

Relationship between Sibling Characteristics and Talent Development

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Abstract

Objective/Background: Parents have been shown to be highly influential in the development of sporting talent, however the relationship between sibling characteristics and talent development is comparatively under-researched. Therefore, the aim of this study was to identify the associations between athlete skill level, birth order, sibling's participation, and achievement in sport in the UK. *Materials and Methods:* The methodology by Hopwood et al. (2015) was followed for the purpose of the current study One hundred and eight UK based athletes competing at three different skill levels (elite, pre-elite, non-elite) divided according to the Athlete Development Triangle (Gulbin et al., 2010) reported data concerning their own and siblings' participation in sports using the Developmental History of Athletes Questionnaire (Hopwood, 2013). A Pearson's chi-square test for independence was used to assess skill level differences in categorical independent variables. *Results:* Results reinforced previous findings from Hopwood et al. (2015) demonstrating that elite athletes were more likely to be later-born siblings, than pre-elite and non-elite athletes ($p = .007$). Elite athletes were also more likely to have siblings who were involved in competitive sport ($p = .005$), competed at elite level ($p = .001$) in the same sport ($p < .001$) than siblings of pre-elite and non-elite athletes. *Conclusions:* The findings revealed that siblings may influence the development of sporting talent and involvement in sport by facilitating the growth of key psychological characteristics and providing additional support and opportunities. Therefore, incorporating those relationships within talent development environments coupled with the concept of role models could be a positive influence aiding towards effective talent development.

Keywords: Family, British Athletes, Competitive Sport, Skill level, Birth Order

Introduction

Talent development (TD) has been defined as “a multi-faceted process of optimally nurturing athletes over time within a sport-system” (Cobley et al., 2021, p. 8). TD environments (TDEs) can facilitate the development of a toolbox of skills and attributes which can empower individuals to progress throughout the TD pathway in sport (Andronikos, Souglis, & Martindale, 2021; Martindale et al., 2007). However, the success of TD in sport is often influenced by several factors both within the close and wider environment of the athletes (e.g., Macdonald, & Allen, 2019). One such factor, the family, has been shown to be influential in the development process of athletes (Hopwood et al., 2015; Taylor et al., 2018). As it has been highlighted in the TD literature, parents and siblings are amongst the key pillars of the microenvironment surrounding prospective elite athletes and as such they can have a considerable influence of the development process of talented athletes (Henriksen, 2010).

In fact, recent research highlights that the family is potentially among the most important support mechanisms in the athletic career (Taylor et al., 2017). Most of the family related has focused on the role of parents (e.g., Knight, 2017); therefore, there is a gap regarding the potential impact of sibling characteristics on the development of talent. Literature examining siblings has focused mostly on physical activity (see Blazo & Smith, 2018) while the limited research focusing specifically on the relationship of sibling characteristics and TD is mainly qualitative in nature (Taylor et al., 2017, 2018, 2020) with only one study (examining those associations) adopting a quantitative research design (Hopwood et al., 2015).

Birth Order

The study from Hopwood et al. (2015) was conducted with 229 Australian and Canadian athletes who provided information for a total of 373 siblings. More specifically, this quantitative study explored the associations between the following variables: sport expertise, sibling characteristics, and sibling participation in sport and physical activity. Athletes were divided and represented three distinct levels of competition (non-elite, pre-elite, elite) and the History of Athletes Questionnaire (Hopwood, 2013; Hopwood et al., 2010) was used to gather information about sibling characteristics and participation in sport and physical activity.

The study from Hopwood et al. (2015) identified a significant relationship between birth order and skill level. Regardless the family size, elite athletes were more likely to be later-born children (Hopwood et al., 2015). These findings were in line with previous studies suggesting that the birth order effect may affect the development of siblings in multiple ways, either in their behaviours, their academic attainment or their involvement and success in sport. For instance, when considering sporting success, younger siblings are generally more successful (Krombholz, 2006).

