Sports Coaches' Athlete Talent Mindset and Views Regarding Talent Identification in Norway

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Abstract

We investigated coaches' mindsets of athletic talent as conceptualised by Dweck (athlete talent mindset, A-TM) along with the athlete age at which they believe talent can be identified. We also looked at the age of talent identification in coaches of different A-TM. Using data collected as part of a survey conducted in Norway, the 3,830 participating coaches were men and women between 16 and 83 years of age. Overall, the coaches held a predominantly growth A-TM. However, older coaches, those not born in Norway, and coaches in athletics, gymnastics, and football were found to have a more fixed A-TM. Regarding their views about talent identification age, one fifth of the coaches believe that talent can be seen before 12 years of age, with football, gymnastics, and swimming coaches and those not born in Norway being more prone to detect talent at younger ages. Analyses also showed that the more fixed A-TM coaches believed they could identify talented athletes at younger ages; however, not all of them reported such talent identification age views. These findings indicate that coaches' A-TM and views regarding talent identification operate as two separate beliefs, which may be useful for understanding coaches' early talent identification and development approaches.

Keywords: coach mindset, mindset of talent, talent identification age

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In the high-performance literature, 'talent' is purported to be a complex concept that lacks a sound theoretical framework, and despite the extensive research on the subject, there has been no consensus regarding its definition (Fischer-Ontrup & Fischer, 2017). Identifying individuals who have talent(s) for sport(s) and the potential to reach elite-level performance, as well as the age at which talent can be considered to manifest, has drawn the interest of researchers, media, and practitioners (Baker et al., 2017; Skille et al., 2017). To a large extent, talent has become a polarising concept in the ongoing debate about the presence or absence of inborn abilities and the how, where, when, and by whom these should be evaluated (Baker & Wattie, 2018; Ward et al., 2017).

Individuals' underlying beliefs about the nature of human characteristics and how they influence their cognitions and behaviours have been linked to Dweck's work on implicit theories (Dweck, 1986; Dweck & Legget, 1988), later called and referred to in this study as mindsets (Dweck, 2006). Drawing on her foundational work on learned helplessness and attributions (Diener & Dweck, 1978; Dweck & Repucci, 1973), subsequently connected to goal orientations (Elliot & Dweck, 1988; Nicholls, 1989), mindsets are found to serve an organisational function by connecting goals, beliefs, and behaviours into a *meaning system* of, for example, talents and abilities (Dweck, 2000, 2006; Dweck & Leggett, 1988; Hong et al., 1999). Fixed mindset is the belief that inborn talents and abilities are fixed capacities and something one possesses to a certain degree, whereas a growth mindset is the belief that inborn talents and abilities are malleable and can develop through effort and practice (Dweck, 2000, 2006; Dweck & Yeager, 2021).

Research across situations and populations has shown how mindsets are domain specific and that individuals may hold more of a fixed or a growth mindset about a variety of

attributes and characteristics (see Molden & Dweck, 2006), entailing potentially significant consequences considering learning and performance (Dweck, 2000). Although individuals may find both mindsets plausible, one type tends to be more dominant, laying somewhere on a continuum between fixed and growth mindsets (Dweck, 2000; Murphy & Dweck, 2010). On the one side of the continuum, individuals holding more of a fixed mindset are likely to orient towards performance goals associated with maladaptive strategies (Dweck & Leggett, 1988) such as validating their abilities by outperforming others or avoiding complex tasks as failure represents an inborn deficiency (Blackwell et al., 2007; Hong et al., 1999). On the other side, individuals holding a growth mindset are concerned about developing their abilities and are likely oriented towards learning goals associated with adaptive strategies (Dweck & Leggett, 1988), such as a higher degree of persistence and attempting new learning strategies when facing obstacles or failure (Blackwell et al., 2007; Hong et al., 1999).

In addition to holding a mindset about one's own attributes and characteristics, research indicates that mindsets influence an individual's perceptions of others, both individuals and groups, and that their judgement affects how they view and interact with them (see Dweck & Yeager, 2019). Of note, individuals believing in the nature of human characteristics were found to form stronger and quicker impressions of others' behaviour than those believing in them as malleable, and they were more prone, even on spare information, to make stronger predictions of what a person could accomplish in the future (Chiu et al., 1997; Levy et al., 1998). Those believing in the malleability of human characteristics, in turn, were more open to information that was not expected in the situation (Plaks et al., 2001), and they believed in social forces as an explanation of group variability and how things varied over time (Levy et al., 1998). Considering that individuals' mindsets about talent inform how they perceive and judge themselves and others, we seek to gain insight into coaches'

mindsets of athletic talent and how these underlying beliefs may influence their goals, beliefs, and behaviours regarding talent identification and development.

Within the sports context, a recent meta-analytic review by Vella et al. (2016) substantiates how individuals' mindsets lead to the pursuit of different goals. These findings have provided novel knowledge regarding the motivational framework; however, most researchers have used two separate subscales for fixed and growth mindsets when assessing and interpreting mindset beliefs, which is congruent to how Nicholls (1989) thought of goal orientations as orthogonal and how goal structures usually have been measured in sport. When assessing mindsets, consistent with Dweck (2000), researchers usually use a short continuous scale where a low or a high score indicates more of a fixed or a growth mindset (Vella et al., 2016). The scale is also used to divide the sample into mindset categories (Dweck et al., 1995), and when investigating children or adults in the general population, about 40% tend to espouse a fixed mindset, 40% espouse a growth mindset, and 20% an undecided mindset between the two (Dweck & Molden, 2005). Furthermore, it is our understanding that researchers have thus far not linked athletic talent to coaches' mindsets on talent[1], as conceptualised by Dweck. Hence, consistent with Vella et al. (2016), we find it essential to operationalise the phenomena as in other prominent domains when investigating coaches' mindsets and use a measurement consistent with the research question conceptually and empirically.

