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Markus Raab^{1,2}

¹ Institute of Psychology, German Sport University Cologne, Cologne, Germany

² School of Applied Sciences, London South Bank University, London, UK

Sport and exercise psychology in 2050

Sport and exercise psychology as a prediction task

Predicting the future is a building block of human behaviour. As far back as the 8th century B.C., the Delphic Oracle was well known to serve solely this purpose. Today predictions about the future have a meaningful impact on choices in every area of society. In sports, predictions serve as an essential tool for resource allocations, whether by national Olympic committees in the preparation of the next Olympic cycle or by health practitioners designing prevention strategies for sport programs. Likewise in research, predictions appear as hypotheses in experimental studies or assumptions about the development of research areas in position papers.

However, to date, few predictions have been made about the future of sport and exercise psychology. In Seiler and Wylleman (2009) and a follow-up article (Wylleman & Seiler, 2016), the authors listed challenges that they believed needed to be met, such as the unification of psychologists and sport-related stakeholders in the field of sport and exercise psychology and the diversification of different specialisations in research, practice and education. The future of some of these challenges have been described as predictions that can be assessed: Have sport and exercise psychology practitioners come together in joint professional associations, cooperated on contracts, or taken specific joint actions? Other predictions are not easy to evaluate such as whether the diversity in education in the field has been sufficient.

Researchers in other fields have potentially even more specific predictions. For instance, in robotics they have bet

humanoid robots will win a soccer game in 2050 against a human team. The precise bet is as follows: “By the mid-21st century, a team of fully autonomous humanoid robot soccer players shall win a soccer game, complying with the official rules of the FIFA, against the winner of the most recent World Cup” (Kitano & Asada, 1998, p. 419). Such a prediction (or vision) has had an impact on the field; researchers from various backgrounds have discussed developments in robotics, informatics and technology, such as how to treat fouls between humans and robots according to the laws of the game in 2050 (e. g. Haddadin, Laue, Frese & Hirzinger, 2007).

Regarding prediction of sport and exercise psychology in 2050 the purpose of this article is to (a) relate the present activities and goals of the field to future desired successes, (b) stimulate discussion about what is desired for the future and partly how it can be achieved, and (c) increase interactions with other fields. So let me state my prediction:

By 2050, a soccer team that loses against fully autonomous humanoid robot soccer players can pick any accredited sport and exercise psychologist to give the team 4 weeks of preparation, leading the team to win the next game based on the competences they gain from sport-psychological training.

If no robots have won against a human team, this prediction can be rephrased so that it relates to a game between two human teams. All other things being equal (e. g. games won; physical, technical and tactical skills), the team that integrates sport-psychological training in their training regimen will win. The main

rationale is to test the additional effect of sport-psychological training.

Sport and exercise psychology from now to 2050

3 S—science, sport, society

As stated by the European Federation of Sport Psychology (FEPSAC), the field of sport and exercise psychology (often abbreviated sport psychology)

is concerned with the psychological foundations, processes and consequences of the psychological regulation of sport-related activities of one or several persons acting as the subject(s) of the activity. The focus may be on behaviour or on different psychological dimensions of human behaviour, i. e. affective, cognitive, motivational or sensori-motor dimensions. (FEPSAC, 1996, p. 1)

Sport psychology focuses in particular on human behaviour related to physical activity that “can take place in competitive, educational, recreational, preventative and rehabilitation settings and includes health-related exercise. Subjects are all persons involved in the different sport and exercise settings, e. g. athletes, coaches, officials, teachers, physiotherapists, parents, spectators” (FEPSAC, p. 1).

In many of the statutes or position statements of the international associations of sport and exercise psychology, it is stated that both performance and health are important areas of investigation. Further it is clear that sport psychology as a field of investigation draws on important relations to other areas of research, such as the disciplines of psychology and sport sciences. In **Fig. 1**

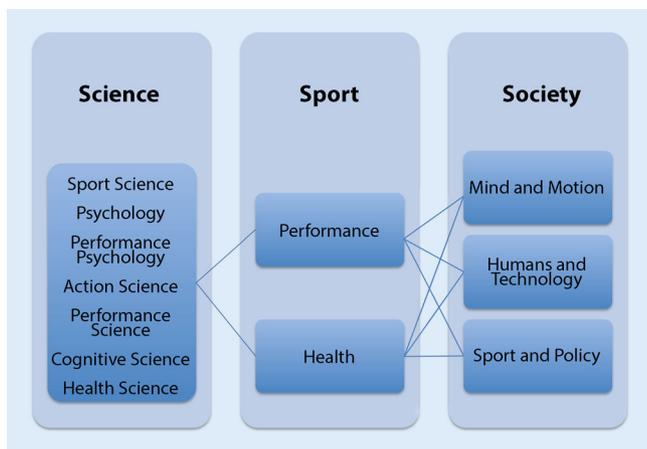


Fig. 1 ◀ The relation of disciplines, areas of investigation, and impact potential within the 3 S (science, sport, society) of sport and exercise psychology. No order or weighting implied

