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Which Athletes Fail Faster to Send Weekly Questionnaires or to Comply with an Injury Risk Reduction Program?

Welche Athleten versäumen es schneller, wöchentliche Fragebögen zu versenden oder ein Programm zur Verringerung des Verletzungsrisikos einzuhalten?

Summary

› **Problem:** Low response rate to weekly self-reported questionnaires used to obtain athlete health-related and risk exposure data and low compliance with intervention have been reported. We thus aimed to investigate if time to 1) non-response to a weekly questionnaire and 2) non-compliance with an intervention is different among French athletics athletes with different characteristics.

› **Methods:** We performed a secondary analysis of data from the PREVATHLE randomized controlled trial including 840 female and male competitive athletics athletes followed over 39-weeks. Using univariate Cox proportional hazards regression models, we analyzed the association between athletes' baseline characteristics and the following outcomes: time to failing to (1) respond to a weekly questionnaire and (2) complete a prescribed intervention.

› **Results:** Most athletes failed to complete all questionnaires over the 39 weeks (n=672, 80%), athletes in the intervention group, female athletes, younger athletes, athletes performing explosive disciplines, and athletes with higher non-specific sport training failed sooner. Nearly all athletes in the intervention group failed to comply with the intervention (n=443; 98.7%), and the rates were similar amongst athletes with different characteristics.

› **Conclusions:** This study shows that novel ways have to be found in order to improve both 1) athletes' self-reported responses to weekly questionnaires on health-related and risk exposure data and 2) athletes' compliance with an injury risk reduction program. Education and/or digital solutions might be potential opportunities.

Zusammenfassung

› **Problem:** In epidemiologischen Studien zu Sportverletzungen wird häufig über eine niedrige Rücklaufquote bei wöchentlichen Fragebögen zur Selbstauskunft berichtet. Diese rückläufigen Fragebögen werden von den Sportlern gebraucht, um gesundheitsbezogene Daten und Auswertungen zur Risikoexposition zu erhalten. Zusätzlich wurde in Studien zur Effektivität von Präventionsprogrammen von Sportverletzungen eine niedrige Compliance der Sportler beobachtet. Wir wollten daher untersuchen, ob sich die Zeit bis zur 1) zur Nicht-Beantwortung eines wöchentlichen Fragebogens und 2) Nichtbefolgung einer Intervention bei französischen Leichtathleten mit verschiedenen Merkmalen unterscheidet.

› **Methode:** Diese Studie ist eine Sekundäranalyse der Daten aus einer 39-Wochen RCT-Studie (PREVATHLE-Studie) mit 840 weiblichen und männlichen Leistungssportlern. Wir analysierten den Zusammenhang zwischen den Ausgangsmerkmalen der Athleten und dem Zeitpunkt bis 1) zur Nicht-Beantwortung des wöchentlichen Fragebogens und 2) zur Non-Compliance mit der vorgeschriebenen Intervention mit Hilfe von univariaten Cox-Proportional-Hazards-Regressionsmodellen.

› **Ergebnisse:** Die Zeit bis zur Nichtbeantwortung des wöchentlichen Fragebogens über die 39 Wochen (n=672, 80 %) war bei den Athleten der Interventionsgruppe geringer, und zwar bei weiblichen Athleten, jüngeren Athleten, Athleten, die explosive Disziplinen ausübten, und Athleten mit einem höheren unspezifischen Sporttraining. Fast alle Athleten in der Interventionsgruppe sind der Intervention nicht nachgekommen (n=443; 98,7 %), und die Raten waren bei Sportlern mit unterschiedlichen Merkmalen ähnlich.

› **Diskussion:** Diese Studie zeigt, dass neue Wege gefunden werden müssen, um sowohl 1) die selbstberichteten Antworten der Athleten auf wöchentliche Fragebögen zu Gesundheits- und Risikoexpositionsdaten als auch 2) die Einhaltung eines Programms zur Verringerung des Verletzungsrisikos durch die Athleten zu verbessern. Bildung und/oder digitale Lösungen könnten Lösungen sein.

KEY WORDS:
Sports Injury Prevention, Prevention Strategies, Self-Reported Questionnaire, Track and Field,

SCHLÜSSELWÖRTER:
Prävention von Sportverletzungen, Präventionsstrategien, selbstberichteter Fragebogen, Leichtathletik

Introduction

Athletes doing track and field (athletics) are exposed to a risk of injury (2, 3). Although they all tend to agree on the relevance of performing injury prevention (5), less than one-third of athletes declared having partially or fully adopted an injury risk reduction program during their lifetime (9). Low compliance with intervention has also been pointed in other injury prevention studies in athletics (3, 4), running (8), and other sports (10). Furthermore, interventional and epidemiological studies, as these examples from athletics show, often used weekly self-reported questionnaires to obtain athlete health-related and risk exposure data (1, 3, 7). Although a high response rate to these questionnaires is fundamental to reduce the probability of non-response bias and missing data, weekly response rate was low in these studies (1, 3).