Drawing on the work of Dweck (2000, 2006, 2009), this study operationalises coaches' mindsets on talent to determine how they attribute athlete success and the malleability of athlete talent, and we refer to this as the 'athlete talent mindset' (A-TM). That

[1] We are aware of two unpublished studies regarding coaches' mindset referred to by Ward et al., (2017) and Chase (2010), however, we do not know the aim of these studies and how the mindset construct is operationalised.

is, we propose that what informs coaches' perceptions of athletic talent and influences their behaviour regarding talent prediction is organised around their A-TM meaning system. We followed the dichotomised view of talent identification in the high-performance talent literature to define and interpret the more extreme values of the mindset continuum (Baker & Wattie, 2018; Ward et al., 2017). On the one hand, Howe et al. (1998) claimed that individuals who believe in innate talent, despite how talent is understood and defined, also assume that early signs are detectable at a young age. This belief about talent as an inborn attribute aligns with individuals who hold more of a fixed mindset meaning system of talent (Dweck, 2009; Dweck & Yeager, 2019, 2021) and represent the fixed A-TM. On the other hand, Ericsson et al. (1993, 2009) argued that every healthy child can develop and reach an elite performance level, with body size being the only genetic endowment. This belief about talent as a context-dependent and malleable concept that can grow in all people aligns with individuals who hold more of a growth mindset meaning system of talent (Dweck, 2009), representing a coach's growth A-TM.

Bearing in mind how a personal mindset influences individuals' perceptions and interpretations of human characteristics (see Dweck & Yeager, 2019), knowledge of how a fixed A-TM (compared to a growth A-TM) influences coaches' talent identification and development will provide the field with new insights into the role of coaching. Regarding early talent identification, coaches who have a fixed A-TM may believe in identifying the 'gifted athlete' as early as possible as their hereditary views of talent determine what the athlete is capable of achieving (Dweck & Yeager, 2021). Coaches have reported that their 'gut instinct' is a primary contributor when deciding whom to identify (see Roberts et al., 2019, 2021). Therefore, understanding how their A-TM informs their decisions may provide novel insights into why some coaches have certain views of an athlete in the first place. We assume that these coaches' fixed A-TM informs their views of athletes, and hence, they find

it meaningful to identify talents at an early age, despite several issues associated with it (Baker et al., 2018; Till & Baker, 2020). For example, it implies that coaches can define criteria necessary for success in future sports as a fixed capacity, and further, that they know how such criteria take forms and can be identified in athletes at a young age. Furthermore, just as talent identification aims to identify athletes with the potential to achieve success in senior elite sports (i.e., winning), they may find early sport specialisation necessary to control young athletes' development and tailor their training loads accordingly to ensure a long developmental period (Breitbach et al., 2014; Vaeyens et al., 2009). The idea is that the degree of success in elite sports increases with participation in developmental programmes and intensive competition in one sports discipline (Johnston et al., 2018; Vaeyens et al., 2009). Hence, some coaches may believe in early deliberate practice as the sole training activity and a necessary prerequisite to elite sport success (Côté et al., 2020), despite scientific evidence constantly showing the potential pitfalls of this early specialised training (e.g., injury, overtraining, burnout, decreased motivation and drop-out; see Bergeron et al., 2015; LaPrade et al., 2016).

In contrast, considering the seminal work of Ericsson et al. (1993), coaches holding a forceful opposing view to the idea of natural talent may believe that expert performers have characteristics and abilities that are qualitatively different from or at least outside the range of more normal performers. However, instead of attributing the difference to innate talent, these coaches may believe that the quality of expert performance reflects sustained training and deliberate effort in a specific field (Ericsson et al., 1993). Furthermore, drawing on how the value of success and failure may vary depending on individuals' meaning systems (Dweck, 2000, 2006), we assume that these coaches consider an athlete's developmental process to be successful when, for example, they have reached their potential, despite evaluating the result as a failure in comparison to others. Hence, instead of attributing an athlete's (lack of) talent

when results are not forthcoming, these coaches attribute the level of athletic development to the quality of available training resources, the absence of diseases and injuries, continued parental and environmental support, and engagement in deliberate practice as these coaches believe that almost every aspect of the person and performance can be refined through training (Ericsson, 2013; Ericsson et al., 1993, 2009).

The belief in elite sports performance as a combination of genetic and training factors has resulted in a more prevalent and systemised talent identification and development approach in recent years (Bergeron et al., 2015; Johnston et al., 2018). In international sports, talent identification most often occurs between 8 and 12 years old; however, it often starts at younger ages with variations between sports and countries (Skille et al., 2017; Vaeyens et al., 2009). For example, it is widely accepted that early talent identification and development takes place in sports where peak performance is expected at young ages or early training onset is required, such as figure skating, gymnastics, football, and swimming (Côté et al., 2020; Vaeyens et al., 2009). Concerning differences between Nations and continents, there is a reason to believe that various talent identification and development programmes exist in most countries, stemming from the former Soviet Union and Eastern bloc countries and adopted to each nation's specific history, socio-economic conditions, and cultural profile (Skille et al., 2017). In this regard, the models prevalent in the Nordic countries (Sweden, Finland, Denmark, Iceland, and Norway) differ from state-led models in countries like Australia, New Zealand and the UK, which represent a normative system aiming to produce and enhance elite level athletes (Andersen et al., 2015; Skille et al., 2017). The Norwegian sports model, on its side, develops and operates based on a value system that ostensibly cares for the 'whole athlete' while focusing on equality and everybody's right to participate (Norges Idrettsforbund, 2015; Skille et al., 2017), receiving international publicity for having the answer to how to mature in youth sport and the paradox of how a system can be evaluated

as successful when counting Olympic medals while considering joy and health as success in everyday life (e.g., Culpepper, 2022; Farrey, 2019). The development of the model has continued for years, and in this regard, it is worth noting the adoption of the Children's Rights in Sport Framework (Norges Idrettsforbund, 2007) in the late 1980s, with a subsequently increased focus on the coach's role and inter/intrapersonal knowledge in coach education programmes. The latter is best exemplified by the educational framework implemented in 2011 (Norges Idrettsforbund, 2011), where it was decided that the values of sports in Norway would characterise all educational levels. The values that characterise sports activities in Norway are fun, health, community and honesty, and the values that inform sports organisations are democracy, loyalty, equality, and volunteerism (Norges Idrettsforbund, 2015, 2021).

Clarifying how the Norwegian sport model is operationalised is of interest since research on organisational mindsets has found that group cultures are characterised by an organisational mindset (Canning et al., 2020) and as research on self-presentation has shown that individuals are prone to display qualities that they believe their organisational culture will value for acceptance (Murphy & Dweck, 2010). This is noteworthy because an individual's experiences with a group or organisation's mindset, whether it is a growth or fixed one, may impact their personal mindset and behaviour through the processes of modelling, persuasion, cognitive dissonance and self-perception in what researchers describe as a self-reinforcing 'culture cycle' (Murphy & Dweck, 2010; Murphy & Reeves, 2021). In fact, although mindsets are considered relatively stable dispositions (Dweck & Leggett, 1988; Dweck & Molden, 2005), several studies have demonstrated that a personal mindset and behaviour can change through interventions (e.g., Blackwell et al., 2007) and that mindsets are malleable and sensitive to environmental cues (Canning et al., 2020). Regarding the sport context, these research findings suggest that coaches' A-TM may be shaped and/or reinforced

through the team's or club's organisational culture cycle, and in turn, their mindsets and behaviours may influence athletes' experiences and personal mindsets (Wattie & Baker, 2017).

