

An investigation into the impact/influence age has on the early specialisation of children in sport

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Abstract

The overall aim of this investigation was to examine the impact/influence of age in sport and early specialisation. Essentially, the objective was to see if there is a link between starting age in sport and the level of representation reached. The sample of subjects consisted of 126 pupils, 82 males and 44 females, aged 14-16 years old. The subjects attended three different grammar schools across Northern Ireland, from both rural and urban backgrounds.

Individual questionnaires were completed by each of the subjects in order to collect information regarding their involvement in sport. The data collection found that subjects participated in a wide variety of sporting activities, ranging in starting ages and level of representation reached. The study revealed that there is no strong evidence or pattern to suggest that early specialisation is directly linked with reaching elite level representation in sport and that late specialisation can also lead subjects to reach elite level representation in their sport.

Key Words

Sport; Age; Early Specialisation; Intense; Drop Out; Level of Representation; Provincial; Regional

Introduction

Background to the Study

At present, it is not clear whether early specialisation is the key to elite sporting success. Finley (2006 [cited in Malina,2009]) reports that an increasing number of coaches, parents and children are convinced that the most efficient way to produce superior young athletes is to “play only one sport from an early age and play it virtually all year round.” This theory of ‘starting them young’ has become increasingly popular and has led many to criticise the concept as it is trying to produce ‘baby champions’ (Lang et al, 2010).

To become a talented, elite sports performer there is an accepted view that athletes must display high levels of commitment to their chosen craft. Coyle (2009) and Syed (2010) claim that sports stars are not born with talent but instead it is the accumulation of extended, focused and intensive practice. This is supported by Mostafavifar et al (2013) who report that there are a growing number of pre-adolescent children who are beginning serious sporting careers at an early age.

There is conflicting opinions between researchers with regards early specialisation. Jayanthi et al (2013) argue that there is no consistent evidence to prove that early intensive training is the key to achievement at an elite level in every sport. The appropriate starting age for participating and competing in sport is debatable. In a study by Vaeyens et al (2009) it was found that it is more likely that elite competitors began competing at an older age, participated in more than one sport and were identified for talent programmes at an older age. The risk of burnout and injury in youth sport is a common theme in the debate of early specialisation. The British Journal of Sports Medicine (2009 [cited in Kaleth and Mikesky, 2010]) emphasise the benefits of diverse sports training as opposed to single sport specialisation, especially during early-middle adolescence. This is supported by Team GB

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who analysed the performance of their athletes at the 2012 Olympic Games in London and found that their most successful athletes had come into their sport at a late age i.e. 16 or later.

Need for the Study

The research to date has been inconclusive and contradictory. Whilst there is evidence to suggest that early specialisation is a key ingredient to achieving elite level success there are also studies that attribute later specialisation with achieving elite level success. Another factor for consideration is the negative aspects commonly associated with early specialisation such as injury and drop out.

To date there is a lack of research specific to Northern Ireland on this topic. A study is necessary to determine if there is an association between age and early specialisation in NI. The study will cover a broad area of NI. The study will assess if there are any trends or patterns for early specialisation and elite representation within different sports including the national sports such as Gaelic football, Hurling and Camogie.

Another important reason for this study is the future implications for Physical Education teachers and sports coaches alike. It is anticipated that this research will inform PE educators and coaches of the current issues for the upcoming generations that they will come into contact with. This will ultimately enable them to influence and guide children along the most appropriate pathway to achieve their sporting goals.

Aims and Objectives

- Investigate the impact of age and early specialisation in sport with pupils in grammar schools
- Establish if there is a link between age in sport and reaching an elite level of sporting representation.

Review of Literature

Early Specialisation in Sport

Early Specialisation is not a recent phenomenon in sport today. According to Malina (2010), the success of Eastern European Communist sporting systems highlighted the benefits of early specialisation. The Western world perceived that athletes in Eastern Europe were part of a year round programme of systematic and specific training regiments. Sports specialisation is defined by Malina (2010) and Jayanthi et al (2011) as Intense, year-round training in a single sport with the exclusion of other sports.

While that is an accepted definition, some theorists such as Ericsson (1993), would question what volume of training qualifies as 'intense', believing that a certain threshold of training quantity must be met to classify an athlete as specialised. In contrast to this, Hill (1989) does not consider training volume a factor but states that limiting oneself to a single sport excluding all others for twelve months of the year qualifies an athlete as specialised.

The progression and change of participation in youth sports has changed. Caine et al (2008) argue that the idea of child-led recreational 'free' play of sports for enjoyment has been overtaken by the adult led, organised, deliberate practice with the focus of specific skill improvement. This is supported by Cote et al (2009) who highlight that the deliberate practice in training has the sole purpose of improving performance, whereas deliberate play promotes enjoyment.

The concept of early specialisation is controversial. However it is important to acknowledge the reasons behind early specialisation. Parents are one of the primary reasons why children specialise in a specific sport at an early age. According to Farrey (2008), parents perceive an early start key to long term success. Farrey (2008) highlights the example of Tiger Woods who began golf as young as two

BALL: AN INVESTIGATION INTO THE IMPACT/INFLUENCE AGE HAS ON THE EARLY SPECIALISATION OF CHILDREN IN SPORT

years old and was put through deliberate practice from his father who demanded the best from him. The story of his success including fourteen Major victories, has led many parents to help their child specialise in a sport from an early age. Research by Bloom (1985) on *Developing Talent in Young People*, identified successful individuals in sports such as swimming and tennis. Sloane (1985) studied these further and found that the environment created by parents of these successful athletes were child centred, concentrated on specific development in one area and placed emphasis and value on achievement.