I illustrate some of these relationships that sport psychology has within what I call the 3 S: science, sport and society. These relations to science, sport and society structure the definitions and goals of the societies of sport and exercise psychology. In terms of science, I highlight the relation to other scientific disciplines of interest beyond psychology and sport sciences, such as performance psychology and performance science, cognitive science, and health science as well as action science. In the area of sports I focus on performance and health as currently represented in sport and exercise psychology. Finally, I discuss the potential impact in three exemplary areas of relevance for society, which I have labelled mind and motion, humans and technology, and sport and policy. These areas are based on a subjective perspective of importance challenges to society in which sport and exercise psychology may be important.

Using the 3S concept, I illustrate a current trend that is extending sport and exercise psychology to larger fields. Again the following selection is not complete and represents subjective samples to illustrate the argument. One such larger field that will be more strongly connected to sport and exercise psychology is action science. Action science is an emerging field in movement science and psychology in which the importance of human actions in the interaction with our environment are investigated (see Prinz, Beisert, & Herwig, 2013). Another field is performance psychology (e.g. Raab, Lobinger, Hoffmann, Pizzera & Laborde,

2016; Murphy, 2012), which has recently integrated findings from different applications of psychology, such as music, medicine and sport. Researchers have provided theoretical (Nitsch & Hackfort, 2016), methodological (Tenenbaum & Filho, 2016) and practical (Clark & Williamon, 2016) recommendations that may bridge experience and best practice.

One indication of activities that may foster future developments is the founding of targeted journals, for example *Sport, Exercise, and Performance Psychology*. More broadly, performance science, a rather new discipline that is developing rapidly, integrates performance psychology with many other disciplines. The sixth World Congress on Performance Science is scheduled for 2017, and sport and exercise researchers as well as researchers from other fields and disciplines can publish in a journal called *Performance Science*, a *Frontiers in Psychology* journal. Similarly, cognitive science and health science have established interdisciplinary activities in which sport and exercise science is combined with societal impact such as jobs or technological innovations (see, for example, Raab & Gigerenzer, 2015).

Sport and exercise psychology topics

As mentioned above, the research and applications that fall under the umbrella of sport and exercise psychology include investigations on performance and health, but here just a limited number of these are discussed. There are—as in any sci-

entific discipline—many ways to identify and group research areas. For instance, it has been well documented that expert enquiries or bibliometric studies are useful methods for presenting the current state of a field or subfield.

Wylleman and Seiler’s (2016) discussion about the past, present and future of sport and exercise psychology, described above, serves as an example of expert enquiries. For bibliometric studies I use an example from the *International Review of Sport and Exercise Psychology*. Lindahl, Stenling, Lindwall, and Colliander (2015) analysed 1140 papers from five sport and exercise psychology journals published between 2008 and 2011 using principal component analysis based on author co-citation relationships. Lindahl et al. followed Eom’s approach (2009), who analysed cited publications into principal components. In the study by Lindahl et al. this procedure resulted in groups of 158 highly cited authors’ papers to detect important research in sport and exercise psychology. The analysis by Lindahl et al. resulted in 73 clusters of topics and 14 principal components (e.g. motivation, performance, stress, talent, leadership and imagery). The relation between the 158 authors and the principal components led Lindahl et al. to declare this as the “overall structure of sport and exercise psychology” (p. 82, Fig. 1). Further the number of citations or the number of authors was used as a quantitative analysis of the size of these research areas. For instance some research areas such as motivation and a theory such as self-determination is researched by 26 authors and about 3000 citations, whereas morality is cited 148 times and three authors published work on that topic. This example can be extended to other studies focussing on specific aspects of the quality of research (Schweitzer & Furlley, 2016), such as power and replication, specific methods used in practice, such as single-case studies (Barker, Mellalieu, McCarthy, Jones, & Moran, 2013) or specific research strategies, such as using longitudinal designs (Stenling, Ivarsson & Lindwall, 2016).

A problem with any of these methods is that one infers their importance from the current analyses of research topics and predicts the field's future on the basis of the simple principle that past behaviour predicts future behaviour. Although this may be valid for individual behaviour, it may not be possible to predict new areas of research on the basis of the current state of affairs.

Predictions about the future

How does one predict the future of sport and exercise psychology beyond forecasting activities as described above? One important lesson I have learned from working with athletes is to reframe situations if I want to change their perception. For instance, for the prediction of sport and exercise psychology in 2050, it may be better to discuss the goals of the stakeholders (i. e. members of sport associations, sport psychologists and researchers) in the field, as they may influence the future of the field through their actions in support of their beliefs or goals. This reasoning led me to ask the presidents of our current sport and exercise psychology associations to provide a brief statement about their vision of sport and exercise psychology in 2050. If these visions will be used to influence their members or the research, application, or education of future sport psychologists, then this may be the best predictor of the future. As predictions about the future by definition can only be judged in 2050, it makes sense to predict that the responses of the current presidents may have a higher validity for the next few years than for 2050.