Considering the gendered differences in pedagogical behaviours among teachers (De Kraker-Pauw et al., 2017) and coaches (Fasting & Pfister, 2000), coach gender is another area of interest. For example, women are associated with supportive communications and value-increasing achievements to a greater extent than men. However, when researchers have investigated how a personal mindset influences cognition about one's abilities with regard to gender, there have been, to our knowledge, no consistent findings. For example, Dweck (1986) found that children and adolescent girls were more likely to hold a fixed mindset, whereas Macnamera and Rupani (2017) recently challenged this phenomenon and found that adult women do not hold a fixed mindset. The latter findings also agreed with the results of Sigmundsson (2021), who found no significant difference between men's and women's mindsets when investigating passion, grit, and mindset in adolescents and adults in Norway.

Taken together, knowing that coaches are primary influencers in athletes' sports experiences (Horn, 2008) and that their behaviour impacts athletes' behaviour, cognition, and affective responses (Cushion, 2010), insight into coaches' mindsets of athletic talent may fill a missing link when working towards optimal athlete (and sport) development. Hence, the first purpose of this study was to operationalise the A-TM construct drawing on Dweck (2000, 2006, 2009) and examine coaches' mindsets of athletic talent by using quantitative data collected as a part of a national survey of coaches in Norway. We systematically investigated the construct by comparing the mindset of coaches to the general population and by controlling for coaches' gender, age, country of birth, and sport coached. Second, we aimed to discover how a fixed or a growth A-TM may influence coaches' views on the detectability of athletic talent. To do that, we first examined at what age coaches believe they

can identify an athlete's talent by controlling for the same variables as A-TM and then investigated the extent to which differences exist in the age at which talent is identified among coaches possessing more of a fixed or growth A-TM. Coaches having a fixed A-TM were anticipated to identify athlete talent at a younger age, and those with a growth A-TM would do so at later times (Baker & Wattie, 2018; Dweck, 2006, 2009; Howe et al., 1998; Ward et al., 2017).

Method

The current study used a cross-sectional research design, and the data were retrieved from a national survey of sports coaches titled *Profiling the Coaches of Norway* (PROCON). Detailed information regarding the PROCON project's purpose, methods and findings can be found in the report provided by Chroni et al. (2018). By taking a post-positivistic approach (Bruce et al., 2018), we sought to test coaches' A-TM and views of talent identification to investigate the context-specific beliefs regarding an athlete and how knowledge of these two beliefs may help us obtain new insights into the coach's role regarding talent identification and development. Hence, although this is the first study to operationalise and investigate these beliefs, the research draws on existing theory and the assumptions that the theory can objectively be tested by measuring predefined variables. We believe such new insight may be a helpful first step for researchers, practitioners or policymakers to understand and develop coach behaviour. However, by following the post-positivistic approach, we acknowledge the complexity of coaching, and we believe that our use of quantitative data only can give an imperfect insight into the phenomena. To receive an even more in-depth understanding of coaches' beliefs, the findings from this study may be followed up by research using other scientific approaches, such as qualitative methods drawing on a constructivist philosophical assumption (Creswell & Clark, 2017).

Participants

Based on the PROCON sample of 5,977 coaches representing 104 different sports, the 3,830 participating coaches included in the present study were men and women between 16 and 83 years of age. A total of 2,147 coaches were excluded from the PROCON sample, representing those who were not active in coaching at the time of data collection (n = 930), did not answer the A-TM and/or the age of talent identification questions (n = 12), or represented sports with very few respondents (n = 1,205 representing 98 sports). This decision was made for statistical analysis purposes to maintain the methodological and statistical assumptions of representativeness, homogeneity of variance, and normality (Bruce et al., 2018; Field, 2018).

The sample coaches reported an average of 13.4 (*SD* = 10.9; *Mdn* = 10) years of coaching experience at one or more levels (local = 96.2%, regional = 20.9%, national = 9.5% and international = 3.3%), and 8.8% of them were coaching more than one sport. In cases of coaching multiple sports, coaches' main sport was used in subsequent analyses. The coaches worked with winter and summer sports as well as individual and team sports, including athletics (n = 142), football (n = 2,499), gymnastics (n = 317), handball (n = 514), skiing (n = 185), and swimming (n = 223). Regarding their experiences as athletes themselves, 99.5% had participated in organised sports as children (65.4%), adolescents (77.0%), and/or adults (67.3%). Furthermore, 72.7% had completed sport-specific coach education according to Norway's four-tier coach certification system (see Norges Idrettsforbund, 2011). Of those educated as coaches, 43.7% had completed Level 1, children in sport; 23.9% had completed Level 2, adolescents in sport; 12.9% had completed Level 3, junior elite athletes; and 10.5% had completed Level 4, elite sport level. A small group of 6.5% had completed the activity leader course, a brief introductory course below Level 1, and 2.5% reported other levels and

types of education. Table 1 presents the descriptive statistics of the participating coaches' genders, ages and country of birth according to the sport coached.

[Insert Table 1 around here]

Procedure

This study was approved by the Norwegian Centre for Research Data prior to its onset (Decision No. 52746). All coaches were invited to participate voluntarily. They were presented with an online consent form prior to accessing the survey, and if they provided consent, they were provided with the survey questions. Participants were invited via (a) emails based on addresses provided by sports federations and the Norwegian Olympic and Paralympic Committee and Confederation of Sports (NIF) and (b) an online call posted on the social media accounts of the NIF, Inland Norway University of Applied Sciences, and other national sport federations. To protect the anonymity of the respondents, their email addresses were separated from the data and deleted.

Measurements

From PROCON's larger pool of 56 questions (Chroni et al., 2018), answers to eight questions were treated for coaches' demographics, and two questions were used to assess coaches' A-TM and age of talent identification, respectively. Considering that not all coaches were natives of Norway, the survey was offered to participants in both Norwegian and English.

