

Reliability and validity of the Developmental History of Athletes Questionnaire (DHAQ)

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Introduction

Understanding the factors that influence sport expertise development is critical for the design of effective sport programs. Information regarding the training history profiles of highly skilled athletes and knowledge of the contextual factors associated with the pathway towards elite sport performance can lead to recommendations relating to the optimal practice conditions for the development of sport expertise.

Previous research in this area is limited by a) relatively small, homogenous participant samples, and b) the lack of a standardized, rigorously validated measurement tool. This study aims to construct and validate the Developmental History of Athletes Questionnaire (DHAQ), a quantitative measurement tool for the collection of athlete developmental histories. Once established, the DHAQ may be used for large-scale investigations of sport expertise development.

Methods

Questionnaire design

The DHAQ was constructed based upon the interview guides, questionnaires, results, and recommendations of previous investigations of the development of sport expertise (Baker, Côté, & Abernethy, 2003; Côté, Ericsson, & Law, 2005; Helsen, Starkes, & Hodges, 1998; Hodges & Starkes, 1996; Soberlak & Côté 2003; Starkes, Deakin, Allard, Hodges, & Hayes, 1996; Ward, Hodges, Starkes, & Williams, 2007). The questionnaire consisted of approximately 75 items, arranged into 14 sections, under three main themes (see Table 3). Items required a variety of short answer, select-from-a-list, and chart-based responses.

Participants

Participants were recruited from the Australian Institute of Sport swimming team (3 male; 4 female), and the Victorian Institute of Sport field hockey teams (4 male; 4 female). Athletes were approximately 21 years old ($M = 21.4$, $SD = 2.6$), had approximately 14 years of experience in supervised activity for their main sport ($M = 13.8$, $SD = 3.3$) and had participated in competition for their main sport at the national level ($n = 4$) or above ($n = 9$).

Procedures

All athletes completed the DHAQ and participated in a face-to-face interview in a counterbalanced order, approximately one week apart. The interviews were based upon a previously validated procedure by Côté and colleagues (2005); however the original interview guide was modified slightly to mirror the content of the questionnaire. In addition, 11 participants completed the DHAQ for a second time approximately four months following the initial test occasion, and 13 of the athletes' parents along with nine of their coaches participated in a telephone interview. The interview guides for the parent and coach interviews were similar to those followed with the athletes.

Statistical analyses

Test-retest reliability, concurrent validity, and convergent validity of the DHAQ were assessed through the comparison of responses from the initial completion of the DHAQ to those from the second completion of the DHAQ, the athlete interview, and the parent and coach interviews respectively. Percent agreement values and intraclass correlation coefficients (ICC) were calculated for each pair of responses, and were classified according to the criteria outlined in Table 1.

Table 1. Classification criteria for percent agreement values and intraclass correlation coefficients

Classification	Criteria
Percent agreement	
Very good agreement	80.00 – 100.00%
Good agreement	65.00 – 79.99%
Moderate agreement	50.00 – 64.99%
Poor agreement	0.00 – 49.99%
Intraclass correlation coefficient	
Very good correlation	ICC .80 – 1.00 + $p \leq .10$
Good correlation	ICC .65 – .79 + $p \leq .10$
Moderate correlation	ICC .50 – .64 + $p \leq .10$
Poor correlation	ICC $\leq .49$ + $p < .10$ OR ICC $\geq .50$ + $p > .10$

Classification of reliability and validity

Following classification of percent agreement values and intraclass correlation coefficients, test-retest reliability, concurrent validity, and convergent validity with both parents and coaches were established for each item according to the criteria outlined in Table 2. Percent agreement values were weighted more heavily than intraclass correlation coefficients in the classification of reliability and validity for each item because absolute agreement is considered to be of greater importance than relative consistency (Atkinson & Neville, 1998).

Table 2. Classification criteria for test-retest reliability, concurrent validity, and convergent validity with parents and coaches

Classification	Criteria	
	Percent agreement	Intraclass Correlation Coefficient
Very good reliability / validity	Very good agreement	+ Any correlation classification
Good reliability / validity	Good agreement	+ Any correlation classification
Moderate reliability / validity	Moderate agreement	+ Very good or good correlation
Poor reliability / validity	Moderate agreement	+ Moderate or poor correlation
		OR
	Poor agreement	+ Any correlation classification

Results

An indication of the typical classifications for the reliability and validity of questionnaire items within each section of the DHAQ is outlined in Table 3.