In **Table 1**, the responses from the presidents of sport and exercise psychology associations have been summarized. The list is in alphabetical order by association name.

The predictions of the presidents in **Table 1** could be classified in relation to science, sport and society. For instance, Angus Mugford (AASP) predicts that *science* will allow us to individually tailor recovery strategies down to our DNA. In *sport* predictions of change refer to the importance to focus on older athletes as indicated by Anne-Marie Elbe

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M. Raab

Sport and exercise psychology in 2050

Abstract

Sport and exercise psychology by definition describes, explains and predicts human behaviour. Yet exact predictions of human behaviour are more the exception than the rule and thus it is no wonder that sport and exercise psychologists are not able to predict very well who will be a talent or win a gold medal in 10 years. In the same vein, it is somewhat easier to describe scientific endeavours in hindsight or by analysis of the current state of affairs than to predict what a discipline will be like in, say, 2050. Other disciplines that face similar levels of complexity have, however, tested their models on (near) future events, such as the mathematical prediction of president elections, climate change or which team will win the next soccer World Cup. Some

disciplines have even tried to forecast what will be in 2050, for instance, predicting that soccer-playing robots will win an official soccer game against humankind. This opinion statement about sport and exercise psychology starts with a description of the current state of affairs in our field, followed by a prediction of sport and exercise psychology activities and potential successes in 2050. Thus, providing a platform for discussion of our mission as well as goal setting for the coming years.

Keywords

Predictions · Resource allocation · Professional sports associations · Joint cooperation · Athletes

Sport- und Bewegungspsychologie im Jahr 2050

Zusammenfassung

Laut Definition beschreibt, erklärt und prognostiziert die Sportpsychologie menschliches Verhalten. Allerdings sind Vorhersagen menschlichen Verhaltens eher die Ausnahme als die Regel, und es verwundert nicht, dass Sportpsychologen und Sportpsychologinnen nicht gute Talente vorhersagen können oder wer in 10 Jahren eine Goldmedaille gewinnen wird. Gleichmaßen ist wissenschaftliche Leistung in der Rückschau sowie durch die Analyse des aktuellen Zustands leichter zu erklären als die Entwicklung einer Disziplin bis zum Jahr 2050. Andere Wissenschaften mit ggf. gleicher Komplexität haben zukünftige Ereignisse, beispielsweise durch mathematische Vorhersagen von Präsidentenwahlen, Klimawandel oder welche Mannschaft den

nächsten Weltmeister stellt, vorhergesagt. Einige Wissenschaften haben sogar gewettet, dass bis 2050 fußballspielende Roboter ein offizielles Fußballspiel gegen die Menschheit gewinnen werden. In diesem Positionspapier über die Sportpsychologie werden aktuelle Entwicklungen des Feldes Sportpsychologie beschrieben und Handlungen sowie mögliche Erfolge bis 2050 vorhergesagt – in der Hoffnung, dass unsere Mission und Zielsetzungen für die Zukunft diskutiert werden.

Schlüsselwörter

Vorhersagen · Ressourcenzuteilung · Professionelle Sportverbände · Gemeinsame Zusammenarbeit · Athleten

(FEPSAC) and Angus Mugford (AASP). Finally for *society* predictions of the role of sport and exercise psychology will even more relate to societal challenges such as obesity as predicted by Anne-Marie Elbe (FEPSAC).

The predictions in **Table 1** could be equally well classified in dimensions of structure, processes and culture. For instance, predictions about *structure* in Vincent Granitos' statement (APA, Division 47) are related to partnerships between medical and sport psychology pro-

fessionals or a job market in high schools or junior colleges. Changes of *processes* could be illustrated in statement of Anne-Marie Elbe (FEPSAC) about how technology will be used in the future or by Pier-Eric Chamberland („CAP“) about aligning education and internships. Finally Gangyan Si (ISSP) provides a nice example on *cultural* changes that encompass the dynamics of cultural diversity.