The lure of college scholarships (USA) or even the potential of fame and wealth that comes with adult sporting success is a major driving force behind early specialisation. This can come at a cost for the family as stated by Tritto (2006). The media and the sports industry are external factors influencing parents drive for early specialisation. Using basketball as an example, Farrey (2008) highlights the search for elite basketball players begins in 6th grade where high school players are ranked locally and nationally. This opens opportunities for parents and players to sign endorsement deals with shoe companies (Danley, 2007). Parents would view this as a fast track to elite success and are therefore extremely motivated to put their kid through early specialised training.

Age in Sport

Blair et al (1992) have reported that decades of research reaffirm that regular physical activity can lead to health benefits. According to Janssen (2007) and the US Department of Health and Human Services people who are active will have higher levels of health related fitness and are at less risk of developing disabling medical conditions in addition to the psychological benefits of physical activity. It is recommended by Tucker et al (2011) that children aged between 5-17 years old should complete at least 60 minutes of moderate-vigorous intense activity each day. Troiano et al (2008) report that less than 50% of children and only 10% of adolescents reach this target.

Sport is structured, organised, competitive and can either be as an individual or as a team. It is common that a child will participate in one if not more sports, however research by Zimmermann et al (2010) and Scientific (2008) has shown that whilst sports participation peaks between the ages of 11-13, there is a decline after this period throughout adolescence. There is evidence to support this belief, however Tammelin et al (2003) and Dunn et al (2005) argue that children who participate in sport are more likely to continue physical activity into adulthood because they have developed a habit for it. There is a contradiction between these two pieces of research. Why is it that some adolescents drop out of sport instead of continuing participation?

Participation in youth sports has always been on the increase. Malina (2010) reported that in 1997 only 9% of children under the age 7 participated in organised sporting activities. By the year 2008, this had increased 12%. This increase in sports participation is supported by DiFiori et al (2014) who estimated that the number of youths participating in team sports in the USA is 27 million.

Starting age for organised competition in basketball, soccer, softball and American football is as young as 6 years old and 5 years old for Little League baseball (Malina, 2010). Feeley et al (2016) report that children participating in swimming at a high level can swim up to 4-9 miles per day for 11 months of the year. Competition can begin as early as 10 years old for swimmers. This trend of sporting competition at an early age is backed up by Grenfell and Rinehart (2003) who reported that in the sport of skating there are competitions for 3 year olds and structured training programmes for 5 year olds.

The Link between Early Specialisation and Age in Sport

Due to the advances in technology, facilities, coaches and opportunities, more children are participating in sport. Mostafavifar et al (2001) believe that the year round intensive training in a single sport including competition is at an all-time high. Many scholars state that parents and coaches believe that to achieve elite success, their children must specialise at an early age. Evidence of this has been reported by Jayanthi et al (2015) and Wiersma (2000) where 30% of athletes from a sample of 1200 were specialising in one sport in the United States.

One of the main controversies surrounding early specialisation is the age at which children should specialise. Malina (2010) produced data on Division One college female athletes (USA) and focused on the average age at which these athletes began to specialise in their chosen sport. The age for specialisation ranged from 5-16 years old for swimming compared to 11-18 years old for volleyball. The age for specialisation for gymnastics can be as young as 4 years old. Feeley et al (2016) reported that there is structured competition for gymnastics at age 4 but it is not considered competitive until the age of 7. It is worth noting the starting age for individual sports such as swimming and gymnastics is considerably younger than that of a team sport such as volleyball. Jayanthi et al (2013), Fischer et al (2015) and Myer et al (2015) have all raised concerns about the appropriate age to begin specialisation and the risk of injury and psychological stress. Professional sport is very elitist. Mostafavifar et al (2013) reports that of all high school athletes in the United States only the very best make it to the professional level, between 0.2% and 0.5%. These figures illustrate that very few specialised athletes reached their end goal of professionalism. As already illustrated some of the negatives that can arise from those who do not make it are injury and dropout. The knock on effect of this is the potential inactive lifestyle in adulthood and potential health risks associated with this type of lifestyle e.g. obesity.

It is worthwhile to acknowledge that there are some success stories with early specialisation. Early specialisation can have many different influences, from the parents or even the nature of the sport. For example, according to Law et al (2008), rhythmic gymnasts specialise typically preadolescent (less than 12 years old). This is primarily because peak performance in this sport usually occurs before the child has reached full maturation.

Methodology

This section will present the methods used in this investigation.

Research Design

According to Thomas et al (2015) the objective of research is “to determine how things are as compared to how they might be.” Essentially then research is carried out to find out information about a sample and compare to the norm or a particular theory. This is supported by Tuckman (1978 [cited in Thomas et al, 2015]) who states that research implies a careful and systematic means of solving problems. To attain reliable results it is crucial to ensure that the most appropriate research techniques are selected and that the process is carried out in a methodical and professional manner.

Research methods are generally categorised into either quantitative research or qualitative research. Sale et al (2002) argue that mixing the two methods of research is common now as it allows questions of substantial importance to be answered however it is not always appropriate for every study. Quantitative research incorporates the use of numerical measurement and analysis (Jones et al, 2003).

For the purpose of this study, qualitative research was selected as the most appropriate to meet the aims. The subjects will receive an individual questionnaire. This enables a large sample and is efficient in terms of time and resources, which are limited.

