles in academic journals	7 (2.2)

The knowledge sources coaches consult when looking for new ideas was examined by asking 1) coaches' preferred knowledge sources when they seek new ideas, 2) the format in which they currently receive new sources of sport science knowledge, 3) relevant organizations coaches perceive as potential knowledge sources for accessing new ideas, 4) coaches' primary sources to consult if they have urgent questions on coaching, and 5) coaches' recommendations on how to best convey sport science information to coaches.

When the coaches were forced to rank their preferences for the ideal knowledge sources from highest to lowest, the coaches' most likely knowledge source preferences were primarily "asking sport science researchers/academics", "communication with other coaches directly", and "looking at websites special to sport"; whereas "reading magazines", "participating in

Table 6. Coaches' ratings of Excellent or Good resources for accessing new ideas.

Knowledge Sources	n (%)
1. Sport federation ***	174 (54.2)
2. Sport science research seminars/congresses	151 (47.0)
3. University academic departments * ***	142 (44.2)
4. Performance evaluation/research centers	85 (26.4)
5. General Directorate of Sport **	81 (25.2)

* Significant group differences by coaching experience (p<.05). ** Significant group differences by coaching educational level (p<.05) *** Significant group differences by type of sport (p<.05).

online discussions", and "reading peer-reviewed articles in academic journals" were the least likely sources that the coaches preferably consult with, respectively (Table 5). No significant differences were found with regard to coaches' gender, years of coaching experience, educational level, coaching certificate level, type of sport and professional status for this question (p>.05).

Coaches' responses as to the current formats that they most commonly receive new sport science information included "seminar or presentation by sport researchers", "personal communication with other coaches", other-unidentified, personal communication with sport science researchers, summary of research findings in newsletters, magazines or newspapers, and reading peer-reviewed articles in academic journals, respectively (Table 5). No significant differences with regard to coaches' gender, years of coaching experience, educational level, coaching certificate level, type of sport and professional status for this question (p>.05).

The third item asked coaches to rate various relevant organizations they perceive as potential knowledge sources to access new ideas. Coaches rated their own sport federation (54.2%), sport science research seminars/congresses (47.0%) and university academic departments (44.2%) as excellent/good resources to access new ideas. Also, coaches rated Performance Evaluation/Research Centers (26.4%) and General Directorate of Sport (25.2%) as excellent/good resources for new ideas (Table 6).

Table 7. Coaches' primary sources to consult in an urgent question/problem.

Knowledge Sources	n (%)
1. Ask another coach in his/her sport	138 (43.0)
2. Look for something relevant to read	80 (24.9)
3. Ask a sport scientist *	68 (21.2)
4. Look for a seminar or congress	16 (5.0)
5. Ask a coach in another sport	10 (3.1)
6. Ask a sport manager or administrator	7 (2.2)

* Significant group differences by type of sport (p<.05)

To determine whether any of the demographic variables influenced coaches' responses to the five above-mentioned items, Chi-square analyses were undertaken. Coaches with fifteen years and more experience (n = 28; 44.4%) were more likely to consider "universities' academic departments" poor to access new ideas compared with their less experienced counterparts (χ^2 (10) = 27.01, p<.05). High school and below degree coaches (n = 26; 28.6%) were more likely to consider "General Directorate of Sport" an excellent/good source to access new information as compared to graduate degree coaches (n = 4; 10.8%) (χ^2 (8) = 16.81, p<.05). Team sport coaches (n = 46; 33.1%) were more likely to regard "universities' academic departments" as excellent/good knowledge obtaining source than individual sport coaches (n = 38; 21.0%) (χ^2 (4) = 13.362, p<.05). Additionally, team sport coaches (n = 61; 43.9%) were more likely to regard "their own sport associations" as excellent/good knowledge obtaining sources as compared to individual sport coaches (n = 55; 30.2%) (χ^2 (4) = 14.47, p<.05). No significant differences were found with regard to coaches' gender, coaching certificate level and professional status for this question (p>.05).