Table 1 Predictions about sport and exercise psychology in 2050 from various national and international associations. Predictions are original citations as exact responses received via emails in November 2016

Institution	President	Prediction
AASP	Angus Mugford	By 2050, human and technology interfaces will have become a common part of everyday life. Our medical healthcare, nutritional needs and recovery strategies have all become individually tailored down to our DNA. The same may be true of our trained ability to self-regulate with bio- and neurofeedback, although our ability to meditate and be mindful, free of technology and feedback will be as fundamental and important as ever. Indeed, Maslow's hierarchy of needs will continue to be as relevant with an ever aspiring desire to self-actualize given most other needs will be met
APA, Division 47	Vincent Granito	<p>Sport, Exercise, and Performance Psychology in 2050:</p> <p>There will be a much greater emphasis on older athletes because of the graying of our population. I think it will focus on both the exercise aspect, but I also believe that elderly will want to remain competitive, so sport involvement would still be a focus. These participants might have performance issues around fear of injury because of the loss of muscle tone and bone strength.</p> <p>I think the practice of sport, exercise and performance psychology will become much more technology infused. There will be new uses for mobile technology that can help athletes with concentration, motivation, stress management, and cognitive restructuring.</p> <p>A greater partnership will take place between medical and sport psychology professionals as we learn more about the impact concussions have on athletes. Students going into the field will probably have to take more physiology and medical type classes to fit this partnership.</p> <p>Since more students are coming into our field, and the relatively few jobs available at Olympic, Professional, and Major College levels, I can see how people will need to get creative to find new areas to work. In the United States, the high schools, Junior Colleges, and lower level colleges are an untapped market that would provide more than enough work opportunities for graduating students.</p> <p>A greater emphasis will be placed on the Performance side of our field. Up to this point, it's been just the athletes or sports—going forward I can see us applying our performance knowledge to dancers, actors, police, military, business, surgeons, etc.</p>
BASES Division of Psychology	Chris Harwood	From the perspective of applied practice, sport and exercise psychology will be a fully established and regulated profession whereby only those who have followed specific education, training and supervised experience programmes can be employed by the sport industry (i. e. national federations, professional sports, youth sport academies, sport institution services, parents). The quality of education and training in psychological support and intervention techniques will be higher, more bespoke to sport and exercise contexts, and with an greater emphasis on demonstrating a wide range of technical, social, organisational and cultural competencies. Due to an enhanced skill-set that begins with an understanding of sport and exercise sciences, the expertise of the sport and exercise psychologist in 2050 will mean that pseudo-psychology practitioners, and unqualified 'mental coaches' no longer exist in the sporting market place
FEPSAC	Anne-Marie Elbe	<p>In general, I think there will be a larger focus on exercise than on sport psychology. This will be due to the fact that there will be a shift in focus from young, athletic populations towards more research on older/the ageing population. Keeping the ageing population healthy and fit will be a major occupational field for graduates from our field.</p> <p>Exercise will be seen as an/the important factor to tackle obesity involving many more exercise psychologists than today. Obesity will be one of/the biggest health challenges Western societies face in 2050. Research in our field will involve the use of many more technologies than today (e. g. more widespread use of psychophysiological methods to measure psychological states, computer/app-assisted research and interventions).</p> <p>Sport/exercise psychology graduates will be increasingly employed in fitness venues/as personal trainers to develop, enhance and support individuals' personal body and fitness projects. Being fit will be even more important than today for members of the upper middle class in Western societies.</p> <p>Sport/exercise psychologists researchers will be involved in many more interdisciplinary projects than today.</p> <p>With regard to the publications in our field I predict more diversity in the applied research methods and in the populations under investigation</p>
ISSP	Gangyan Si	Given the global nature and dynamics of cultural diversity within the sporting arena, there will be more systematic-empirical cross-cultural/indigenous studies based on the cultural/indigenous researches in sport and exercise psychology. Such comparisons not only highlight the differences in the sporting behaviours, motivations and thought patterns of people from different cultural backgrounds, but can also discover their similarities. Using this combined emic-etic approach, sport and exercise psychology can truly contribute to the realization of the ultimate goal for psychology

Table 1 Predictions about sport and exercise psychology in 2050 from various national and international associations. Predictions are original citations as exact responses received via emails in November 2016 (Continued)

Institution	President	Prediction
CPA	Pier-Eric Chamberland	<p>A lot can happen in 33 years. Training and licensing requirements in Canada changed drastically over the past 15 years alone. For example, 2017 will be the first year where graduate students from all provinces will earn a salary during their internships (Québec joined only recently). Part of my predictions are obviously wishes, but I believe the trends and needs I noticed in the field have significant chances of materializing by 2050.</p> <p>First and foremost, sports psychology as a specialization will be promoted to a larger scale at the public, professional and inter professional levels. Athletes are now able to share their lifestyle, ambitions and feelings on social media. With time, such exposure will make the presence of a team of professionals that includes a trained sports psychologist more obvious to the public, whether it is for mental preparation, skill acquisition, career/education/life balance for mental health. It will become common knowledge for coaches and physical trainers that these duties will be best assumed by sports psychologists who will, as a result, accelerate the advancement of knowledge in that area. I would therefore expect an increase in popularity of graduate programs in sports psychology, which may become more widely available. For the moment, undergraduate students have to plan their education carefully if they seek a specialization in sports psychology.</p> <p>In order to promote training in sports psychology, professional organizations within the psychology practice will have formed stronger bonds by developing and disseminating training guidelines, which will be adopted by a growing number of universities. This will also be facilitated by the emergence of evidence-based practice guidelines within and across countries and regulatory organizations.</p> <p>In line with this, I would also expect a stronger development of the scientist–practitioner identity within the sports psychology practice. Data is absolutely everywhere now, actively used in sports predictive analytics from Baseball to Mixed Martial Arts. I would hope that sports psychologists join the trend and form a habit of collecting psychological data in a systematic manner to publish their findings in clinical journals, or collaborate with sports agencies to identify determinants of performance and well-being. As professional sports have a strong influence on society, the dissemination of the practices above will inspire people to engage more actively in conscious efforts of self-improvement</p>