Subjects

The total number of subjects for this study was 126; 82 males and 44 females. The uneven balance of gender was due to the selection of schools and the number of students choosing to do PE as a GCSE in these schools. The sample of subjects range from the age of 14-16. The subjects cover three different post primary schools across Northern Ireland, including rural and urban locations.

Procedure

To ensure the professionalism and confidentiality of any research project, there are ethical procedures that must be taken into consideration. Subjects must be treated with high levels of respect. Berg and Latin (2008) state that “research subjects have intrinsic rights that allow them to make informed decisions about participating in a study, and during and after participation to be treated in a safe, humane, and professional manner.” Researchers have an ethical and moral obligation to provide their subjects with the relevant information that they need before they commit to partaking in a study. Berg and Latin (2008) go on to emphasise the need for “investigators to display an ethical commitment to ensure that a potential subject has sufficient information and comprehension to make a sound decision about participating in a study.”

Initially, the questionnaire itself had to be thought through and the types of questions that had to be included were designed to ensure the relevant information would be provided by the subjects. It was vital that the principal, teachers and parents approved of the children participating in the study. Each principal received a letter to ask for permission to proceed with the investigation. The letter included details about the objective of the study and the expectations of the school and pupils. There was also a guarantee that the data would be handled confidentially and professionally. A similar letter was sent to the parents/guardians of the pupils taking part in the study. The letter underlined the purpose of the investigation, who would be conducting the study and what information their children would be asked to provide. Each parental letter was provided with a consent form. If the parent/guardian authorised for their child to take part in the study, the consent had to be filled in and returned to the school prior to the data collection.

The institution of St Mary’s University College regards the values of confidentiality and professionalism essential for students of the college to understand and apply in all their areas of work. As such, the ethical considerations review form provided by the college was completed prior to this study.

Testing – Children’s Questionnaire

McColl et al (2001) describe the main objective of questionnaires as “to collect reliable, valid and unbiased data from a representative sample, in a timely manner.” The variables investigated in the questionnaire included starting age for sport, types of sports currently participating in, the level of sporting representation, previous sports participated in, reasons for dropping out of previous sports and finally parental history of participation in sport.

Analysis

In order to ascertain if there is a link between the starting age in sport and the level of representation attained, the data obtained from the questionnaires will be investigated through Microsoft Excel. Data were inputted, formulas applied and consequently a number of graphs were presented. From this observations and conclusions will be made.

Results and Discussion

Introduction

Within this section the data collected will be analysed to review the objective of this study. The objective of the study was to investigate whether age is a factor that influences the early specialisation

of children in sport. The questionnaires were related to the subjects' involvement in sport. After analysis, these results should provide some sort of evidence as to whether the age of the subjects influences their decision to specialise in a single sport and whether this has a direct correlation to reaching an elite level of participation.

Early Specialisation

In this section, I will analyse the data collected in the form of graphs produced on Microsoft Excel. This section will focus on Early Specialisation and specifically the number of sports that the subjects participate in.

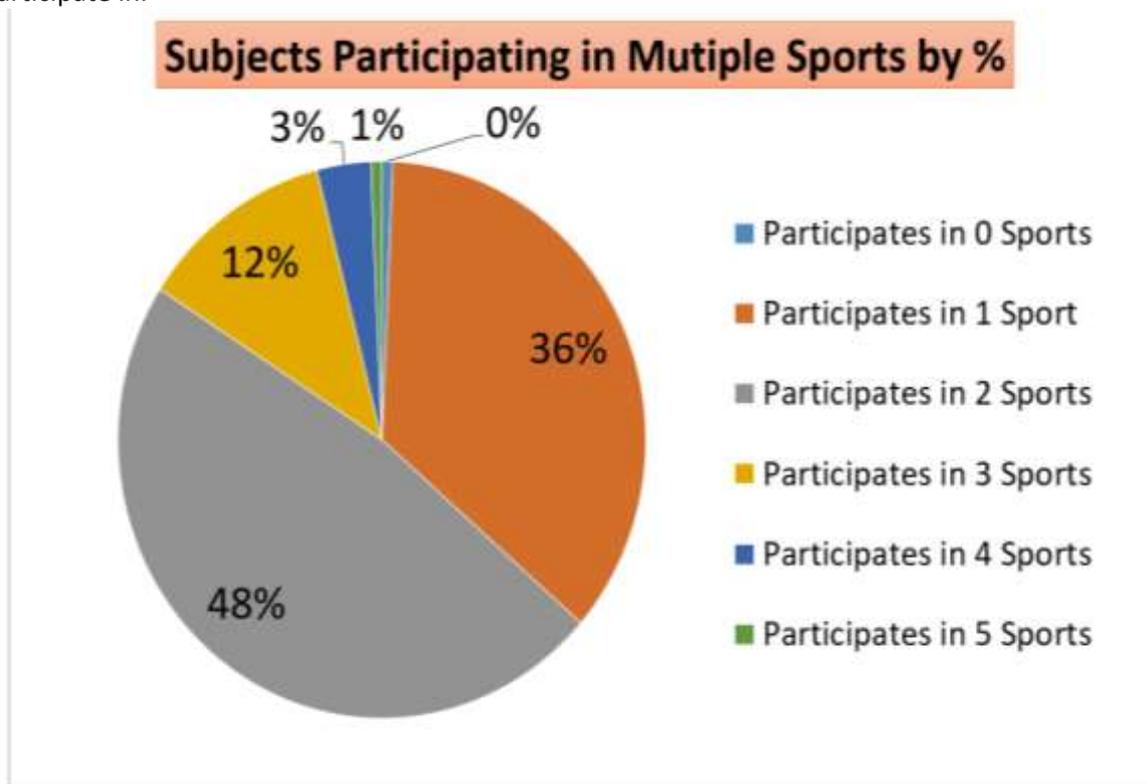


Figure 1. The percentage of subjects participating in multiple sports.