Coaches' responses to their primary sources to consult when they have an urgent question or problem were as follows: ask another coach in his/her sport, look for something relevant to read, ask a sport scientist, look for a seminar or congress, ask a coach in another sport, and ask a sport manager or administrator (Table 7).

Chi-square analyses indicated that individual sport coaches (n = 45; 24.7%) were more likely to ask a sport scientist in case of an emergency relative to coaching as compared to team sport coaches (n = 23; 16.5%) (χ^2 (5) = 11.07, p<.05). No significant differences were found with regard to coaches' gender, years of coaching experience, educational level, coaching certificate level and professional status for this question (p>.05).

The last item asked an open-ended question to the coaches to find out their ideas related to the best way of conveying sport science information to them. 243 coaches responded to the question. The content analysis of the coaches' responses indicated

Table 8. Coaches' perceptions of the top barriers to accessing and applying sport science information.

Barriers	Most Difficult n (%)	2nd Most Difficult n (%)	Least Difficult n (%)
Being able to find out the source of information	120 (37.4%)	130 (40.5%)	71 (22.1%)
Being able to transfer the information obtained from sport science into applied coaching context *	113 (35.2%)	120 (37.4%)	88 (27.4%)
Being able to get financial support to cover the expenses of obtaining information *	88 (27.4%)	71 (22.1%)	162 (50.5%)

* Significant group differences by coaching certificate level (p<.05)

variety of preferred best ways of transmitting knowledge they thought best. These responses included: compulsory applied seminars and conferences (n = 76; 31.27%), internet (n = 71; 29.21%), sport federation web pages (n = 25; 10.28%), working with sport scientists together in the field (n = 21; 8.64%), books, monthly journals, and CD's (n = 12; 4.93%), and publishing scientific findings on the General Directorate of Sport's website (n = 4; 1.64%). Chi-square analyses indicated no significant differences with regard to coaches' gender, years of coaching experience, educational level, coaching certificate level, type of sport and professional status for this question (p>.05).

Research question 3. What barriers do coaches encounter when trying to access and apply the knowledge they need for their sport?

The barriers coaches encounter on their way to obtaining new information were examined through three items; 1) Rate the following three possible barriers by "Most difficult", "2nd Most difficult", and "Least difficult": a)" being able to get any financial support to cover the expenses of obtaining information", b) "being able to find out the source of information", c) "being able to transfer the information obtained from sport science into applied coaching context", 2) Is there any other barrier that you encounter on your way to obtain new information?, and 3) Do you know a sport scientist personally?

Considering the coaches' aggregated responses of "most difficult" and "2nd most difficult", it appears that the majority of the coaches regard "being able to find out the source of information" as the most difficult barrier in accessing sport science

information. The coaches' overall responses to provided barriers that they may encounter in accessing and applying sport science information are shown in Table 8.

When asked to list additional barriers to obtain new sport science information, the coaches' most frequent answers were "language barriers" (n = 35), and "lack of time" (n = 22). Of the coaches, 229 (71.3%) reported that they knew a sport scientist personally.

Chi-square analyses were undertaken to determine whether any of the demographic variables influenced how coaches answered the above items. High level coaches (n = 50; 43.5%) (Coaches from 3rd to 5th coaching certificate levels) were more likely to regard the barrier of "transferring the information obtained from sport science into applied coaching situations" as difficult as compared to their low level counterparts (n = 50; 29.6%) (χ^2 (2) = 5.78, p<.05). High level coaches (n = 62; 53.9%) were likely to regard the barrier of "being able to get any financial support to cover the expenses of obtaining information" as less difficult as compared to low level coaches (n = 85; 48.5%) (χ^2 (2) = 5.94, p<.05). No significant differences were found with regard to perceived barriers to obtaining new information by gender, years of coaching experience, academic educational level, coaching team or individual sports, and being paid or unpaid for coaching (p<.05).