AASP Association for Applied Sport Psychology, *APA* American Psychological Association, Society for Sport, Exercise & Performance Psychology, Division 47, *CPA* Canadian Psychological Association, *FEPSAC* European Federation of Sport Psychology, *ISSP* International Society of Sport Psychology, *BASES* British Association of Sport and Exercise Sciences, Division of Psychology

SPC model of the future

I argued above that the visions of the future of sport and exercise psychology can be categorized according to the 3 S: science, sport, and society. Further I illustrated through the responses from the professional association presidents that they could be classified into the dimensions of structure, processes and culture (SPC). Such SPC descriptions are often used in change management and specifically in areas of interest such as health (Evans, Baker, Berta & Barnsley, 2015). Applying these change management strategies to health or performance could lead to discussions of the changes needed to promote the future of sport and exercise psychology. In the following sections, each of the parts of the SPC framework as they apply to the 3 S of exercise and sport psychology (see [Fig. 2](#)) are discussed. These ideas could form the basis of goals to be met by 2050.

Science

Structure

First, a scientific strategy that integrates the areas of performance science, cognitive science and health science as well as the subdivisions of sport, exercise and performance psychology would need theoretical clusters. A cluster would be a structure that serves as a “melting pot” for stakeholders from these different disciplines and areas of interest. On a global level, such a cluster addressing the theory of human performance might take the form of a worldwide commission or continental associations in which, for instance, experts from the Association of Performance Science, the International Society of Sport Psychology and other associations would meet. Their task would be to develop and evaluate common theories that describe, explain and predict behaviour in human performance in general as well as in specific areas of exercise and sport. A structure of joint working groups could potentially lead to continental or national levels of structure

for governmental or nongovernmental organizations and a specific funding and scientific dissemination strategy.

Second, clusters of these kinds may need to include members who work on other important developments, such as methodology. It seems quite important that by 2050 we standardize the methods we use in a way that is accepted beyond the boundaries of exercise and sport psychology (Clark & Williamon, 2016) by sport science, psychology, or the cognitive, performance, or health sciences in general. The influence of sport and exercise psychology on other fields might be measured by the number of citations and documented changes in theory, methods and applications. More practically, sport and exercise psychology could develop a catalogue, similar to those used in clinical psychology (e. g. International Statistical Classification of Diseases and Related Health Problems, ICD-10), to describe our phenomena and diagnostics using the same vocabulary. This would require defining diagnostics and interventions such that, for instance, stress,

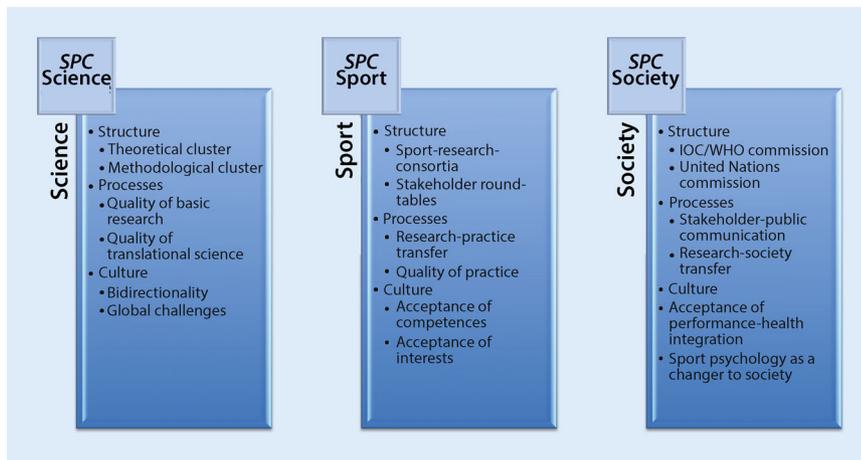


Fig. 2 ▲ SPC (structure, processes, culture) applied to the 3 S (science, sport, society), suggesting goals to reach by 2050. No order or weighting implied. *IOC* International Olympic Committee, *WHO* World Health Organization

burnout and depression can be differentiated and the roles of sport and exercise psychologist and clinician can be easily distinguished.