Figure 1 illustrates how many sports the subjects participate in. In total, the subjects are participating in 222 sports, averaging 1.76 sports per subject.

It is noteworthy that 100% of the subjects are participating in at least one sport although this was expected of GCSE PE students. However a significant proportion of the sports that the subjects are participating in are outside of school. The increased funding provided by Sport NI in the last number of years could be the reason behind such high participation levels. In 2012, it was reported that over £60million had been provided to sports funding with around half of this going to grassroots projects (Cited in Hull, 2012).

At this stage of the subjects' development, there is evidence that there are signs of early specialisation amongst the majority of the subjects. Already 36% participate in only one sport and are dedicating all their time to this sport only. Furthermore, almost half of the subjects, 48%, participate in only two or more sports.

The types of sports must be taken into consideration. There are some sports and in particular team games such as Gaelic football where the season has a definitive start and end. However, those participating at a high level may never have an ending to their season if they compete for more than

one team. This 'off season' in some sports gives subjects the opportunity to participate in a different activity for the remainder of the year e.g. swimming or basketball. This may explain why some subjects participate in two or more sports, but it does not mean that they participate in them all year round.

The number of subjects that participate in three or more sports is considerably less, 16%. This low percentage may be due to subjects sampling in a couple of sports, more than likely these sports could be extra-curricular activities provided within the school setting. Early diversification is another term used for sampling. According to Ford and Williams (2017) early diversification can have many benefits and claim that studies into athlete development will show that "early diversification precedes the attainment of later expert status" meaning that multisport participation can lead to elite status in later years. However, there are a couple of examples in this study of subjects competing at a high level in more than one sport. This accounts for some of the small percentage of subjects participating in three or more sports.

Age in Sport

This section will focus on the impact and influence of age in sport. The data collected represents the average starting age in sport and the reasons for dropout of sport.

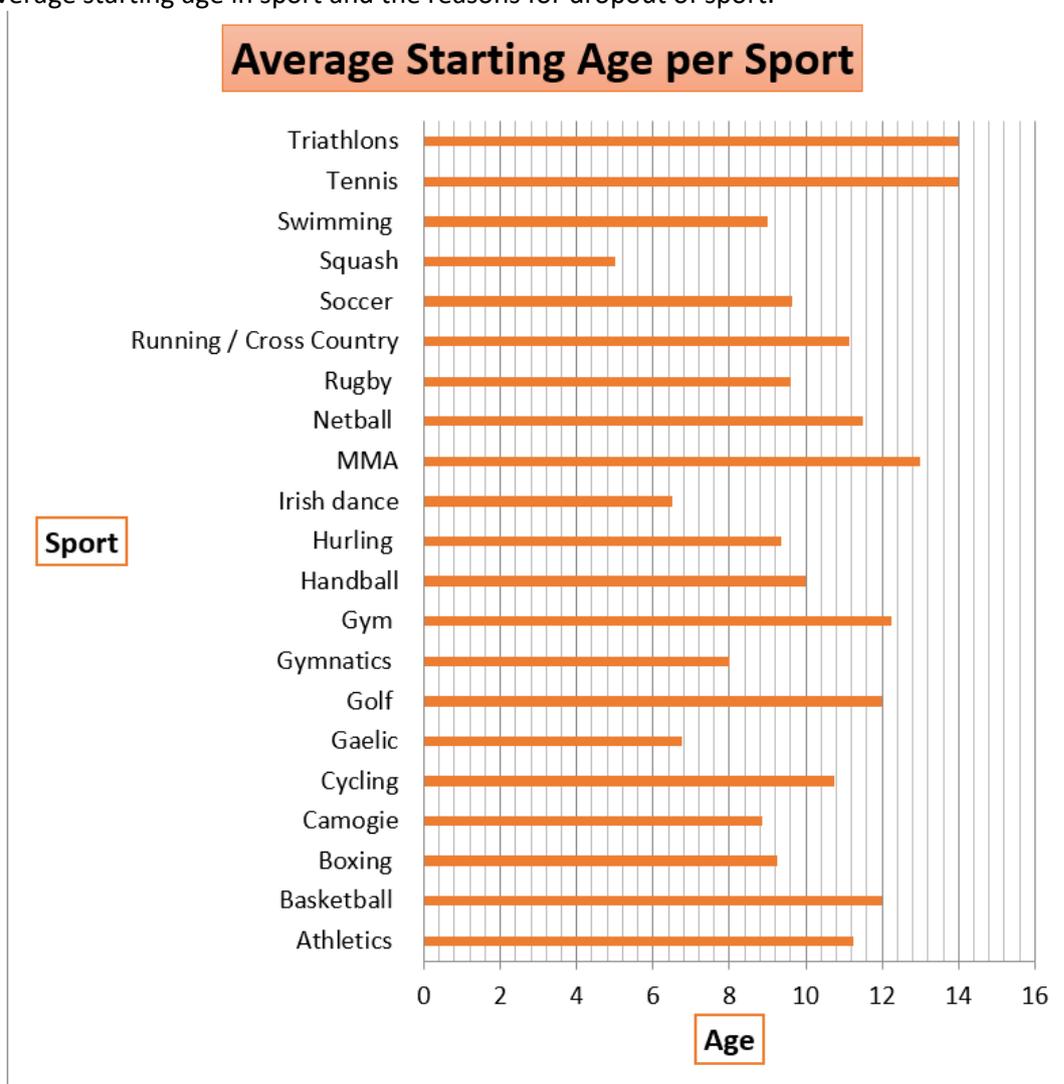


Figure 2. Average Starting Age per Sport.