A modified version of the Theories of Intelligence Scale (Dweck, 2000) was used to measure coaches' mindsets regarding athlete talent. Due to space limitations, only two items of the scale were included in this A-TM question, which is consistent with other researchers investigating mindsets (e.g., Claro et al., 2016). Following Claro et al. (2016), we chose fixed mindset items only as the use of growth mindset items may have created an acquiescence bias. Considering recent research on teachers (Sun, 2019; Willingham et al., 2021), we found this to be required as a growth mindset may have appeared compelling for adult coaches,

resulting in a tendency to drift towards growth mindset answers (Hong et al., 1999). The items were originally developed in English and discussed with Dweck via email correspondence (personal communication, August 21, 2017). Next, a back-to-back translation process was used for translation to Norwegian to ensure construct validity (Chapman & Carter, 1979). Aligning with Claro and Loeb's (2019) methodology, A-TM answers were provided on a five-point Likert scale. In particular, we asked the coaches about their levels of agreement (ranging from 1 = *strongly disagree* to 5 = *strongly agree*) with two fixed A-TM statements:

(a) Talent is something about the athlete that he/she can't change very much.

(b) The athlete can learn new things, but can't really change the basic level of talent.

By following mindset research in other domains (e.g., Claro et al., 2016), a growth A-TM score was calculated by reversing and averaging the two fixed A-TM statements into one scale wherein a lower score corresponded to a more fixed A-TM. The A-TM score was standardised to a mean of 0 and an SD of 1 (Claro & Loeb, 2019).

In addition, a categorical variable was created to compare the sample distribution of coaches' A-TM with previously published results. The variable was created based on the scale by considering the cut-off points by Dweck et al. (1995): a fixed A-TM referred to scores from 1.0 to 2.6, a growth A-TM referred to scores from 3.4 to 5.0, and a mixed A-TM referred to those who scored between 2.7 and 3.3. By using such categorisation, 80% of the sample was expected to be evenly distributed between the fixed and growth A-TM groups, and as only 20% represented a mixed A-TM, they did not represent the extreme groups (Dweck et al., 1995). Furthermore, as research has indicated that some samples may differ from the general population by holding a stronger growth mindset (Sun, 2019; Willingham et al., 2021), we also created a variable based on the work by Claro and Loeb (2019), which used a relative cut-off point based on the A-TM mean score with which fixed A-TM coaches

scored below 1 SD, growth A-TM coaches scored above 1 SD, and mixed A-TM coaches scored between ± 1 SD. This was done to examine the variation in mindset scores within the sample.

Regarding the age of talent identification, coaches were asked at what approximate age they believed they could foresee the athlete becoming exceptionally good in their sport. The coaches could choose to answer with one of four age options: 'before reaching 12 years of age', 'between 13 and 19 years of age', 'from 20 years of age and later,' or 'cannot be seen at any age'. This range of answers was developed upon reviewing the talent literature (see LaPrade et al., 2016; Vaeyens et al., 2009) and age guidelines regarding children, youth, and adult sport participants in Norwegian sports (Norges Idrettsforbund, 2015).

Data Analysis

The data were analysed with IBM SPSS Statistics (version 26). Descriptive statistics were calculated, and the data were checked for normality, missing values, outliers, and internal consistency (Cronbach's α; Field, 2018). The standardised fixed A-TM items had skewness in the range of -0.50 to -0.62 and kurtosis in the range of -0.42 to -0.70. The scale reliability coefficient showed an acceptable α of 0.78. Hence, the normality distribution was satisfactory for further analyses (George & Mallery, 2020), and the reliability coefficient was above the suggested 0.70 level (Cronbach, 1951).

The analysis strategy followed the study's purposes when treating the *A-TM* variable as continuous data and the *A-TM category* variables and *age of talent identification* variable as categorical data, requiring parametric and non-parametric tests (Field, 2018). To analyse data associated with the first purpose, a chi-square goodness of fit test was used to compare the distribution in the A-TM categories to the expected proportions when assessing mindsets in the general population. In addition, four one-way analyses of variance (ANOVA) were computed to investigate significant differences in coaches' A-TM regarding gender, age,

country of birth, and sport coached. Gender was divided into either female or male based on the responses provided by the participants. Age was organised into six groups: 16–19, 20–29, 30–39, 40–49, 50–59, and 60+ years. Country of birth was assessed as whether respondents were born in Norway. Finally, the sport coached variable was six-fold, consisting of 'athletics', 'football', 'gymnastics', 'handball', 'skiing', and 'swimming'. To analyse data associated with research purpose two, four Kruskal–Wallis tests were employed to investigate potential differences in the coaches' age of talent identification while controlling for gender, age, country of birth, and sport coached. As the visual inspection of the boxplots indicated dissimilarities in the age of talent identification across groups, their distributions and mean ranks were analysed (Laerd Statistics, 2015). Then, an ANOVA was computed to investigate the significant difference in coaches' A-TM regarding the age of talent identification. The statistical tests of the ANOVAs were checked for homogeneity of variance and corrected with Welch's *F* when Levene's test was significant (Field, 2018).

A test of significance was employed alongside the estimated effect size for each test. Cohen's *d* was calculated for the ANOVAs, and the pooled *SD* was employed for both the main test and the post hoc comparisons to account for group differences (Cohen, 1988; Fritz et al., 2012). The Kruskal–Wallis *r* was calculated for each test and transformed into Cohen's *d* for unambiguous interpretations between statistical tests (Field, 2018; Lenhard & Lenhard, 2016). Our interpretation of effect size relied on the recapitulated argumentation by Dweck (2018), who stated that even a small effect might have a meaningful and large effect when using the proper comparisons (e.g., in a real-world setting) and how the communication of A-TM messages may have important implications for coaches' psychological processes when accumulated and repeated over time (see Funder & Ozer, 2019). Therefore, effect size was evaluated based on Funder and Ozer's (2019) guidelines for psychological research with

regard to a very small (d = 0.10), small (d = 0.20), medium (d = 0.41), large (d = 0.63), or very large effect (d = 0.87).

Results

Athlete Talent Mindset

The participating coaches recorded an average growth A-TM score of 3.58 (*SD* = 0.96), representing a mean of zero when standardised. When organising the A-TM score into categories using an absolute cut based on the scale, a large number of the coaches fell into the growth A-TM group (64.4%), whereas a relatively smaller number of coaches fell into the fixed (19.6%) and mixed (15.9%) A-TM groups. The chi-square goodness of fit test indicated that the number of coaches in the A-TM groups was significantly different from the proportions expected for a general population, χ^2 (2) = 1000.76, $p < 0.001$. When organising the coaches into categories using a relative cut based on the sample A-TM mean score, a similar number of coaches (19.6%) appeared to have a fixed A-TM (below 1 *SD*) as when using the scale. What differs is that most coaches (67.0%) scored within the mixed A-TM range (+/- 1 *SD*), not unexpected considering the skewness of data, while the smallest group consisted of coaches appearing to have a growth A-TM (13.4%). Table 2 presents the descriptive statistics of the participating coaches' distribution in A-TM categories.