Processes

Processes in change management are important to optimize developments. For predicting the future of sport and exercise psychology, two aspects—the quality of basic research and the quality of translational science—seem to be important, as discussed in previous predictions (Wylleman & Seiler, 2016).

A number of challenges in basic research could be met by 2050. For instance, the quality of basic research will be improved if the structural clusters discussed above have developed theoretical and methodological standards that can be judged in real practice. By 2050 the confidence crisis in psychology (Pashler & Wagenmakers, 2012) that has also affected sport psychology (Schweitzer & Furley, 2016) should be resolved, and guidelines for allowing for both specific standards and variance in the way to conduct research are warranted. A vision for 2050 would include processes that allow sufficient resources for quality to be established by national and international bodies; cooperation among associations, clubs, teams, and individuals in sport and exercise should also lead to quality in basic research in more applied settings. Current strategies such as the Open Science Framework (OSF, [\[osf.io/\]\(https://osf.io/\)\) and future developments should be adapted to the specific scientific needs and conditions in sport and exercise psychology. For instance, OSF standards may not fully apply to scientific investigations in elite sports. Sport and exercise psychologists need to develop standards based on reliable scientific findings to implement in elite sports and increase scientific reproducibility.](https://</p>
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The quality of basic research needs to have a counterpart in translational science that makes it possible to translate research into practice. In 2050 institutions and dedicated experts may transfer research findings that are validated and checked for their effects in real situations. These should be directly communicated to stakeholders in practice. Infrastructures that optimize the processes of individually tailored communication should become as frequently used as our current messenger systems. Whereas this has become common practice in physical health disciplines (e.g. Lewis, Lyons, Jarvis & Baillargeon, 2015), for mental health and sport and exercise psychology, this is still an aim for 2050.

Culture

The scientific culture of 2050 may be different in terms of its bidirectionality and in the extent to which global challenges are taken into account. First, bidirectionality needs to surpass current strategies. For instance, currently in basic research often a unidirectional transfer from, say,

psychological theories to application in the sport and exercise psychology content is realized. Likewise, unidirectionality is often seen when researchers use a sport context to test their ideas in practice. With bidirectionality I envision that in 2050 research conducted in sport and exercise psychology will influence research in psychology, sport science, performance, and cognitive and health sciences as much as vice versa. An indication of change would be researchers publishing and working more often in interdisciplinary teams, using sport and exercise psychology findings to test theories in other areas of research (see, e.g. Raab, 2012). Further I envision that a culture of cooperation between researchers and practitioners will be fostered in which questions that emerged from previous research as well as from applied situations will be addressed.

Second, global challenges in sport and exercise psychology require global attention. For instance, recent advances in science that could enhance peak performance have generated a culture of national proprietary interest that may prevent early dissemination of scientific findings. Currently sport and exercise psychology is not equally accepted worldwide, and relevant activities of governments, funding agencies, international societies and journal publishers in developing countries are not yet optimal. I envision in 2050 this may still be the case if the sport system and competitions remain similar. However, researchers in sport and exercise psychology may be much more involved in global activities, such as coach education on ethics, psychological aspects of doping, that would allow for fair, transparent competition in which psychological preparation becomes a crucial component, as indicated in my prediction for 2050. In areas of health I think these global challenges have been addressed much more; I predict that the specific role and impact of sport and exercise psychologists will be clearly acknowledged in 2050.

Sport

Structure

The sport structure could change by 2050 in meaningful ways using sport-research consortia and stakeholder roundtables. For sport-research consortia there are a couple of visions that could be developed at the local or global level. Locally, sport clubs could create teams consisting of coaches, sport psychologists and a researcher. The team would be accountable for successes and failures and thus their cooperation and jobs would depend on their joint activities. Within clubs and associations we need researchers and sport and exercise psychologists to be the representatives of the club. Just as a main coaching philosophy in a club is needed, so too a psychological philosophy beyond individual coach-psychologist or athlete-psychologist dyads is critical to success.

Globally, associations could provide the same structure bringing together national/international sport associations and sport psychologists and researchers. Again, hiring and firing them as a team will increase cooperation among coaches, sport psychologists and researchers. Some current activities such as professional soccer academies already show a structural integration for some research areas, such as performance analysis (Raya-Castellano & Fradua, 2015).

I envision that stakeholders will have roundtables that develop new structures. For instance, currently research, advanced education in sport and exercise psychology, and sport administration are not conducted in the same place. I can envision that we will build places in which they all come together in the same building to allow daily exchanges. Some universities do host sport associations or scientific associations and some sport structures such as the Wembley campus integrate education in the sport system (<http://ucfb.com/ucfb-experience/campus-locations/ucfb-wembley/>). Nevertheless, a united structure that integrates all these components in the same place is lacking on national and international levels and would be a vision for 2050. Needless to say, to implement such

changes, concrete action plans need to be developed that would use the proposed new structures.