Figure 2 illustrates the average starting age of subjects for each sports. From first viewing of the graph there is evidence of a wide range of starting ages with the youngest age being 5 (Squash) and 14

(Triathlons and Tennis). The age at which subjects begin participation in sport is dependent on the availability and access of the sport or even the influence of a culture, family and peers.

The research indicated that Gaelic football is the most dominant sport with a very high percentage participating in Gaelic games. Throughout Ireland, almost every community, parish, village or town there is a GAA club. The GAA club (n.d.) is promoted by the GAA headquarters to promote and sustain Irish culture based on the history of Gaelic games. The GAA club can be considered the social hub of almost every community which brings with it a sense of heritage and pride (GAA, 2017). The likelihood of the subjects participating in Gaelic games is considerably high because children are brought up into the GAA club especially if their parents are current/former players or administrators and indeed if their peers participated in the sport. Furthermore, the links made between GAA clubs and the local primary schools is quite strong. This explains the young starting age for Gaelic games. In addition to this, the Irish culture within many communities perhaps also explains the average starting age for Irish dancing (6.4).

Gymnastics is another sport which has a very young average starting age, 8 years old. The explanation for this is different to that of Gaelic games. As with almost every sport, adulthood or even late adolescence is the age when expert performance is reached or when athletes are considered to be in their 'peak'. Gymnastics is an exception. Ford and Williams (2017) argue that expert performance in gymnastics is reached by mid-adolescence and this explains why subjects specialise in this sport at such in early age.

The starting age for team sports and individual sports must be acknowledged. The general trend for starting age for team sports is below the age of 10, the exception to this is basketball. In contrast to individual sports such as Triathlons, MMA and Golf the starting age is 12 or above. These individual sports are more specialised and elitist where competition does not begin until a later age. However Soccer, Rugby and Gaelic Games begin at a younger age because of initiatives such as Tag Rugby and Go Games which are non-competitive and promote the fun and participation.

Early Specialisation and Age in Sport

This section will analyse the link between early specialisation and age in sport. The data collected illustrate the average starting ages and the level of representation of the subjects. The subjects level of participation was divided into four categories; Provincial, Regional, Club/School and Recreational. Provincial represents the highest level of representation and includes subjects that represent Ulster (Gaelic, cycling, swimming) or above e.g. Northern Ireland (netball and soccer) or World level (Irish dancing). The regional level of representation includes subjects who represent their county (GAA) or compete at Ulster level in Irish dancing. Club/School level is the most common level of representation and includes local clubs for each sport. The recreational level includes subjects that participate in activities such as swimming, cycling and Gym for the health benefits and enjoyment.

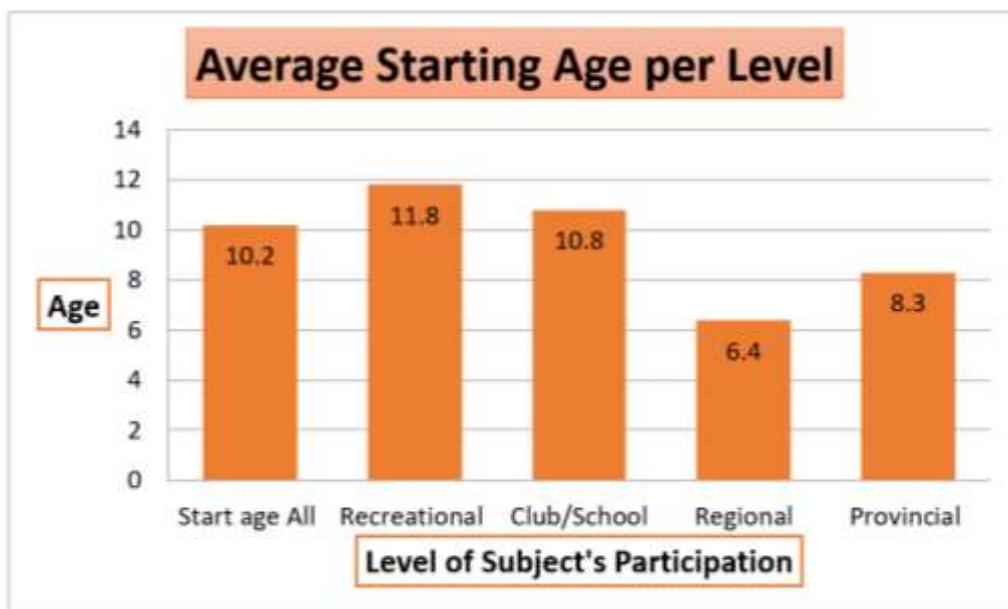


Figure 3. The Correlation between Average Starting Age and level of Representation.