Furthermore, results demonstrated that siblings of elite athletes were more likely to participate in physical activity than siblings of non-elite athletes (Hopwood et al., 2015). According to Social Learning Theory (Bandura, 1977), individuals learn through imitation, observation, and modelling. Therefore, it is plausible that older siblings of elite athletes acted as socialising agents encouraging the younger athletes to participate in sport and physical activity. This aligns with previous research suggesting that birth order in the family can influence participation in sport or physical activity levels (Atkin et al., 2013). Similarly, findings have shown that the level of physical activity amongst adolescents was significantly associated with the siblings' frequency of participation in sport or physical activity (Blazo & Smith, 2018; Duncan et al., 2004). More specifically, brother-brother dyads spend more time in both structured and unstructured activities compared to any other sibling dyad composition (Tucker et al., 2008). According to TD literature, it is those early experiences that may positively influence the future development of talented individuals; as for example, positive experiences fostered by sibling cooperation can promote enjoyment (Baker & Cogley, 2008) and future engagement in sport (Côté, 1999).

Sibling Characteristics and Talent Development

In sports, siblings can be both training partners and competitors (Hopwood et al., 2015). Côté (1999) described siblings as a source of encouragement, with older siblings being reported as role-models for younger siblings, increasing their commitment to sport. This is echoed by qualitative work by Davis and Meyer (2008), which showed that competition with one's sibling increased motivation to train harder and prepare for competitions more effectively. Sibling competitors from the study also provided emotional and instructional support – despite being direct competitors. These findings are consistent with a classic study from Weiss (1974), which theorised that there are emotional support (reassurance of worth) and instructional support (guidance) relationship functions in the athlete–sibling dyads.

Recently, there is an increasing focus on sibling interactions with some studies focussing on how sibling interactions can influence not only participation levels but also the development of sport expertise (i.e., Taylor et al., 2017). In line with this, existing studies have shown that athlete-sibling relationships are not purely hierarchical but are dynamic (Taylor et al., 2017, 2018). More specifically, Family System Theory (Bowen, 1978) emphasises the athlete-sibling subsystem can be placed on a dynamic continuum from permeable (frequently asking for support outwith the athlete-sibling subsystem) to enmeshed (placing greater dependence on members of the subsystem). The nature of these boundaries can shift and flux for various reasons and changing needs over time, which can lead to naturally occurring challenge and support. This may positively influence the TD journey by ensuring a 'rocky road' of training and competition experiences with their sibling(s) (Collins et al., 2016). As such, this process may essentially facilitate the acquisition of psycho-behavioural skills (e.g., resilience and quality practice), essential for effective exploitation of learning environments (Taylor et al., 2017). To fully understand the dynamics of the athlete-sibling subsystem, the need for both longitudinal and contextual considerations is crucial when evaluating interactions during the development of talented individuals. The importance of longitudinal studies has been emphasised by Buekers et al. (2015) as it allows researchers to further explore the multifaceted nature of the TD environment and sibling dynamics (Taylor et al., 2018, 2020). Currently, researchers have acknowledged the need to investigate various TD pathways and environments including those in amateur level (Curran et al., 2021). Similarly, Franck et al. (2018) has highlighted the need to examine this topic across different contexts using quantitative methodology to extend the current understanding in this area.

The effect of the athlete-sibling subsystem on the TD pathway has been examined by Taylor and colleagues (2017). Interview data highlighted several ways which facilitated positive TD - namely regularity of interaction in sport, emotional interpersonal skills (closeness, support, and empathy) and co-operation. Taylor et al. (2017) expanded past findings by identifying separation (lack of regular interaction between siblings) as influential for TD. Separation, as athletic expertise develops, demonstrates the non-linear role of the athlete-sibling subsystem as it reduces the conducive role of siblings on TD. Taylor et al. (2017) further discovered that rivalry between siblings can positively influence TD by contributing to the development of resilience - a key psychological characteristic which allows athletes to manage high training loads.

The idea that sibling interactions can impact TD has been further reinforced by another recent study from (Taylor et al., 2018). This longitudinal study interviewed families at different time points through the year (pre-season, in season, post-season), which allowed the results to be better contextualised along the TD pathway and demonstrated examples of the Family System Theory (Bowen, 1978) in practice. When considering sibling separation, the permeability of the athlete-sibling subsystem was evident with younger siblings utilising parent-child subsystems as well as peer relationships outside of the family system to combat an older sibling moving

out. However, when the older sibling returned, other family members commented on the enmeshed nature of the relationship, stating that when reunited, they had little interest for people outside of their subsystem.