Processes

Sport processes that may require attention are the research-practice transfer and the quality of practice; both processes could be very different in 2050. For research-practice transfer, processes could be instituted that validate research in an area that summarizes current trends via meta-analyses or other forms of reviews (Raab, Wylleman, Seiler, Elbe & Hatzigeorgiadis, 2016). These transfer processes could be summarized on slides for use in teaching at universities as well as disseminated via tweets to stakeholders. Further, such material needs to be translated by research coordinators in sport associations for use in the different coach education systems and communicated to club and association management. Sharing databases and knowledge management systems between, for instance, diagnostics centres at universities or Olympic training centres and sport associations would benefit all sports at the local and international level (e.g. <https://www.dshs-koeln.de/en/momentum/>).

For the quality of practice, I envision that in 2050 there will be computer-based processes that support decisions of sport psychologists. For instance, “big data” has arrived in sports, but it seems that different members of the sport system have access to it for specific judgments, such as talent selection and development, competition and training analyses. Sport and exercise psychologists certainly should be members of the expert groups that determine what data should be used in diagnostics, contributing to the kind of analyses used and interpretations that add a psychological perspective to decisions. For instance, there could be a database and online system that directly integrates information from different sensors and feeds it to sport psychologists. Whereas today we use different devices to gather global positioning system tracking data, heart rate variability, or psychological states, in the future there may be a device such as a ring an athlete wears that transmits such data to an

online database (for a current device see <http://www.thebioring.com/>). Again the process to interpret the data and decide on interventions will in the future still require the expertise of sport and exercise psychologists that I believe a ‘computer bot’ would be unable to handle in 2050.

Culture

A change towards a stronger acceptance of the different competences and interests of sport psychologists and other stakeholders seems warranted for building the structures and processes described above. Regarding the acceptance of competences, in the future, education, accreditation and certification are needed to identify the competences a sport psychologist possesses that differ from those of the other professionals on a team of experts in sports. Acceptance of these different competences would also allow for different beliefs about the differentiation of expert teams and could lead to the adoption of a set of clearly defined competences that takes into account different educational backgrounds and job titles in the profession (e.g. performance enhancers, personal coaches, mental coaches, sport psychologists, clinical psychologists, psychiatrists, sport psychological experts). Whether in 2050 it will be meaningful and manageable to have an internationally recognized certificate in sport and exercise psychology that unites them all is to be seen. Communication culture may also change here, as well as the roles of these different stakeholders in sport and exercise psychology. The ambiguity surrounding these roles is one reason why individuals, teams, clubs and associations do not rate the importance of our field as high as it deserves.

For acceptance of interests, I could envision a cultural change that encourages cooperative teams as described above. In their professions, a coach’s value is measured in winning games, a researcher’s value is measured in publishable outcomes and a sport psychologist’s value is measured in the personal development of an athlete. Accepting that these goals and the measures of success at least partly differ and sometimes conflict would be such a change. A special issue of *Ath-*

letic Insight (Schinke, Hancock, Dubuc & Dorsch, 2006) summarized some of the applied sport psychology challenges for accepting these different goals. Asking Swedish sport psychology students, the sport psychologist Urban Johnson (2006) envisioned that 10 years later (so at the time of the writing of the current paper you read), theory and methodology would develop and licensed sport psychologists might be fighting over a limited job market. It may still be that in 2050 full certification of sport psychologists will not yet be internationally recognized. Whereas some certifications have been established on national levels, broader agreements are still needed. This is still a work in progress for groups such as the European Federation of Sport Psychology (FEPSAC) and the European Federation of Psychologists' Associations (EFPA).

Society

Structure

Currently the structures of performance and health aspects of sport and exercise psychology are treated separately. The International Olympic Committee (IOC) and the World Health Organization (WHO) do not work together, and sport and exercise are not high on the agenda of the United Nations. In **Fig. 1**, I identified mind and motion, humans and technology, and sport and policy as target areas in which sport and exercise psychology can show that exercise and movement have an impact on the mind (see, e.g. the area of embodied cognition; Fischer & Coello, 2016). Further, the influence of sport and exercise psychology on human–technology interaction is almost absent but has been well documented in general psychology (Vogeley & Bente, 2010).

For goals involving health and performance, I envision a structure that merges policy and sport, such as one in which the WHO and the IOC work together to fight, for instance, doping in elite sports or doping in body-building contrasting economic interests of business stakeholders. Further, the two associations could develop joint strategies to encourage more young people to participate in sports and fight societal challenges such as obe-

sity together, potentially achieving performance and health goals through sports participation. A structure of cooperation would potentially lead to the development of joint standards, integrating for instance the body mass index (BMI) used by the WHO or the muscle–fat ratio used by sport scientists. Certainly constructs such as self-efficacy have explanatory value across different branches of health and performance research. The field of sport and exercise psychology therefore would need to address both perspectives of health and performance together in education and in relating these areas of interest to the areas of science and sport as discussed above. Examples include joint work, published meta-analyses beyond the performance and health areas, and transfer from performance to health and vice versa.

