

Article

Interrater reliability of the Italian version of questionnaire for classification Injuries of specialized young athletes: the CIGAS tool

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Abstract: *Background:* The aim of this research was to study the reliability of an Italian version of Pasulka's questionnaire for the Classification of Injuries of Specialized Young Athletes: "Classificazione degli Infortuni per Giovani Atleti Specializzati - CIGAS". *Methods:* Two researchers independently translated the English version of the questionnaire into Italian. The approved version was given twice, with an interval of one week between each administration. The interreader agreement was assessed by calculating the intraclass correlation coefficient, using the kappa (κ) statistic. *Results:* Twenty-nine athletes participated in the study, of which 18 completed the questionnaire twice. Five out of 13 items were perfectly or substantially agreed in the two administrations ($\kappa > 0.8$): these items were those more specific or descriptive than the other ones, such as the definition of acute injury, description of the location of the injury and participation in contests. *Conclusion:* The online use of this questionnaire gave a satisfying response rate (70%) and indicated it to be a valid tool.

Keywords: sport, sports specialization, youth, adolescent, overuse injuries, sports disease, reliability, validity, questionnaire.

Introduction

Participation in competitive sports sets high demands on athletes' physical skills, but also it exposes them to a high risk of frequent injury (1). Interest in the pathogenesis of sport injuries has led to the general conclusion that two major factors influence an athlete's vulnerability to injury: external factors (e.g., type of sport and weather conditions) and internal factors (e.g., physiological and psychological factors) (2). Early sport specialization appears to be increasing in young athletes (3), but data is lacking regarding the independent risk of injury related to intense single-sport training or the growth rate of young athletes.

One of the first studies that underlined the fact that sports specialization alone—independently of age and amount of training—increases the risk for overall injury and serious overuse injuries in young athletes was published in 2015 (4). The term overuse injury is a broad term used to describe an injury caused by repeated micro-trauma, rather than a specific or single injury event. An overuse injury is usually caused by repetitive activities over a period of time. It is often due to excessive and repetitive loading of the specific tissue with a gradual onset of symptoms (5).

A meta-analysis published in 2018 had the searching question as: "Are highly-specialized young athletes at a greater risk of overuse injuries as compared to low-specialization young athletes?" (6). The study found that an increased risk of musculoskeletal injuries due to overuse was present, but the conclusion was based on a qualitative review of the findings of five articles and a meta-analysis of four of these studies.

Particularly, Di Fiori et al. reported that engaging in year-round intense training programs at an early age may result in negative outcomes for some young athletes, such as overuse injuries, burnout, and dropping out of sport(s) (5).

Overuse injuries, defined as those without a specific, identifiable event responsible for their occurrence, may be a substantial problem in many sports. These injuries are believed to be predominant in sports that involve long, monotonous training sessions such as cycling, swimming and long-distance running, (7) (8) (9) (10) as well as in technical sports that involve the repetition of similar movement patterns such as throwing and jumping (11) (12) (13). They may also be common in team sports such as football, handball and volleyball, particularly at an elite level and among young athletes when the total load on the athlete increases rapidly due to training and competition (14) (15) (16).

In order to describe and analyze the different risks for injuries in sports, it is useful to categorize these events. For instance, a survey published in 2017 proposed a questionnaire developed for classifying the injuries of young athletes (17). The questionnaire defined three different categories of injuries on the basis of the history of the injury: athletes who simply referred an injury/ies (injury self-report yes/no); athletes forced to rest from sports because of an injury (<1 month of rest from sports [overuse]/ at least 1 month of rest from sports [serious overuse yes/no]); and athletes who simply referred a direct or indirect injury (direct injury yes/no). In this study, injury-related information was investigated very well (whether the injury was new or recurrent, injury mechanism, degree of training before the injury, sports enjoyment, and degree of sports specialization) and it classified injuries based on diagnoses together with a review of the

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athletes' electronic medical records. The survey tools used to assess sports training patterns and level of sports specialization were self-reported, based on their sports participation. The non-specific formulation of the listed items allows the questionnaire to be given to a sample of injured athletes under different conditions (those who completed rehabilitation and were competing for the first time following injury, as well as to a sample of non-injured athletes who had undergone their first official competition following a summer break).