The findings from sibling research have been confirmed by associated TD findings showing that athletes can benefit from emotional support from their siblings and by having proximal role models to aspire to, which was most evident in prospective athletes who trained alongside elite athletes (Henriksen, 2010). The complex nature of relationship characteristics between siblings (e.g., emotional support, competitiveness and/or rivalry) can have a multi-factorial impact on the non-linear pathway to becoming an elite athlete - specifically through bio-psycho-social interactions (Taylor et al., 2017, 2018).

Summary and Objective

Existing literature has identified the bio-psycho-social impact athlete-sibling subsystems can have on TD. The most up to date research in the UK has examined the impact of siblings on development adopting a qualitative approach (Taylor et al., 2018, 2020) and a conceptual analysis article which has provided useful insights regarding the role of siblings (Taylor et al., 2021). Considering the scarcity of quantitative studies, the need to further investigate different contexts is apparent demonstrating the significance of the current study. To ensure the rigour of our research the methodology adopted in the study by Hopwood et al. (2015) was followed for the purpose of the current study. More specifically, to expand our understanding in this area the current study examined the skill level differences in sibling characteristics and sibling involvement in sport within the UK. The context of the current study (i.e., UK) was chosen due to its high success at international level and effective TD processes in various sports. As such, the aim of this study was to identify the associations between athlete skill level, birth order, sibling's participation, and achievement in sport in the UK.

Methods

Participants

One hundred and eight competitive athletes with a variety of sporting backgrounds from the UK participated in this investigation (Males = 57, Females = 51). Athletes participating in the following sports were included in this study: swimming (22), athletics (23), rugby (21), gymnastics (8), football (19), and hockey (15). Athletes were recruited via advertisements on social media, in sporting centres or by invitation from their coach or team. Participants were required to be aged 16-36. Athletes were classified into three skill groups: elite (n = 36), pre-elite (n = 37) and non-elite (n = 35), according to the Athlete Development Triangle. The Athlete Development Triangle illustrates the various competitions levels that athletes experience throughout the developmental trajectory and differentiates the athletes to different levels based on their competition profiles (Gulbin et al., 2010). As such, this model was used as a guidance for dividing the participants as the same division strategy was also used by Hopwood et al. (2015) to examine sibling dynamics and sport expertise amongst Australian and Canadian athletes aged 15-35. Elite athletes were defined as competitors that had participated in their sport at an international level; pre-elite athletes were defined as competitors that had participated in their sport at a national level; and non-elite athletes were defined as competitors that had participated in their sport at a regional level.

Procedure

Ethical approval was obtained from the Research Ethics and Governance committee of Edinburgh Napier University prior to commencement. Informed consent was gathered prior to testing and participants completed the questionnaires in paper format or online via Qualtrics software. Data concerning the athletes and their siblings was collected using the Developmental History of Athletes Questionnaire (Hopwood et al., 2010; Hopwood, 2013).

Athletes reported their highest representation in their sport (i.e., competed internationally, nationally, or regionally) and number of siblings. For each sibling, athletes stated whether their sibling was older or younger, was physically active, how active their sibling was whilst living together (participating once, twice or three or more times per week), if their sibling competed in competitive sports and finally their sibling's representation in that sport (i.e., competed internationally, nationally, or regionally).

Statistical analysis

Data was analysed using SPSS software (IBM SPSS Statistics 23). A Pearson's chi-square test for independence was used to assess skill level differences in categorical independent variables. The Monte Carlo estimate was used to determine the significance of the association (significance accepted at 95% ($p < .05$)). Adjusted standardised residuals were computed to determine factors that contributed to significant main effects (significance accepted at value ≥ 1.96). Effect sizes for Pearson's chi-square tests with nominal data were measured using Cramer's V. The effect sizes were interpreted according to guidelines from Cohen (1988).