For a structure such as a United Nations commission on sport and exercise psychology, a demonstration of importance is needed. If the performance and health dimensions of sport and exercise psychology could be merged to reduce, say, obesity and doping through behavioural changes based on psychological interventions, a 2050 United Nations commission could be an achievable goal. In work and organizational psychology there is well-documented evidence that health and performance goals can be achieved at the same time (e.g. Genaidy et al., 2007) and that these common goals are jointly implemented in organizational structures. A joint organizational structure of the IOC and the WHO does not exist, but current IOC prevention activities targeting injury in elite athletes or doping (<http://www.ioc-preventionconference.org/>) and WHO activities on health promotion (<http://www.who.int/healthpromotion/conferences/9gchp/en/>) could be jointly developed under the patronage of the United Nations in the future. For instance, the United Nations has included the global issues of good health/well-being and decent work and economic growth in the 17 sustainable development goals to be reached by 2030 (<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>).

Processes

Stakeholder–public communications and research–society transfer need to be improved by 2050. For stakeholder–public communications, currently large institutions such as the WHO do communicate standards of exercise to the public (<http://www.who.int/mediacentre/factsheets/fs385/en/>). These have been refined and specified on the continental and national level (see white papers on physical activity by the EU Commission on Sport [<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52007DC0391>] and the American College of Sports Medicine [<http://www.acsm.org/public-information/position-stands>]). A process that has recently started is to personalize recommendations that are additionally supported by more data from individuals and devices (e.g. <http://quantifiedself.com/>). A system that integrates all stakeholders as mentioned above via the IOC, WHO, and United Nations and makes use of personalized communication processes to achieve both health and performance goals may come to be in 2050, aided by the sport and exercise psychologist's knowledge of diagnostics and interventions.

For the transfer of research to society, there are currently many activities aimed at increasing access to research for the public. For instance, national and international funding bodies have instituted open-access strategies for making data and publications publicly available. Researchers, agencies and politicians have established open-access policies to set up standards of transparency and informed decision making. However, given the number of papers published and the amount of data compiled and given the style in which research is typically written up, future research transfer to society needs to adopt styles and formats that are more accessible to the public without lowering the scientific standards or jeopardizing confidence in the evidence being presented. Whereas scientists are well versed about scientific standards and are familiar with current activities such as the Open Science Collaboration (2015), for society at large this is certainly not the case today.

Social and societal demands change the needs of individuals and thereby their sport behaviour, and thus the relation is bidirectional in nature. For instance, changes in the education structure, the use of electronic devices by youth and long working hours in business may produce a perception of limited time and desire for sports. This perception has already had an impact on the way people train, with shorter, intensive programs such as CrossFit gaining in popularity. The role of sport and exercise psychology is yet to be defined for such new sport behaviour developments.

Culture

Sport and exercise psychologists can impact society by increasing the acceptance of performance–health integration and by becoming key players in promoting societal change. Sport and exercise psychologists can push for the acceptance of performance–health integration on both the international (e.g. United Nations, IOC, WHO) and the national (e.g. sport and Olympic associations) and encourage joint goal setting. If stakeholders with their different interests accept that global problems such as doping and obesity can be better targeted together, a cultural shift would allow the structures suggested above to work in 2050.

In the coming decades before 2050, sport and exercise psychologists should demonstrate to the public that they can be key players in promoting societal changes through the dissemination of their diagnostic methods and successful interventions. I envision that we need to specify and quantify the effects of interventions. For instance, any strength training has a clear baseline and a target value that is matched to specific durations, intensities and structures of the training regime. By 2050 our interventions should come as close to those prescriptive levels as possible. We further need to personalize and describe the effects, given the complexity of the behavioural changes we want to predict.

Conclusions

I bet at the beginning of this essay that providing sport-psychological training to

a World Cup team would make it possible for that team to win against humanoid robots that had just won against such a team without training. I do believe that to win such a bet there must be enormous developments in sport and exercise psychology in relation to science, sport and society. These changes need to be realized on a structural level as well as by optimizing processes and making changes in society. A bet by default is a prediction of the future with an uncertain outcome. Are we ready to take the challenge?

Corresponding address

M. Raab

Institute of Psychology, German Sport University Cologne
Am Sportpark Müngersdorf 6, 50933 Cologne, Germany
raab@dshs-koeln.de

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Compliance with ethical guidelines

Conflict of interest. M. Raab declares that he has no competing interests.

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