The aim of this study was to investigate the influence of age on early specialisation. Figure 3 illustrates the link between average starting age for all subjects and the correlation between starting age and the level of representation that subjects reached in their sport.

The average starting age for all subjects is considerably high at 10.2 years of age. If all the subjects were participating at some sort of sport in primary school then this average would be lower. It is evident that some subjects did not begin participating in sport until they reached post-primary school. These subjects missed out on vital years of developing fundamental movement skills and indeed social skills through participating in sports clubs. Therefore, some subjects missed out on this opportunity at a young age however through engagement in secondary school sports they began to make new friends through that environment.

The subjects that reached the highest level of representation (Provincial) had the second youngest average age of 8.3 and those that reached the second highest level of representation (Regional) had the youngest average starting age of 6.4. Literature from Ericsson et al (2003) would indicate that the younger a subject begins participating in a sport there is a chance they can make it to the elite level of that sport. However this graph indicates that those who started to specialise in their sport at the youngest age did not in fact reach the highest level. Was this due to overuse injury? Less enjoyment? It is important to remember that the results in the graph are an average therefore there were subjects who began participating in their sport below the age of 6 which is very young. The subjects that reached the highest level of representation began their sport at the optimum age for long term athlete development. Balyi and Hamilton (2004) designed a six stage model for Late Specialisation for long term athlete development. The first stage of development is carried out when the subject is between the ages of 7 and 9 and is focused on enjoyment and development of fundamental movement skills. The average age for those subjects who reached Provincial level representation fall into this category.

This concept of experimenting with different activities to seek enjoyment is supported by Allender et al (2006) who also report that participation is greater when this occurs.

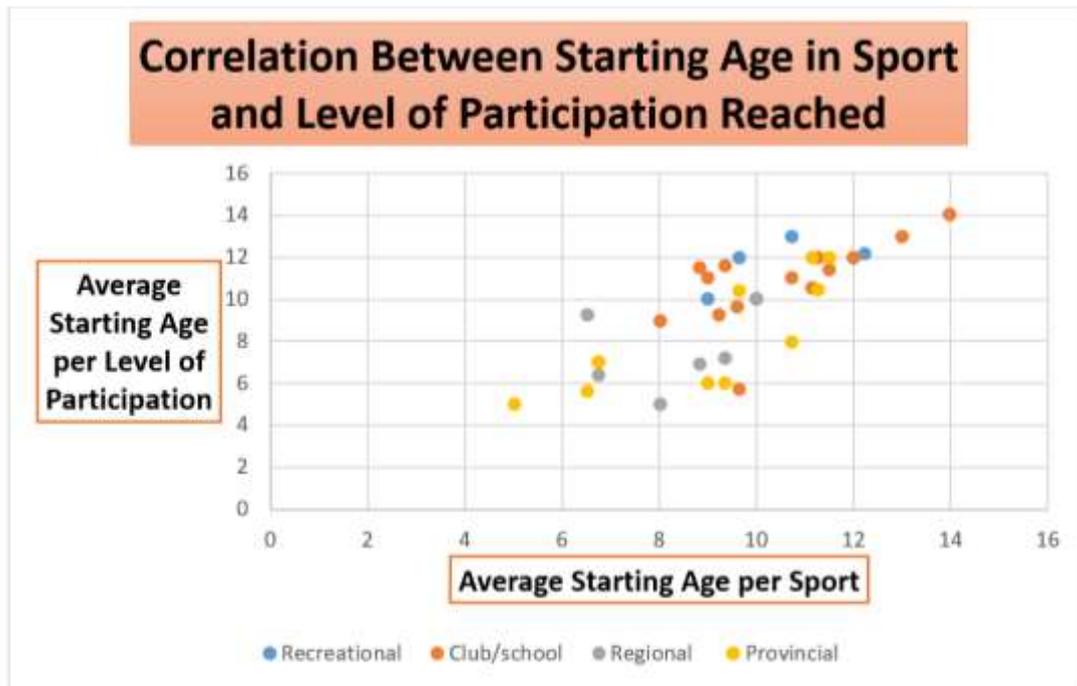


Figure 4. The Correlation between Starting Age in Sport and Level of Participation reached.

The scatter graph outlined in Figure 4 is a comparison between the average starting ages for all sports and the average starting ages for subjects that reached different levels of representation. Each of the different levels of representation is highlighted by a different colour. From first viewing of the graph, the colours of the dots appear to be scattered in different places with no clear pattern.

The concept of early specialisation is focused on the idea of intense training and competition at a young age with the aim of gaining an advantage over your peers and ultimately creates a fast track to elite level sport. When analysing the highest level of representation, Provincial, it can be seen that there is a wide spread of yellow dots on the scatter graph. Therefore this is evidence that early specialisation and indeed late specialisation can both lead subjects to represent at a provincial level within their sport. There is a similar pattern for all the other levels of representation. From this it can be concluded that there is no direct correlation with early specialisation and success in reaching elite level participation.

Conclusion

From the questionnaires provided there was a significant amount of data collected and processed into Microsoft Excel. Representing the data in graphic form allowed for in depth analysis of the impact and influence of age in early specialisation. Overall, there is no clear pattern as to whether early or late specialisation is the most appropriate for reaching an elite level of representation in sport.

Conclusions

After undertaking research into early specialisation in sport, age in sport and the influence/impact age has on early specialisation, data was collected from a sample to explore this research further. These data were compiled and arranged into a variety of graphical representations to allow for comparison and analysis. The results illustrate that there is no strong evidence or pattern to suggest that early specialisation is directly linked with reaching elite level representation in sport. The risks and drawbacks associated with early specialisation, such as burnout, overuse injury and not making it may all contribute to the drop out of participation in sport in adolescence.