Results

Descriptive Statistics

All athletes were UK residents and with the following characteristics in relation to competition level and gender: non-elite = 63% males; pre-elite = 52% males; elite = 43% males. Data was collected for a total of 174 siblings (from the 108 participants). There were 94 siblings that were older than the athletes and 78 siblings

younger than the athletes. All athletes were born in the same country as their sibling and 46% of siblings were the same sex as the athlete. Sixty-three participants reported having one sibling, 28 participants had 2 siblings, and 17 participants had 3 or more siblings. In relation to skill level of the participants; 19 non-elite athletes had 1 sibling and 28 had 2 or more siblings, 24 pre-elite athletes had 1 sibling and 10 had 2 or more siblings, while 20 elite athletes had 1 sibling and 16 had 2 or more siblings.

Birth Order

There was a significant association between skill level and birth order (birth order was classified as first-born or later-born athletes), ($X^2(2, N = 108) = 13.996, p = .007$). The Cramer's $V = .36$ indicating a moderate effect size. There was an overrepresentation of later-born children competing as elite athletes (adjusted standardised residual = 3.7) while first-born children were overrepresented in the non-elite athlete group (adjusted standardised residual = 2.4). Observed and expected frequencies for athlete skill level and sibling birth order are presented in Table 1.

Table 1 Frequencies and adjusted standardised residuals between athletes' skill level and birth order

Birth order		Elite	Non-elite	Pre-elite	Total
First born	Observed	4	19	15	38
	Expected	12.7	13.4	12	38
	Adjusted Standardised Residual	-3.7	2.4	1.3	
Later born	Observed	32	19	19	70
	Expected	23.3	24.6	22	70
	Adjusted Standardised Residual	3.7	-2.4	-1.3	
Total	Observed	36	38	34	108
	Expected	36	38	34	108

Siblings' involvement in competitive sport

Out of the 108 participants 92 of them had a sibling that competed in sport at a competitive level. Results showed a significant relationship between athlete skill level and siblings participating in sport ($X^2(2, N = 108) = 10.46, p = .005$, Cramer's $V = .311$). Elite athletes were more likely to have siblings participating in competitive sport (adjusted standardised residual = 3.1) while non-elite athletes had siblings that were not involved in competitive sport compared to non-elite athletes (adjusted standardised residual = 2.5) and not at elite level (adjusted standardised residual = -2.5).

Table 2 Frequencies and adjusted standardised residuals between skill level and siblings' involvement in competitive sport

Siblings' involvement in competitive sport		Athletes' skill level			Total
		Elite	Non-elite	Pre-elite	
Yes	Observed	36	28	28	92
	Expected	30.7	32.4	29	92
	Adjusted Standardised Residual	3.1	-2.5	-6	
No	Observed	0	10	6	16
	Expected	5.3	5.6	5	16
	Adjusted Standardised Residual	-3.1	2.5	.6	
Total	Observed	36	38	34	108
	Expected	36	38	34	108

Siblings' skill level in competitive sport

Since 92 of the participants had a sibling who took part sport at competitive level, the number of cases included in the analysis for "siblings' skill level" was 92. There was a significant association between athlete skill level and sibling's skill level ($X^2(4, N = 92) = 19.983, p = .001$, Cramer's $V = .33$ indicating a moderate effect size). Elite athletes were more likely to have siblings competing at elite level (adjusted standardised residual = 3.2) and not at non-elite level (adjusted standardised residual = -3.8), whereas non-elite athletes were more likely to have siblings competing as non-elite athletes (adjusted standardised residual = 3.4).

Table 3 Frequencies and adjusted standardised residuals between skill level and siblings' skill level in competitive sport

Sibling's skill level in competitive sport		Athletes' skill level			Total
		Elite	Non-elite	Pre-elite	
Non-elite	Observed	6	19	13	38
	Expected	14.9	11.6	11.6	38
	Adjusted Standardised Residual	-3.8	3.4	.7	
Pre-elite	Observed	15	7	10	32
	Expected	12.5	9.7	9.7	32
	Adjusted Standardised Residual	1.1	-1.3	.1	
Elite	Observed	15	2	5	22
	Expected	8.6	6.7	6.7	22
	Adjusted Standardised Residual	3.2	-2.5	-9	
Total	Observed	36	28	28	92
	Expected	36	28	28	92

Siblings participating in the same sport at competitive level

In line with the analysis of the “siblings’ skills level in competitive sport”, the siblings participating in the same sport at competitive level included 92 cases. Results demonstrated a significant relationship between athlete skill level and siblings participating in the same competitive sport ($X^2(2, N = 92) = 23.602, p < .001$, Cramer’s $V = .507$ showing a large effect size for this relationship). Elite athletes had an overrepresentation of siblings participating in the same sport at competitive level (adjusted standardised residual = 3.3), whereas non-elite athletes had an overrepresentation of siblings participating in different sports (adjusted standardised residual = 4.8).