DISCUSSION

Findings pertaining to Turkish coaches' perceptions on the application of sport science research to their coaching indicated that majority of the coaches always look for new ideas in coaching, and they believe the contribution of sport science research to new ideas in their specific sport. Unpaid coaches look for new ideas more than paid coaches when their athletes do not perform well. The coaches frequently look for new ideas in the areas of "drills special to sport", "mental training and preparation" and "fitness and conditioning". Team sport coaches look for new ideas more in "team building/cohesion" expectedly, and they look for new ideas less in "injury prevention/recovery" than their individual sport counterparts. The coaches perceive that research on "fitness and conditioning", "individual skill development" and "drills special to sport" contribute to their professional knowledge substantially more than the other areas. Furthermore, low level coaches believe the contribution of sport science research in understanding today's athletes more than high level coaches. Slightly more than half of the coaches believe that there is relevant research in their specific sport. Graduate degree coaches and team sport coaches perceive the research being done as relevant to their sports more, compared with coaches with low educational degree and individual coaches.

Findings on coaches' knowledge sources indicate that coaches' ideal knowledge sources are usually sport science researchers and other coaches in their sport. Similarly, higher number of coaches identify common sources of knowledge as seminars or presentations by sport researchers, and personal communication with other coaches. Asking another coach, looking for something relevant to read and asking for a scientist are the highest ranked primary sources to consult when coaches have an urgent coaching problem. More experienced coaches and individual sport

coaches regard the universities and sport science researchers as poor to access new ideas as compared to less experienced coaches and team sport coaches. Coaches with lower educational level consider "General Directorate of Sport" as an excellent/good source of accessing new information more than their higher educated counterparts.

Findings with regard to the barriers coaches encounter when trying to access new information may indicate that coaches need to develop skills to find out the source of sport science knowledge they need, and transfer this knowledge into their unique applied coaching situations. As compared to their low level counterparts, high level coaches perceive transferring information obtained from sport science into applied coaching setting as more difficult. However, finding financial support to cover the expenses of obtaining new information is more difficult issue for low level coaches. Language barriers and lack of time are the further important reasons for poor transfer of sport science knowledge into coaching applications. One of the language barriers may be coaches having poor foreign language skills, which limits them to follow the sport science research done in other parts of the world. Another language barrier that coaches confront may be having poor understanding of academic language used in research papers and in sport science researchers' presentations.

The results of the study are consistent with the related literature (24, 25, 28); indicating that the coaches are looking for new ideas in a variety of areas in sport science, and they believe sport science contributes to finding the answers to their needs and interests in coaching. Similar to the findings in coaching literature, this study also found that the areas of "drills special to sport", "fitness and conditioning" and "mental training and preparation" are coaches' most focused areas of new information (24, 28). Coaches perceive a knowledge gap in the area of "mental training and preparation" more, which is in line with the results found in Australian coaching context (28). Also, similar to Rodgers et al. (25), the results of our study indicate that coaches from individual sports perceive the knowledge produced in sport science as less relevant to their coaching situations than team sport coaches do. This implies that there are different foci of attention between coaches of different coaching settings.

Our study confirms the previous study findings that coaches mostly prefer to ask other coaches to obtain new information (12, 14, 21, 25). At the same time, coaches also regard sport science researchers as ideal knowledge source. In Williams and Kendall's (28) study, a degree of congruence was found between the coaches' expectations and sport science researchers' products. However, the coaches in their study who had at least 10 years of experience, were already in close contact with sport science researchers (the Australian Institute of Sport), and this may be influential on the result of the congruence found between the two parties. Contrarily, the coaches in our study tend to consider sport science researchers and universities poor in meeting their knowledge needs as they get experienced. It is probable that the dominance of coach-to-coach knowledge transfer may give way to reproducing the existing knowledge in different coaching contexts and do not

encourage coaches to gain a new knowledge base (5).

Coaches mostly have difficulties with finding the source of information, thoroughly understanding the information they find, and transferring the information they obtain to their coaching situations. These findings further support the previous studies (14, 24, 25, 28). In line with Reade et al.'s (24) study, the coaches considered "finding out the source of information" the most difficult barrier to obtain new information. Coaches of this study also regard "transferring the information obtained from sport science into applied coaching context" as difficult. This may indicate that Turkish coaches, particularly high level coaches, are less likely to be able to transfer knowledge they obtain from sport science to their specific coaching situations effectively. Additionally, the coaches were found not to prefer to use academic journals as firsthand knowledge sources. In parallel with Williams and Kendall's (28) finding, the coaches in this study also seem to have difficulty with understanding academic language. This indicates a need for coaches to improve their academic language skills to better understand academic journals as well as sport science researchers' presentations.