[Insert Table 2 around here]

Welch's *F*-adjusted ANOVA test, Levene's test of homogeneity of variance, $F(1, 3820) = 7.03$, $p = 0.008$, showed insignificant differences in coaches' A-TM with regard to gender, $F(1, 1574.41) = 3.63$, $p = 0.057$, and a miniscule effect size was detected ($d = 0.07$). Regarding the coaches' age, the ANOVA test, Levene's test of homogeneity of variance, $F(5, 3817) = 0.90$, $p = 0.483$, indicated significant differences in A-TM between age groups, $F(19.84, 3803.90) = 3.98$, $p = 0.001$, $d = 0.42$. The Bonferroni post hoc test showed that coaches older than 60 years had significantly lower growth A-TM scores than coaches aged

16–19 years ($p = 0.038$, $d = 0.42$) and 20–29 years ($p = 0.040$, $d = 0.35$). Regarding the coaches' country of birth, the Welch's F-adjusted ANOVA test, Levene's test of homogeneity of variance, $F(1, 3821) = 4.62$, $p = 0.032$, showed that coaches born in Norway had a significantly higher growth A-TM score than coaches not born in Norway, $F(1, 282.85) = 9.23$, $p = 0.003$, with a small effect size ($d = 0.21$). Furthermore, there were significant differences in A-TM among coaches working in different sports, $F(25.68, 3803.32) = 5.17$, $p < 0.001$, $d = 0.40$; Levene's test of homogeneity of variance: $F(5, 3824) = 1.54$, $p = 0.175$. The Bonferroni test revealed a significantly higher growth A-TM score for handball coaches compared to those coaching athletics ($p < 0.001$, d = -0.40), football ($p = 0.028$, $d = -0.15$), and gymnastics ($p = 0.003$, $d = -0.27$). The main analyses indicated a medium effect size, whereas the post hoc comparison indicated a lower but meaningful effect, ranging from very small to medium. Figure 1 illustrates the participating coaches' A-TM along the mindset continuum with consideration to research purpose one (gender, age, country of birth, and sport coached) and research purpose two (talent identification age).

[Insert Figure 1 around here]

Views Regarding Talent Identification

Regarding the age at which coaches identify athletes to have talent, 20.3% reported that they could identify talent before the athlete reached the age of 12. Furthermore, 58.6% said they could do so when the athlete was between 13 and 19 years of age, 3.5% could do so after the age of 20, and 17.6% reported that they could not identify talent at any age.

When examining coaches' gender, or age, and age of talent identification, the Kruskal–Wallis test showed no significant findings, gender: $H(1) = 2.74$, $p = 0.098$, $d = 0.04$; age: $H(5) = 7.09$, $p = 0.214$, $d = 0.06$. Regarding their country of birth, the Kruskal–Wallis test showed significant differences in coaches' age of talent identification, $H(1) = 5.35$, $p =$

0.021 (mean rank score: born in Norway = 1921.72, not born in Norway = 1774.30), with a minuscule effect size (d = 0.07). Analysing coaches' view regarding the age of talent identification in association with the sport coached, the Kruskal–Wallis test indicated overall significant group differences, $H(5) = 151.47$, $p < 0.001$, with a general medium effect size, d = 0.40, based on the groups' mean rank score (athletics = 2261.98, football = 1903.94, gymnastics = 1366.21, handball = 2100.79, skiing = 2195.41, and swimming = 1943.39). Pairwise comparisons with Bonferroni adjusted p-values revealed significant differences in age of talent identification between the gymnastics coaches and those coaching athletics ($p < 0.001$, d = 0.93), football ($p < 0.001$, d = 0.36), handball ($p < 0.001$, d = -0.78), skiing ($p < 0.001$, d = -0.89), and swimming ($p < 0.001$, d = -0.61). Apart from the differences between gymnastics and football coaches, where a medium-sized effect was detected, the other pairwise comparisons indicated effects from large to very large. Significant differences in age of talent identification were also observed between football and handball coaches (p = 0.001, d = -0.15), ski coaches (p = 0.001, d = -0.15) and athletics coaches ($p < 0.001$, d = 0.17), ranging from very small to small-sized effects. Here, the pairwise test showed significant differences in the age of talent identification between swimming and athletics coaches (p = 0.037) with a large effect size (d = 0.68). Figure 2 illustrates the age of the talent identification variable as distributed by the sport coached.

[Insert Figure 2 around here]

Regarding coaches with different A-TM and their views on age of talent identification, Welch's adjusted ANOVA, Levene's test of homogeneity of variance, $F(3, 3826) = 9.03$, $p = <0.001$, indicated significant differences in A-TM between the age of talent identification groups, $F(3, 549.07) = 20.47$, $p = < 0.001$, with a medium effect size, d = 0.42 (see Figure 1). The Bonferroni post hoc test revealed a significantly lower growth A-TM score for coaches who said they could see talent by the age of 12 and those who could see

talent in the 13–19 age group ($p < 0.001$, $d = 0.26$) or in athletes older than 20 years of age ($p = 0.015$, $d = 0.28$), as well as those who could not identify talent at any age ($p < 0.001$, $d = 0.42$). These differences had an effect size ranging from small to medium. The Bonferroni test also indicated a significantly lower growth A-TM for those who said they could see talent at 13–19 years of age and those who could not see talent at any age ($p = 0.002$), with a very small to small effect size ($d = 0.16$).

Discussion

We sought to investigate the A-TM and views regarding talent identification age among athletics, football, gymnastics, handball, skiing, and swimming coaches in Norway. The A-TM mean score indicated that the participating coaches held a predominantly growth A-TM. Older coaches, coaches not born in Norway, and those coaching athletics, gymnastics, and football were found to hold more of a fixed A-TM, while younger coaches, coaches born in Norway, and those coaching handball held more of a growth A-TM. There were no gender differences in coaches' A-TM. Regarding views of talent identification age, most coaches believed that talented athletes could be identified before the age of 12 and between the ages of 13 and 19. Differences between coaches' country of birth and sports existed, with those not born in Norway and coaching football, gymnastics and swimming being significantly more prone to believing they can identify talent at younger ages (before 12), whereas no differences were found between gender and age. Furthermore, coaches with a more fixed A-TM tended to believe they could identify talented athletes at young ages. However, when interpreting coaches' A-TM and age of talent identification, differences in the sample indicated that these were separate beliefs that may have influences coaches differently concerning early talent identification and development.