Table 4 *Frequencies and adjusted standardised residuals between skill level and siblings’ participating in the same sport at competitive level*

Siblings’ participating in the same sport at competitive level		Athletes’ skill level			
		Elite	Non-elite	Pre-elite	Total
Yes	Observed	33	11	23	67
	Expected	26.7	20.4	20.4	67
	Adjusted Standardised Residual	3.3	-4.8	1.3	
No	Observed	3	17	5	25
	Expected	9.8	7.6	7.6	25
	Adjusted Standardised Residual	-3.3	4.8	-1.3	
Total	Observed	36	28	28	92
	Expected	36	28	28	92

Discussion

The aim of this study was to identify the associations between athlete skill level, birth order, sibling’s participation, and achievement in sport in the UK. The analysis revealed significant differences between athlete skill levels, furthering understanding of how individual family subsystems can affect the TD pathway - supporting the work of Hopwood et al. (2015). More specifically, the common findings between the two studies are the following: i) elite athletes were more likely to be later born; ii) non-elite were more likely to be first born; iii) siblings of elite athletes were more likely to have participated in sport particularly at competitive level. Additionally, Hopwood et al. (2015) showed that siblings of elite athletes were more likely to have participated in regular physical activity. The current study did not examine for the associations of physical activity; however, it provided a novel finding in this area of research by identifying that elite athletes had an over representation of siblings participating in the same sport at competitive level. On the other hand, non-elite athletes had an overrepresentation of siblings participating in different sports. Significant associations found in Hopwood’s study (2015) between regular physical activity and the relationship between participation in the same sport and skills could be explained by the Social Learning Theory (Bandura, 1977). Siblings may have acted as socialising agents, encouraging athletes to participate in sport and/or physical activity from an early age (Hopwood et al., 2015); to follow the same sport as shown in the current study. This finding demonstrates the significance of our study as it provides a novel perspective into the potential benefits of same sport participation within a family. Thus, this association warrants further attention to better understand this relationship and the potential benefits in TD.

The present study supports early findings from Ebihara et al. (1983), who investigated the possibility of family members acting as sport socialisation agents. When asking athletes their reasons for participating in sport, older siblings were found to be highly influential. Older siblings were described as role models for sport socialisation to younger siblings, easing their entry into sport. Additionally, Ebihara et al. (1983) observed that younger siblings acted as a source of reinforcement for older siblings’ continued participation in sport. This aligns with existing research, suggesting that siblings can facilitate one another’s initial and continued involvement in physical activity and sport (Blazo & Smith, 2018).

The patterns in sport participation showing a significant relationship between athlete skill level and siblings participating in sport may partially explain the birth order effect observed. Literature suggests that younger siblings have better motor skills which shows the potential benefits of having older siblings as role models which could accelerate their development in sport and physical activity (Krombholz, 2006). In line with this, researchers have identified that the systematic utilisation of role models can be highly beneficial for effective development of talented athletes (Martindale et al., 2007). In addition, Henriksen (2010) demonstrated this through the assessment of three successful TD environments. In all environments, prospective athletes cited elite athletes as role models, receiving both instructional and emotional support when training together. To create a successful TD environment, having prospective athletes train together with current elite athletes who are willing to pass on their knowledge of their sport could optimise the potential of a prospective athlete making it to elite athlete status. The findings of the current study potentially reinforce the idea of role modelling as data suggested that elite athletes were more likely to have siblings participating in the same sport at competitive level. This suggests that siblings may be acting as role models in practice allowing their siblings to develop a toolbox of skills which are essential for dealing with the challenges throughout the TD pathway. The beneficial role of

role models has also been highlighted in the recent literature particularly in relation to within career transitions in sport (Andronikos, Westbury, et al., 2021; Pummell & Lavalee, 2019).