This suggests that early specialisation is not the 'be all and end all' for elite level sport. Overall, late specialisation may be the most appropriate for all children because elite level representation can still be reached, there are fewer risks associated with it plus the benefits gained from diversification and sampling are greater for the individual. This is supported by Brenner (2007 [cited in Kaleth and Mikesky, 2010]) who suggests that the initial diversification, followed by later specialisation, gives players the opportunity to develop a range of physical, cognitive, psychological and social skills that act as a foundation for sustained engagement in sports whilst also being more enjoyable and motivating. Super Bowl winning coach of the Seattle Seahawks (2013/14), Pete Carroll, backs the benefits of multi-sport participation by claiming that when recruiting players he looks for "guys that are so special athletically, and so competitive, that they can compete in more than one sport."

Recommendations

- There is a lack of research specific to Northern Ireland on the topic of early specialisation in sport.
- A large scale study is required consisting of a substantial number of participants.
- The study should be developed to a longitudinal study to show the progression and development of subjects.
- Future studies to consider the whole population of NI including variety in gender, ethnicity, religion and socio-economic background.
- PE teachers and sports coaches have a responsibility to provide of a variety and fun activities for children and also the advice and guidance that should be given to young aspiring sports stars.

Limitations

- This was a small scale study of 126 participants. The sample size should be increased.
- The data collected was in November/December. This could have impacted the results of the questionnaire because some subjects could be in the off season for their sport and may have excluded it from their answers.
- A wider sample of post primary schools could have been selected to cover a variety of sports and ethnic groups.

References

- Allender, S., Cowburn, G. and Foster, C. (2006) 'Understanding participation in sport and physical activity among children and adults: a review of qualitative studies', *Health Education Research*.
- Balyi, I. and Hamilton, A. (2004) Long-term athlete development: Trainability in childhood and adolescence. Windows of opportunity. Optimal trainability. *Victoria: National Coaching Institute British Columbia & Advanced Training and Performance Ltd, 194.*
- Berg, K.E. and Latin, R.W. (2008) *Essentials of research methods in health, physical education, exercise science, and recreation*. Lippincott Williams & Wilkins.
- Blair, S.N., Kohl, H.W., Gordon, N.F. and Paffenbarger Jr, R.S. (1992) How much physical activity is good for health?. *Annual review of public health, 13*(1), pp.99-126.
- Bloom, B.S. (1985) *Developing Talent in Young People*. New York: Ballantine Books
- Caine D., Maffulli, N., Caine, C. (2008) Epidemiology of injury in child and adolescent sports: injury rates, risk factors, and prevention. *Clin Sports Med; 27: 19 - 50.*
- Côté J., Lidor, R., Hackfort, D. (2009) ISSP position stand: to sample or to specialize? Seven postulates about youth sport activities that lead to continued participation and elite performance. *Int J Sport Exerc Psychol. 9: 7 - 17.*
- Coyle, D. (2009). *The talent code: It's born. It's grown. Here's how*. New York: Bantam
- Danley, S. (2007) On basketball: trying to corner the market on the best players [Internet]. New York Times [cited 2007 July 11]. Available from:

- <http://www.nytimes.com/2007/07/11/sports/basketball/11camp.html> (Accessed: 1st October 2017)
- DiFiori, J.P., Benjamin, H.J., Brenner, J., et al (2014) Overuse injuries and burnout in youth sports: a position statement from the American Medical Society for Sports Medicine. *Clin J Sport Med*; 24(1):3-20
- Dunn, A.L., Trivedi, M.H., Kampert, J.B., Clark, C.G. and Chambliss, H.O. (2005) Exercise treatment for depression: efficacy and dose response. *American Journal of Preventive Medicine*, 28(1), pp.1-8.
- Ericsson, K.A., Krampe, R.T., Tesch-Romer, C. (1993) The role of deliberate practice in the acquisition of expert performance. *Psychol Rev.* 100 (3): 363 – 406
- Farrey, T. (2008) *Game On: The All-American Race to Make Champions of Our Children*. New York: ESPN Books
- Feeley, B.T., Agel, J. and LaPrade, R.F. (2016) When is it too early for single sport specialization? *The American journal of sports medicine*, 44(1), pp.234-241.
- Ford, P.R. and Williams, A.M. (2017) Early specialization and diversification. *Routledge Handbook of Talent Identification and Development in Sport*, p.117.
- Grenfell, C.C. and Rinehart, R.E. (2003) Skating on thin ice: Human rights in youth figure skating. *International Review for the Sociology of Sport*, 38(1), pp.79-97.
- Hill, G., Simons, J. (1989) A study of the sport specialization on high school athletics. *J Sport Social Iss.* 13 (1): 1 - 13.
- Hull, D. (2012) *Grassroots sport in Northern Ireland: A summary of participation and potential challenges*. Available at: <http://www.niassembly.gov.uk/globalassets/Documents/CAL/Committee-Motions/Grassroot-and-Elite-Sports-Facilities/3.Grassroots-Sport-in-NI-A-Summary-of-Participation-and-Potential-Challenges.PDF> (Accessed: 29th December 2017)
- Janssen, I. (2007) Physical activity guidelines for children and youth This article is part of a supplement entitled Advancing physical activity measurement and guidelines in Canada: a scientific review and evidence-based foundation for the future of Canadian physical activity guidelines co-published by Applied Physiology, Nutrition, and Metabolism and the Canadian Journal of Public Health. It may be cited as Can, J. Public Health 98 (Suppl. 2). *Applied Physiology, Nutrition, and Metabolism*, 32(S2E) pp. S109-121.
- Jayanthi, N.A., Pinkham, C., Durazo-Arivu, R., Dugas, L., Luke, A. (2011) The risks of sports specialization and rapid growth in young athletes. *Clin J Sports Med*; 21(2):157.
- Jayanthi, N., Pinkham, C., Dugas, L., Patrick, B., LaBella C (2013) Sports specialization in young athletes: evidence-based recommendations. *Sports Health*; 5:251-257.
- Jayanthi, N.A., LaBella, C.R., Fischer, D., Pasulka, J., Dugas, L.R. (2015) Sports-specialized intensive training and the risk of injury in young athletes: a clinical case-control study. *Am J Sports Med*; 43:794-801.
- Jones, I. and Gratton, C. (2003) *Research methods for sports studies*. New York: Routledge.
- Kaleth, A.S. and Mikesky, A.E. (2010) Impact of early sport specialization: A physiological perspective. *Journal of Physical Education, Recreation & Dance*, 81(8), pp.29-37.
- Lang, M. and Light, R. (2010) Interpreting and implementing the long term athlete development model: English swimming coaches' views on the (swimming) LTAD in practice. *International Journal of Sports Science & Coaching*, 5(3), pp.389-402.
- Law, M.P., Côté, J., Ericsson, K.A. (2008) Characteristics of expert development in rhythmic gymnastics: a retrospective study. *Int J Sport Exerc Psychol.* 5:82-103
- Malina, R.M. (2009) Children and adolescents in the sport culture: the overwhelming majority to the select few. *Journal of exercise science & fitness*, 7(2), pp. S1-S10.
- Malina, R.M. (2010). Early sport specialization: roots, effectiveness, risks. *Current sports medicine reports*, 9(6), pp.364-371.