More importantly, not knowing foreign language (i.e., English) is also an important barrier for Turkish coaches, as the absence of this skill deprives them from following the recent developments occurring in sport science literature and international coaching conferences and/or seminars, in which the formal language is English. Finally, some of the coaches in this study reported "lack of time" as a barrier to look for new information. Reade et al. (25) had also found "lack of time" to look for new ideas as an important barrier for the coaches.

Coaches from different coaching environments focus on certain areas of sports science research (i.e., fitness and conditioning). This may indicate deficiencies in coaches' knowledge in other areas of sport science research such as "injury prevention" and "nutrition", as well as "mental training and preparation", in which this study found a knowledge gap.

Team sport coaches and individual sport coaches have different perceptions on the relevance of sport science research to their coaching needs and interests. This indicates that coaching setting plays an important role in the direction of knowledge seeking. Rodgers et al. (26) argued that coaching athletes individually or in a group environment may represent very different challenges and opportunities for coaches; therefore, their needs and interests differ accordingly. Participants of this study claim a presence of a knowledge gap in certain coaching areas. Further in-depth research is needed to determine the underlying factors of the coaches' perceptions and preferences in relation with use of sport science research produced in different sport settings.

Although coaches of this study appear to have a contact with sports science researchers, they commonly use coach-to-coach communication in obtaining new information. They do not use first-hand knowledge sources in obtaining new information (i.e., peer-reviewed scientific articles). Besides, the coaches seem to be alienated from universities and sport science researchers as they grow older. This

may exacerbate the knowledge transfer between the two parties; namely, coaches and sport science researchers. Providing coaches with further education opportunities at universities will encourage the two parties to approximate. In this way, while coaches can benefit from academic environment by increasing their awareness of sport science research and improving their skills to better understand the knowledge produced in academic arena, sport science researchers will develop a better understanding of coaches' needs and areas of interest in coaching, and consequently have an opportunity to align their research agendas accordingly. Considering the substantial number of unpaid coaches who are expectedly more disadvantaged in reaching the knowledge they need, developing mechanisms that provide equal learning opportunities for coaches from different coaching contexts also appears as a need to ensure effective knowledge transfer.

Scientific findings are predominantly in English, and the academic language itself is also difficult to comprehend for coaches. Consequently, for coaches, reaching new scientific knowledge and understanding their content may become very difficult. These factors may seriously hinder effective knowledge transfer. As a result, it may become difficult to continuously follow scientific research articles related to their areas of interest. In Williams and Kendall's (28) study, both coaches and the researchers reached a consensus that the coaches were unable to update their knowledge by ever-following all of the sports science literature and it was the researchers' duty to transmit the knowledge produced in coaching literature. We suggest that sport science researchers take a more active role in disseminating scientific findings produced in the world to coaches by utilizing from different possible means such as web sites of related sport organizations, coaching conferences, and seminars more often. A more comprehensible academic language of these means, which are not beyond coaches' understanding, both in verbal presentations and written documents, will enhance effective knowledge transfer. To better understand the issue, it is suggested that underlying motivational factors for the two parties to take action be further examined.

In conclusion, this study extended the body of knowledge on coaches' use and transfer of sport science research by examining the situation in Turkish coaching context. This study identified the effect of gender, years of coaching experience, academic educational level, coaching certificate level, coaching team or individual sports, and being paid or unpaid for coaching on coaches' perceptions of and preferences for the issue. Future coach education programs should emphasize developing coaches' competencies in identifying and obtaining eligible sport science knowledge. Additionally, coaches should be provided equal educational opportunities for accessing scientific knowledge that is in keeping with their idiosyncratic needs and interests. Finding strategies to encourage sport scientists to directly disseminate scientific knowledge to coaches more often could also help remove the barriers.

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