The aim of this study was to determine the reliability of an Italian version of Pasulka's questionnaire for injury classification related to youth with sport specializations: "Classificazione degli Infortuni per Giovani Atleti Specializzati (CIGAS)".

Methods

The study was carried out in two phases: the first was the translation of the questionnaire into the Italian language together with cultural adaptation of the questionnaire; the second was a pilot study done to assess the comprehensibility, reproducibility and validation of the metric characteristics of the Italian version.

Italian version

The Italian version of the survey questionnaire of Pasulka et al., CIGAS, was developed according to a standardized protocol (18). Two researchers independently translated the English version into Italian. Thereafter, the two translations were compared. The resulting draft was translated back into English by an independent native English researcher having a good level of knowledge of the Italian language and without previous contact with the original version of the scale; his translation was then compared with the original English version. The Italian version of the questionnaire that was finally adopted was therefore the result of corrections for any inconsistencies detected between the original version and the resulting draft. Thereafter, this final version in Italian was tested. A web-based anonymous questionnaire was realized using a Google form.

Participants

Participants were recruited through the professional and recreational regional sports structures of Calabria, Italy, i.e. clubs and sports centers. Using the university stakeholders' mailing list, numerous coaches, health professionals, sports medicine doctors, and physiotherapists were informed regarding the details of the study, who then notified the eligible athletes. All subjects participated on a voluntary basis and signed an informed consent before being accepted for the study, which was then conducted in accordance with the Declaration of Helsinki. The participants were requested to complete the online version of the CIGAS. Each young athlete was given the CIGAS on the day of admission to the study (1st wave) and once again about 5 days later (2nd wave). The matching of the two questionnaires was realized by asking them to choose and enter the same nickname on both. The athletes completed each questionnaire individually, in a free

moment of their day. The estimated time of filling in the requested information was about 10 minutes.

Statistical analysis

Statistical analyses were performed using Excel 2016 (Microsoft Corporation Inc., USA) and the SPSS for Windows version 25.0 (Chicago, IL, USA). Two-tailed p-values ≤ 0.05 were considered significant. Categorical data was represented by absolute (n) and relative (%) frequencies. Cohen's kappa coefficient was calculated to evaluate the concordance in the items (1st wave versus 2nd wave) classified as categorical data. Kappa (κ) values were interpreted as follows: 0.00-0.20, slight agreement; 0.21-0.40, fair agreement; 0.41-0.60, moderate agreement; 0.61-0.80, substantial agreement; and 0.81-1.00, almost perfect agreement (19). The correlation was adopted to assess the relationship of quantitative variables: the Spearman's r correlation coefficient was computed between the two waves.

Results

The CIGAS questionnaire can be seen in **Table 1**. Several considerations arose during the translation of the questionnaire, namely, item 8 of both versions was considered the only quantitative variable. Item 10 was recorded in the three dichotomous variables so the agreement analysis could be applied. Finally, item 11 of Pasulka's questionnaire was reviewed and split into three different items on the CIGAS questionnaire. The splitting up was chosen in order to adapt the item to the Italian context. Items 11, 12 and 13 asked; 11) whether the injury had occurred during the sports activities; 12) whether there had been a cessation of the sport for the athlete, and; 13) whether the cessation had been due to the injury.

The questionnaire was given to 26 young injured athletes of whom 19 had completed the second round of the online survey (73% response rate). One subject had reported in the first round to have sustained an injury and on the second questionnaire that he had not, so he was removed from the analysis.

A total of 18 adolescents was included. The sample was composed of 88% males, with a mean age of 15.6 years (minimum = 13, maximum = 18; SD = 1.5). Sixty-seven percent of the respondents were basketball players, 32% were taekwondo practitioners (**table2**).

Cohen's Kappa coefficient was calculated on the quantitative items and shown in **table 3**.

Items 3 and 4 showed significant, very good concordance, whereas items 7, 12 and "10-equipment" showed substantial agreement, and finally items 2, 5 and "10-new technique or skill" showed moderate agreement. The item on the "growth spurt" turned out to be the only one showing poor agreement but it was not significant.