BALL: AN INVESTIGATION INTO THE IMPACT/INFLUENCE AGE HAS ON THE EARLY SPECIALISATION OF CHILDREN IN SPORT

- McColl, E., Jacoby, A., Thomas, L., Soutter, J., Bamford, C., Steen, N., Thomas, R., Harvey, E., Garratt, A. and Bond, J. (2001) *Design and use of questionnaires: a review of best practice applicable to surveys of health service staff and patients*. Core Research.
- Mostafavifar, A.M., Best, T.M., Myer, G.D. (2013) Early sport specialisation, does it lead to long-term problems? *Br J Sports Med*; 47:1060-1061.
- Myer, G.D., Jayanthi, N., Difiori, J.P., et al (2015) Sport specialization, part I: does early sports specialization increase negative outcomes and reduce the opportunity for success in young athletes? *Sports Health*. 2015;7:437-442.
- Sale, J.E., Lohfeld, L.H. and Brazil, K. (2002) Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality and quantity*, 36(1), pp.43-53.
- Scientific, C. (2008) Industrial Research Organisation: 2007 Australian National Children's Nutrition and Physical Activity Survey: Main Findings. *Canberra: Commonwealth of Australia*.
- Sloane, K.D. (1985) Home influences on talent development. Cited In: Bloom BS, editor. *Developing Talent in Young People*. New York: Ballantine Books;
- Syed, M. (2010) *Bounce: Mozart, Federer, Picasso, Beckham, and the science of success*. New York: HarperCollins
- Tammelin, T., Näyhä, S., Hills, A.P. and Järvelin, M.R. (2003) Adolescent participation in sports and adult physical activity. *American journal of preventive medicine*, 24(1), pp.22-28.
- The GAA Club* (no date) Available at: <http://www.gaa.ie/my-gaa/getting-involved/club> (Accessed: 28th December 2017)
- Thomas, J.R, Silverman, S. and Nelson, J. (2015) *Research methods in physical activity*, 7E. Human Kinetics.
- Tritto C. (2006) Paying for performance: velocity, hammer bodies cash in as parents invest thousands in child athletes [Internet]. 2006 St. Louis Business Journal [cited 2008 November 5]. Available from: <http://www.bizjournals.com/stlouis/stories/2006/07/10/story2.html?page=1> (Accessed: 1st October 2017)
- Troiano, R.P., Berrigan, D., Dodd, K.W., Mâsse, L.C., Tilert, T., McDowell, M. (2008) Physical activity in the United States measured by accelerometer. *Medical Science Sports Exercise*; 40(1):181-188
- Tucker, J.M., Welk, G.J. and Beyler, N.K. (2011) Physical activity in US adults: compliance with the physical activity guidelines for Americans. *American journal of preventive medicine*, 40(4), pp.454-461.
- Vaeyens, R., Güllich, A., Warr, C.R. and Philippaerts, R. (2009) Talent identification and promotion programmes of Olympic athletes. *Journal of sports sciences*, 27(13), pp.1367-1380.
- Wiersma, L.D. (2000) Risks and benefits of youth sport specialization: perspectives and recommendations. *Paediatric Exercise Science*; 12:13-22.
- Zimmermann-Sloutskis, D., Wanner, M., Zimmermann, E. and Martin, B.W. (2010) Physical activity levels and determinants of change in young adults: a longitudinal panel study. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), p.2.