Table 3. Reliability and validity of the Developmental History of Athletes Questionnaire

	Key			
	Test-retest reliability	Concurrent validity	Convergent validity: Parents	Convergent validity: Coaches
Very good reliability / validity	★★★★	★★★★	★★★★	★★★★
Good reliability / validity	★★★	★★★	★★★	★★★
Moderate reliability / validity	★★	★★	★★	★★
Poor reliability / validity	★	★	★	★
Section not included in coach interview guide	—	—	—	—
Participant information				
Demographics	★★★★	★★★★	★★★★	—
Places of residence	★★★	★★★	★★★	—
Familial involvement in sport and physical activity	★★★	★★★	★★★	—
Involvement in main sport				
General involvement	★★★★	★★★★	★★★★	★★★
Type of practice activities	★★★	★★★	★★	★★
Nature of practice activities	★★★	★★★	★★★	★★★
Competition involvement	★★	★★	★★	★★
Coaching history	★★★	★★	★★★	—
Sporting milestones	★★★★	★★★★	★★★★	★★★★
Career transitions	★★★	★★★	★	—
Support services	★★★	★★	★★	★★★
Injuries, illnesses and time off	★★★	★★★	★★	★★
Involvement in sporting activities other than main sport				
Organised sports	★★★	★★★	★★	—
Informal, playful sporting games	★★	★★	★	—

Discussion

Test-retest reliability

Test-retest reliability was very good or good for the majority of items, indicating that participants provided consistent responses when completing the DHAQ on multiple occasions. Two notable exceptions include items relating to competition and informal, playful sporting games.

Although athletes consistently recalled the total number of competitions per year, they expressed uncertainty regarding the components that ought to be included in estimations of competition duration. It is recommended that this section of the DHAQ be modified to differentiate between competition type, total time spent at the competition venue, time actively involved in competition, and time participating in preparation and de-brief activities.

Athletes were also highly inconsistent in their reports of the types of informal, playful sporting games they engaged in, as well as the time involved in these activities. While the unstructured nature of playful games make precise details of participation more difficult to recall, the results are surprising given the attention that participation in informal, playful sporting games has received in the past.

Concurrent validity

A previously validated interview procedure for the collection of athlete developmental histories (Côté et al. 2005) was used as a criterion measure to assess concurrent validity of the DHAQ. Positively, the majority of items were classified as having very good to good concurrent validity. Competition involvement and participation in informal, playful sporting games again received moderate ratings for concurrent validity, as did sections relating to coaching history and support services.

Despite the coaching history and support services sections of the DHAQ involving detailed explanations and response charts, athletes did not provide the same depth of information within the questionnaire as they did during the interview. While it is possible to collect a wealth of information regarding athlete developmental histories with a quantitative questionnaire, it is acknowledged that some aspects of athlete development require more thorough discussion in the form of a qualitative interview. For this reason it is recommended that the coaching history and support services sections of the DHAQ be removed.

Convergent validity with parents

Parents play an integral role in an athlete's involvement in competitive sports and so we considered them an appropriate source for the assessment of convergent validity. As expected, convergent validity with parents was strong for items relating to participant information however results relating to involvement in main sport were mixed.

Parents appear to have a general knowledge of their child's participation in their main sport but are less certain of more specific details such as type of practice, availability of support services, and the effect of injuries and illnesses on training. Once again, items relating to competition received only a moderate rating for convergent validity with parents for similar reasons as described above. Interestingly, convergent validity with parents for items concerning career transitions was poor, suggesting that athletes' views regarding the progression of their sporting career are quite different to the views of their parents.

Considering athletes were unable to consistently recall their own involvement in informal, playful sporting games, it is not surprising that convergent validity with parents for this section was poor. Moderate convergent validity with parents for participation in other organised sports was, however, unexpected. Although athletes and parents both identified participation in a number of different sports, the two lists of sports were unusually disparate.

Convergent validity with coaches

Coach interviews were limited to items relating to their athlete's involvement in their main sport for the period of the coaching relationship. Convergent validity with coaches was expected to be very good given the high level of involvement of the coach in the athlete's training schedule. Surprisingly, convergent validity with coaches was only good to moderate.

It is possible that coaches were basing their responses on the general training and competition schedule of their squad, rather than the participant's individual regime, which could explain some of the discrepancies. It may also be that coaches are not completely aware of their athlete's involvement in activities relating to their main sport outside of the supervised environment.

Conclusion

This study aimed to construct and validate a quantitative measurement tool for the collection of athlete developmental histories. Designed using previous investigations of sport expertise as a guide, the Developmental History of Athletes Questionnaire consisted of approximately 75 items, each of which were subjected to rigorous reliability and validity analyses. Results indicate that despite requiring minor modifications, the DHAQ displays reasonably good test-retest reliability, concurrent validity, and convergent validity with both parents and coaches. The DHAQ is therefore suitable for use within future investigations of the development of sport expertise.