The correlation analysis using Spearman's coefficient reported a significant association ($p < 0.001$) between the first and the second questionnaire for items 8 ("To date, how many days of practice has your injury caused you to miss?") with $r = 0.942$.

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Table 1. Injury Survey of Pasulka's questionnaire (Pasulka, 2017) versus CIGAS (an Italian version).

English version Items	CIGAS Italian version	
	Items	Answers
1. Have you had an injury in the last 6 months related to sports that has prevented you from playing sports?	1. Negli ultimi sei mesi hai avuto un infortunio sportivo?	Si
		No (Il questionario termina)
2. Is the injury you're being asked to talk about (describe) a repeat of an old injury or is it a new injury?	2. L'infortunio (negli ultimi 6 mesi) è stato causato:	da un trauma recente
		da un vecchio trauma
3. Was this injury a traumatic (acute) injury? (Was there a single injury or movement that caused your pain/injury?)	3. L'infortunio è stato:	diretto, cioè legato ad un singolo evento traumatico (per es. scontro con altra persona, colpo ricevuto). (direct injury)
		Indiretto, ovvero causato o da più eventi o da contesto (per es. urto con oggetto, caduta accidentale, errato movimento, inciampo, ecc.) (indirect injury)
4. Can you describe the location of your injury?	4. L'infortunio ha compromesso la seguente parte del corpo: (indicare solo una risposta la parte del corpo che ha subito il maggior danno)	Arto/i inferiore (anca, coscia, ginocchio, gamba, caviglia, piede, ecc.)
		Arto/i superiore (spalla, braccio, avambraccio, polso, mano, ecc.)
5. Please mark the amount to which this injury limits (or limited) your sports participation: a. participation remained normal b. participation remained normal, but pain occurred following activity/sport c. pain during activity that affected performance, but continued activity d. pain during activity caused you to stop activity/sport	5. L'infortunio ha limitato o ti sta limitando nella pratica sportiva?	No, la partecipazione è la stessa senza particolare dolore. (overuse)
		No, la partecipazione è la stessa ma ho avvertito dolore dopo l'attività sportiva. (overuse)
		Si, ho avvertito dolore durante l'attività e ciò ha influito sulle prestazioni, ma ho continuato l'attività sportiva. (overuse)
		Si, ho avvertito dolore durante l'attività e ciò ha causato l'interruzione dell'attività sportiva per almeno 1 mese. (serious overuse)
		Sì, il dolore non ti ha permesso sin da subito di partecipare all'attività sportiva per almeno 1 mese. (serious overuse)

e. pain prevented any participation in sports activity		
6. Has (did) the injury cause you to miss any practice?	6. L'infortunio non ti ha permesso di essere costante negli allenamenti?	No, ho potuto mantenere il ritmo degli allenamenti
		Si, mi ha impedito di fare tutti gli allenamenti necessari
7. Has (did) the injury cause you to miss any competition (games, tournaments, matches, etc.)?	7. L'infortunio ti ha fatto saltare qualche competizione (giochi, tornei, partite, ecc.)?	Si /No
8. To date, how many days of practice has your injury caused you to miss?	8. Ad oggi, quanti giorni di pratica ti ha fatto perdere il tuo infortunio? (riportare un valore numerico, utilizza il valore 0 nel caso di nessun giorno)	<i>Risposta numerica</i>
9. Do you feel you had a "growth spurt" in the last 6 months prior to injury?	9. Pensi di aver avuto uno "scatto di crescita" nei 6 mesi precedenti l'infortunio?	Si /No
10. In the last 4 weeks prior to injury, did you: a. Increase the amount of hours per week you were training? b. Learn a new technique or skill? c. Use new or different equipment?	10. Nelle ultime 4 settimane prima dell'infortunio, hai:(possibili più risposte)	Aumentato il numero di ore settimanali di allenamento
		Imparato una nuova tecnica o abilità
		Utilizzato attrezzature nuove o diverse
11. Have you quit any sport in the last 6 months? a. Was this your primary or most important sport? b. Was your decision to quit related to an injury?	11. Quando si è verificato l'infortunio sportivo stavi praticando il tuo sport principale /più importante?	Si /No
c. Did you quit so that you could focus on another sport?	12. Hai di fare sport negli ultimi 6 mesi?	Si /No
	13. Se si, hai smesso di fare sport ...	a causa dell'infortunio per altro motivo

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Table 2. Descriptive statistics of the participants and injuries qualitative characteristics at 1st wave.