While siblings have been identified as socialising agents for sport participation, research has highlighted co-operation as a desirable characteristic for TD (Blazo & Smith, 2018; Trussell, 2014). Taylor et al. (2017) supported this notion, suggesting that siblings can support athletes acting as a coping mechanism for managing stress and challenge. Additionally, work from Davis and Meyer (2008) postulated that siblings can provide both emotional and instructional support to athletes - despite direct competition.

Considering the research, elite athletes in the present study may have received support from their older, more experienced siblings - consistent with the guidance and reassurance of worth relationship functions from Weiss (1974) - potentially explaining why elite athletes were most likely to have a sibling competing in the same sport. However, on the other hand, contradicting findings have revealed that younger siblings did not want to be like or compete at the same sport as their older siblings (Osai et al., 2020). Furthermore, with many studies suggesting the potential negative effects of competing with a sibling (e.g., anger, jealousy, pressure), it would be wrong to assume that all siblings have a positive influence on TD (e.g., Blazo et al., 2014; Davis & Meyer, 2008). This is a key nuance within the sibling literature that has implications for applied practice as it becomes apparent that an 'one size fits all' solution cannot be used for all sibling relationships.

In the current study, siblings of elite athletes were significantly more likely to compete as an elite athlete than siblings of non-elite athletes which reinforces the findings from Hopwood et al. (2015). With the 'talented' sibling's involvement in sport consuming a large portion of the family's time, it is possible that younger siblings perceived sporting success as a positive trait within the family. As such, younger siblings could have attempted to emulate or surpass their more developed older siblings to receive recognition and attention from their parents (Hopwood et al., 2015). The competitiveness between siblings co-participating in sport may result in increased motivation to train harder and more effectively to outperform their sibling rival (Davis & Meyer, 2008).

For the present study, elite athletes were most likely to have a sibling competing as an elite athlete. Recent publications have argued that athletes can benefit from various challenges (structured or unstructured) along their development pathway (Collins et al., 2016; Taylor et al., 2017). A study from Collins et al. (2016) broadened our understanding in this area, suggesting that the quantity of challenges does not create a successful athlete; it is through establishing proactive coping habits and the development of favourable psychological characteristics such as resilience and competitiveness, which can moderate the extent to which an athlete acknowledges challenge. The challenging nature of sibling rivalry could foster adaptive and developmental responses, leading to outcomes that can facilitate TD (Taylor et al., 2017). It is also evident that the supportive/co-operative nature of relationships can foster a similar development process for the athletes (Taylor et al., 2018, 2020). More specifically, having available opportunities to interact with capable peers (i.e., siblings) can help young athletes to develop their competence through scaffolding or follow appropriate behaviours through modelling (Collins et al., 2019).

Limitations and Future Research

Younger participants (i.e., 16-20 years old) may not have yet reached their maximum potential in their sport. While sibling characteristics are likely to remain the same, it is plausible that prospective athletes could progress into another level of competition or potentially take up a new sport. As such, future research could consider using a more developed age group, which would give a more accurate representation of how siblings can influence TD. Due to the limited sample, data was not sufficient to cross-analyse differences in sports. As such future research could use multivariate analyses to elicit the individual contributions of different factors in these complex interactions.

Conclusions and Implications

Findings demonstrated the influential role siblings may have, not only on TD but also on sport participation contributing and reinforcing the qualitative findings in a UK context (Taylor, 2017, 2018, 2020). More specifically, the current research demonstrated that having siblings competing at the same sport can encourage participation and facilitate development. In addition to this, available support from the siblings when balanced appropriately with the challenges created by them can aid the effective development of young athletes particularly of those who are later born. From a practical perspective, the dynamic relationships between siblings may enable them to develop key psychological characteristics, or have additional support/opportunities, which can facilitate their development. As such, incorporating those relationships into TDEs more broadly, informal settings, training sessions, competitive matches/events coupled with the concept of role models could have a positive impact on the development of talented athletes. The role model process could encourage athletes to work harder and smarter on physical development and social skills (such as communication, empathy, trust) as well as the psychological skills.

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