Athlete Talent Mindset

To get an impression of the A-TM construct as operationalised and assessed here for the first time, we initially highlighted aspects assumed to be relevant when interpreting the findings in the context of sport in Norway. Considering Canning et al. (2020) and Murphy and Reeves (2021), the relatively high A-TM mean score may reflect the manifestation of the growth A-TM that we seemed to find in the NIF's stated values and organisational mindsets. This finding may also explain one aspect of why the Norwegian sport model differentiates from the talent identification and development models used in other countries (Skille et al., 2017) and how sports in Norway provide attention to children's rights in sports and emphasise inter/intrapersonal competencies in coach education programmes for better coach–athlete relationships (Ellingsen & Danielsen, 2017; Norges Idrettsforbund, 2011).

When organising the data into A-TM groups using cut-off points based on the scale (Dweck et al., 1995), the low number of coaches holding a fixed A-TM and the fact that almost three quarters of the coaches fell into the growth A-TM group may strengthen the view of how Norway's sports coaches endorse a growth A-TM. In this regard, note that the coaches' A-TM mean score is comparable with the teachers' mindset score in the study of Sun (2019) and that the proportions in A-TM groups show the same tendencies as the teachers in the study of Willingham et al. (2021), which implies that both coaches and teachers weights towards a growth mindset and are substantially different from what is expected in the general population (see Dweck & Molden, 2005). By drawing on the argumentation of Willingham et al. (2021), these findings may indicate that a growth mindset is a defining characteristic of coaches as a group, similarly to teachers as a profession. Such an approach can be understood by the fact that teaching and learning constitute the core idea of sports and school, and it is reasonable to assume that those working in organisations communicating such a view and who are responsible for learning processes themselves

believe in the malleability of talents and abilities to a greater extent than the general population.

An alternative model of organising the categories is based on the A-TM mean score (Claro & Loeb, 2019), showing that the same number of coaches fell into the fixed A-TM group, whereas a minority of the coaches fell into the growth A-TM group in the case of the coaches. Although such categorisation entails more extreme fixed and growth A-TM groups, considering Dweck et al. (1995), this proportion may elucidate those holding a clear mindset and provide a more nuanced picture of the whole sample's mindsets. In the case of the coaches' A-TM, such an approach seems reasonable considering that the identification of gifted athletes shapes the debate surrounding the development of future elite athletes in Norway (e.g., Hoel & Hussain, 2020). Furthermore, the use of extreme groups may illustrate the diversity of practices related to talent identification and development. The latter can be exemplified by the fact that various models for talent identification and development exist in Norwegian sports. These models may be adapted to the different sports organised by NIF (see Andersen et al., 2015) or alternative models organised outside the organisational system (e.g., Kvamme, 2022), although the coaches in such models may also be a part of organised sport. Taken together, even the data indicate that coaches in Norway embrace a growth A-TM; every fifth coach seems to believe in talent as an inborn and unchangeable capacity, regardless of the method of categorisation, whereas the number of coaches holding a clear growth A-TM is uncertain. Just as individuals' mindsets are domain specific and changeable (Molden & Dweck, 2006), we are careful in characterising coaches as holding either a fixed A-TM or a growth A-TM. However, we find it helpful to draw on coaches representing the more extreme groups when interpreting the theoretical implications of coaches' A-TM and how they may influence talent identification and development.

According to gender and personal mindset, this study may fit into the deficient picture drawn by previous research (see Dweck, 1986; Macnamera & Rupani, 2017; Sigmundsson, 2021), as no significant differences were found. Note that when interpreting coaches' A-TM across gender, many female participants were coaching gymnastics, and they reported more of a fixed A-TM. This small and overrepresented group of female coaches may have influenced the gender differences concerning coaches' A-TM. Hence, we believe these findings emphasise the need for further research to examine whether there are gender differences in the distribution of coaches' A-TM and their behaviour.

Regarding the coaches' age, the high growth A-TM scores reported by the youngest coaches, between 16–19 years and 20–29 years old, may reflect the development of sport in Norway and how coaches acquire knowledge and values through informal, non-formal, and formal learning sources (see Schein, 2017; Van Woezik et al., 2021). Younger coaches may, for example, have completed coach education after the values of sports in Norway have been emphasised as part of the educational framework for the last two decades (Norges Idrettsforbund, 2011). Coaches older than 60 years reported a largely fixed A-TM, which may reflect conventional and outdated pedagogical approaches (conventional wisdom) to athletic development. Considering how individuals' mindsets may be shaped and reinforced through the culture cycle (Murphy & Dweck, 2010; Murphy & Reeves, 2021), the younger and less experienced coaches are more likely to self-present, demonstrate, and adopt the organisational mindset that they perceive to reflect the culture into which they are assimilating. Hence, the talent mindset of older and experienced coaches may be of particular interest as these individuals are overrepresented in what is described as 'powerful people' in the context of sport in Norway (i.e., coaches, leaders, and board members; Norges Idrettsforbund, 2020), who are assumed to be particularly influential in the reinforcement of the cultural cycle (Murphy & Reeves, 2021).

We also found that coaches' A-TM varied across the sports represented in this study. We are cautious about attributing the differences found to organisational cultures, as this may imply that sports or federations enforce either fixed or growth A-TM cultures. However, each sport represented in this study is organised and managed by national federations with independent responsibilities for sports development and collaboration with international federations (Norges Idrettsforbund, 2021), and it is common for organisational cultures to vary across different sports bodies (Skille & Chroni, 2018). Furthermore, considering the research on organisational mindset and cultures (e.g., Murphy & Reeves, 2021; Schein, 2017), A-TM messages may shape and reinforce separate mindsets about the nature of athletes' talent at all levels of an organisation. Hence, sports like handball and swimming may embrace a growth A-TM coterminous with the Norwegian sport value system. Note that handball has a long history of well-planned athlete development to provide later age engagement without specialisation (Bjørndal & Ronglan, 2020), an approach reinforced by powerful people (e.g., national team coaches; Hemmestad & Jones, 2019). Accordingly, messages that substantiate a growth A-TM may inform practices and behaviour, and in turn, serve as a cue in a culture cycle that reinforces a growth A-TM, in the case of handball coaches (see Canning et al., 2020).