Variables		1 st wave
		N (%)
Gender	Male	16 (89)
	Female	2 (11)
Sport	basketball	12 (67)
	taekwondo	6 (33)
CIGAS qualitative items		
2. Related to old injury	yes	14 (78)
	no	4 (22)
3. Direct injury	yes	11(61)
	no	7 (39)
5. Type of injury	overuse injuries	10 (56)
	serious overuse injuries	8 (44)
6. To miss practice	yes	11 (61)
	no	7 (39)
7. To miss competition	yes	11 (61)
	no	7 (39)
9. "Growth spurt" in the last 6 months prior to injury	yes	13 (72)
	no	5 (28)
11. Was injury occurred during the your primary or most important sport practice?	yes	18 (100)
	no	0
12. Have you quit any sports in the last 6 months?	yes	9 (50)
	no	9 (50)
13. If yes, have you quit the sport activities due to the injury?*	yes	7 (78)
	no	2 (22)

*The percentage was count on the total who has declared to quit any sports (item 12): N=9.

Table 3. The agreement analysis of CIGAS questionnaire. *All subjects who were enrolled in the study have had an injury; ** No statistics have been computed because the item is a constant; n.c. = not computable.

Items CIGAS	Agreement T0 versus T1 K	p
Item 1 *	n.c.	n.c.
Item 2	0.60	0.009
Item 3	1.00	<0.001
Item 4	0.87	<0.001
Item 5	0.55	0.020
Item 6	0.43	0.066
Item 7	0.78	0.001
Item 9	0.25	0.301
Item 10 amount of hours per wk	0.46	0.064
Item 10 new technique or skill	0.49	0.049
Item 10 new or different equipment	0.64	0.006
Item 11**	n.c.	n.c.
Item 12	0.67	0.003

Discussion

The study shows quite an acceptable degree of reliability in the environment of young Italian athletes. Even though the athletes were young (children and adolescents), the test had been made adequately comprehensible to them. The descriptive or more specific items turned out to be in perfect agreement, such as the definition of an acute injury, the description of the location of the injury, the participation in contests, etc. These items probably leave no room for interpretation. Item 9 had a lower incidence of agreement. A possible explanation could be problems with the interpretation of the term “growth spurt” that may have confused the participants. However, the influence of a measured growth rate on the risk of overuse and other sports-related injuries has not been adequately studied (4). We think it may be necessary to make some slight modifications to this question while taking into consideration the participants’ suggestions. The authors do not believe that this should affect the applicability of the results to this segment of the population.

The CIGAS questionnaire shows substantial interreader agreement and only one item was critical. The recommendation is to include an introduction to guide the responders. The online administration of the questionnaire has given a satisfying response rate (70%) and indicated the

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validity of the tool. The advantages of online surveys include speed and ample reach, ease, cost-effectiveness, flexibility, and automation (20).

This type of classification is warranted in the setting where children and adolescents in developmental phases are concerned, because there is a gap in knowledge regarding the prevalence of sport 'specialization' in young, high-level athletes (6). Additionally, if the risk of injuries is greater in specialized athletes, then the history of the injury may prove to be informative about the type of injuries that those athletes have sustained during their athletic careers (21). Post et al. examined the association between specialization and injury and found that the specialized athletes had been more likely to report the occurrence of some type of injury during the previous year (22). This tool could be useful for clinicians, coaches, and parents for monitoring young athletes for the risks of overuse injuries related to sports participation. Athletic associations, coaches and sports medicine providers need to educate parents and athletes regarding the increased risk of injuries for athletes who specialize in a single sport (23).

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