Conversely, some sports are heavily associated with early specialisation and intensive selection–deselection experiences at the international scene (Skille et al., 2017; Vaeyens et al., 2009). For these sports, practices and behaviours that do not align with the stated values of the NIF may exist, and messages that substantiate a fixed A-TM may be communicated through formalised collaboration or the exchange of powerful people. Such situations may create a discrepancy between the stated values of an organisation and its mindset (Canning et al., 2020), which may be the case for coaches in athletics, gymnastics and football who reported more of a fixed A-TM despite operating on the same value system as other sports. In

this regard, athletics and gymnastics were among the sports with the highest number of coaches not born in Norway, who reported more of a fixed A-TM and may endorse an A-TM alternatively to the Norwegian sport model (see Skille et al., 2017).

Views Regarding Talent Identification

Regarding coaches' beliefs in talent identification age, their country of birth and sport coached revealed differences in when they could foresee the potential for elite-level performance, whereas their gender and age did not. Once again, coaches in some sports, such as athletics, handball and skiing, appeared to embrace a view that is more coterminous with the Norwegian sport value system (Norges Idrettsfobund, 2007, 2015). Conversely, for sports like football, gymnastics and swimming, the coaches' view of talent is coterminous with international sports where talent identification and development models are generally more accepted and systemised (Skille et al., 2017; Vaeyens et al., 2009).

The Children's Rights in Sport Framework, which constitutes a cornerstone of the value system in Norway, regulates children's sport, with 12 years as the upper age (Norges Idrettsforbund, 2007). Violations of these regulations can lead to financial sanctions for the club or the individual, for example, the coach (Ellingsen & Danielsen, 2017), and hence, we consider talent identification below the age of 12 as a rather extreme approach within Norwegian sport. Notably, we found that more than half of our 3,830 coaches reported that they indeed believe they can identify talent during the athlete's adolescent years (13–19 years of age), and regardless of sport, several coaches believed they can identify talented athletes before they reached 12 years of age. Football, gymnastics and swimming coaches were more prone to believing they can identify talented athletes at the youngest ages, which is in agreement with recent studies on coaches and the general view that these sports are frequently associated with talent identification and development in Norway (Ellingsen & Danielsen, 2017) and internationally (Skille et al., 2017). In these sports, where peak

performance is expected at young ages or early tailored training is considered necessary to ensure a long developmental period, early specialisation may be the means to achieve elite sports performance (Côté et al., 2020). Hence, considering the sport talent literature, coaches in sports like football, gymnastics, and swimming may justify and systemise early talent identification, selection, and development to make the most of the athletes' potential to win international competitions (Breitbach et al., 2014; Skille et al., 2017; Vaeyens et al., 2009).

As expected, we found that coaches holding a fixed A-TM believe they can identify talented athletes at an early age to a greater extent than coaches holding a growth A-TM. However, a visual inspection of coaches' A-TM and age of talent identification showed that coaches in athletics, who reported the lowest growth A-TM score, were simultaneously less extreme in terms of talent identification, so the picture is complex. However, swimming coaches appeared to be more average in their A-TM, although they reported more extreme values regarding talent identification. These findings follow Dweck (personal communication, August 21, 2017) and show that a coach may believe that talent can be developed while also believing that it is detectable in some cases.

Knowledge of the discrepancy between coaches' A-TM and views of talent identification may expand our insight into coaches' underlying beliefs concerning early talent identification and development. The question is not necessarily about the judgement of the presence or absence of inborn talent and when it is detectable; it is instead about the extent to which athletic talents are malleable. In addition, we find it reasonable to suggest that the findings may provide possible insight into why deliberate practice represents the main training activity in the early specialisation pathway (Côté et al., 2020). As a social context eliciting social comparisons in which performance can only be assessed compared to others (Roberts, 1992), the sports context may embrace conditions that trigger both the early identification and development of talented athletes. In such conditions, coaches with a

stronger fixed A-TM may focus on finding the most talented athletes and conduct deliberate practice at the expense of other training activities to develop selected skills. As such, they may consider early involvement in deliberate practice necessary to maximise these athletes' potential while achieving success in senior elite sports (Côté et al., 2020). Thus, we propose that these coaches' fixed A-TM informs their 'gut instinct' (see Roberts et al., 2019, 2021) of whom to identify to ensure these particular athletes reach what they consider as their main goal in sports: winning. Conversely, coaches holding a more growth A-TM may value a broader range of abilities with respect to both athlete assessment and training activities (Ward et al., 2017). These coaches conduct deliberate practice activities to develop athletes' performance and help them excel; however, they also conduct other training activities (e.g., deliberate play) to inspire and develop all athletes, reaching out to the potential of all athletes, which is their goal as coaches.

Limitations and Future Research

The study's findings may be limited by the differences in group size, which increased the risk of falsely determining insignificant differences when actual differences existed (Type II error), or the high number of coaches, which increased the risk of concluding that significant differences existed between the groups when there were none (Type I error; Field, 2018). The use of two items to measure the A-TM construct may raise concerns regarding the validity, as the questionnaire consisted of three items when validated (Dweck, 2000). Further, the theoretical significance can be questioned, as the reported effect sizes were small when referring to Cohen's *d* (1988). Note the minuscule effect size in the age of talent identification despite significant differences in whether they were born in Norway. Considering the use of sport coached as an independent variable, the reader should also be aware that some sports consist of a variety of disciplines, such as alpine and freeski in skiing.

As a social desirability measure was not used in the study, acquired knowledge about acceptable and preferred coaching behaviours may have led the coaches to provide us with socially desirable answers leaning towards the growth A-TM (Sun, 2019); hence, social desirability bias should be assessed in future research. Researchers should also investigate how and to what extent organisational A-TM may influence coaches' A-TM and age of talent identification, particularly as these beliefs may relate to the culture of a sport and underlying influences from national and international models, values, and cultures (see Canning et al., 2020; Skille et al., 2017). Knowing that mindset interventions are more effective or show different outcomes with sub-groups (Dweck & Yeager, 2019), it would be interesting to explore whether some coaches are more open than others to self-present and embrace a perceived A-TM. Finally, given that A-TM is a universal belief impacting talent identification and development (Vella et al., 2016), research that builds on growth mindset interventions should investigate whether coaches' talent mindset can be altered and its subsequent impact on actual coach behaviour.

Conclusion and Practical Implications

The findings indicate that coaches' A-TM and views regarding talent identification operate as two separate beliefs, which may be useful for understanding coaches' early talent identification and development approaches. Although existing data cannot explain coach behaviour, this study may shed light on how both A-TM and views of talent identification age influence coaches' cognition with respect to the detectability of athletic talent and development. Based on this, we suggest that instead of discussing whether talent exists, a germane proposal may be to increase the focus on the malleability of the talent concept among researchers, coaches, sports leaders, parents and athletes when working towards optimal athlete and sports development.

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Table 1

Descriptive Statistics of Participants' Gender, Age, and Country of Birth According to Sport Coached

	Gender		Age		Age groups (%)						Country of birth (%)
Sports	**Men**	**Women**	***M***	***SD***	**16-19 years**	**20-29 years**	**30-39 years**	**40-49 years**	**50-59 years**	**60+ years**	**In Norway**
Athletics	104	38	49.42	11.04	—	5.6	7.7	38.0	33.8	14.8	88.0
Football	2,208	239	43.04	8.00	0.7	6.8	18.6	56.1	16.3	1.6	94.5
Gymnastics	85	229	36.39	13.11	12.6	24.9	17.4	29.3	12.0	3.8	87.4
Handball	302	211	42.39	9.20	1.9	7.0	23.0	51.1	13.6	3.3	95.5
Skiing	136	48	42.57	10.08	1.1	14.6	14.6	44.9	23.2	1.6	94.6
Swimming	85	137	34.32	13.61	19.3	26.5	12.6	28.3	11.2	2.2	87.9
Total	2,920	902	42.11	9.77	2.9	9.8	18.2	50.4	16.2	2.5	93.4

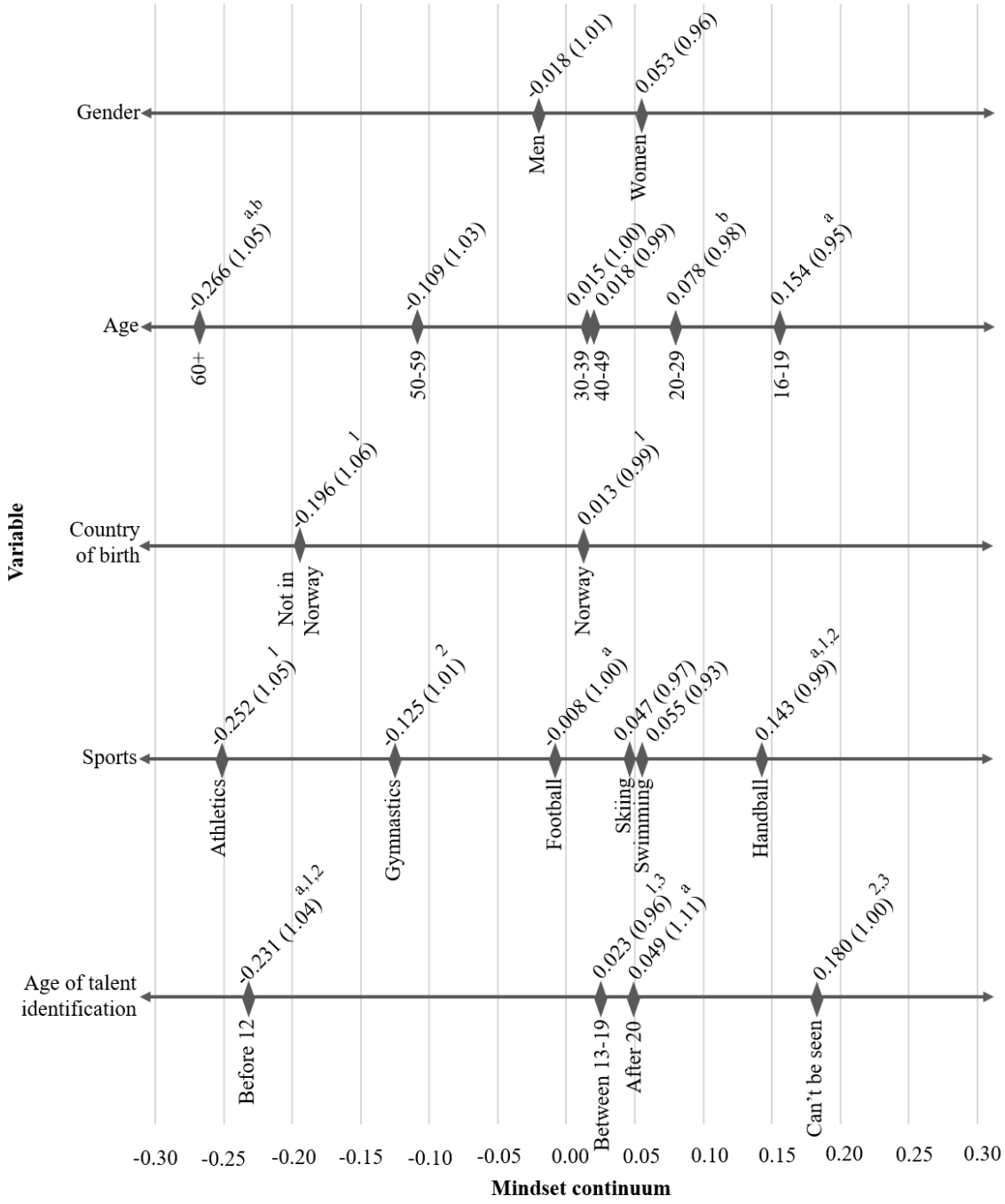
Table 2

Descriptive Statistics for the Distribution of Participants' in Athlete Talent Mindsets Categories

Mindsets	Observed N based on scale[a]	Expected N[b]	Observed - expected	Observed N based on sample mean score[c]
Fixed	752	1,532	-780	752
Growth	2,468	1,532	936	513
Mixed	610	766	-156	2,565
Total	3,830			3,830

Note. [a] = The categories are based on scale by considering cut-off points used by Dweck et al., (1995). [b] = The expected distribution for each category is based on Dweck & Molden (2005). [c] = The categories are based on the sample by using relative cut-off point based on the athlete talent mindset mean score (see Claro & Loeb, 2019).

Figure 1



Participants' athlete talent mindset within the mindset continuum with *M* and *SD* for gender, age, country of birth, sport coached, and age of talent identification. The first four continuums refer to research purpose one, athlete talent mindset, and the last continuum refers to research purpose two, views regarding talent identification. [a, b] Talent mindset distribution is significantly different at $p < .05$. [1–3] Talent mindset distribution is significantly different at $p < .01$.

Figure 2

Age of talent identification distributed by sport coached. [a] Talent identification age distribution is significantly different at $p < .05$. [1–8] Talent identification age distribution is significantly different at $p < .01$.