Table 1

Associations between athletes' characteristics and (1) weekly response rate and (2) compliance with the intervention (for more details about the intervention, please see (3)). HRR=Hazard rate ratio; CI: confidence interval. For discipline, we categorized as "explosive" the following disciplines: "sprints", "jumps", "throws", "hurdles", and "combined events"; and as "endurance": "middle and long distances", "marathon", "race walking", "road running", and "trail and mountain running" (9). Bold values are for significant HRR (when 1 is not included in the 95%CI). HRR above 1 indicate a tendency for the reference group to have an increased instantaneous risk of 1) a weekly response rate below 100%, or 2) a compliance with the intervention less than two times a week. *=Number of athletes included in the analysis.

	WEEKLY RESPONSE RATE (TOTAL=840)				COMPLIANCE WITH THE INTERVENTION (N=449)			
	ATHLETES*	HRR	(95% CI)	P-VALUE	ATHLETES*	HRR	(95% CI)	P-VALUE
Group (reference control)	840	**0.71**	**(0.61 to 0.82)**	**<0.0001**	-	-	-	-
Sex (reference male athletes)	840	**0.82**	**(0.70 to 0.95)**	**0.009**	449	0.97	(0.80 to 1.17)	0.735
Age (years)	840	**0.98**	**(0.97 to 0.99)**	**0.0003**	449	1.00	(0.98 to 1.01)	0.602
Discipline (explosive)	833	**1.20**	**(1.00 to 1.44)**	**0.049**	444	1.10	(0.88 to 1.39)	0.391
Athletics training (hours)	529	1.03	(0.99 to 1.07)	0.113	269	0.96	(0.92 to 1.01)	0.127
Non-specific sport training (hours)	530	**1.04**	**(1.00 to 1.08)**	**0.029**	269	1.00	(0.96 to 1.04)	0.995
Previous injuries (reference yes)	530	1.03	(0.84 to 1.27)	0.770	269	1.11	(0.87 to 1.41)	0.397

More specifically, a low response rate to athletes' health and exposure information and a low compliance with the intervention were raised as major limitations for the interpretation of intervention efficacy in a recent cluster-randomized controlled trial (RCT) in athletics (3). Indeed, over the 39 weeks of follow-up, the average weekly response rate was 40% (SD=41), and only 20% (168 of 840) of the athletes provided all weekly questionnaires (3). In addition, only 9% (6 of 68) of the athletes from the intervention group and included in the analysis declared to have fully complied with the intervention (i.e., 8 exercises two times a week) (3). A recent online survey revealed that some athletes' characteristics (e.g., competing level and number and time of past injuries) could be associated with different levels of compliance with injury risk reduction programs (9). Exploring such potential associations with real participant data from the RCT mentioned above (3) would help better understand whether some athletes' characteristics could be associated with not sending all weekly questionnaires and not complying with the intervention, and specifically faster failing in these actions. Such information would be of help to orient strategies to improve response rate and compliance.

Therefore, in the present study, we aimed to investigate if time to 1) non-response to a weekly questionnaire and 2) non-compliance with an intervention is different among French athletics athletes with different characteristics.

Methods

In the present study, we used the data from the "PREVATH-LE" RCT (3), which was approved by the Committee for the Protection of Persons (CPP Ouest II–Angers, number: 2017-A01980-53) and registered on ClinicalTrials.gov (Identifier: NCT03307434). We performed a secondary analysis of data from the PREVATHLE randomized controlled trial including 840 female and male competitive athletics athletes (449 intervention and 391 control) followed over 39-weeks (3). Athletes in the intervention group were asked to performed 2 times a week an unsupervised exercise-based injury prevention program (AIPP), and athletes in the control group were asked to follow their regular training plan (3).

Our main outcomes were: 1) Time to non-response to the weekly injury and exposure questionnaire dichotomized into either yes (completed all questionnaires during follow-up – equivalent to being censored at the end of follow-up) or no (the specific time slot they failed to respond the first time), and 2) Time to non-compliance amongst those assigned to the intervention group dichotomized into yes (completed at least two unsupervised exercise-based injury prevention program sessions per week – equivalent to being censored at the end of follow-up) or no (did not complete two sessions per week at a specific time slot during follow-up) (3).

We analyzed the association between the two outcomes and each of the seven exposures: randomization (intervention/control group), sex (males/females), age (years), discipline (explosive/endurance), athletics and non-specific sport training (hours), and previous injuries (yes/no), using univariate Cox proportional hazards regression models with weeks as the time scale. We calculated the hazard rate ratio (HRR) with 95% confidence interval (95% CI) as measure of association. The assumption that the hazard rates were constant/proportional over time was evaluated using a log-minus-log plot for each analysis. We performed the statistical analyses using R (version 3.6.3 (2020-02-29, ©2020 The Foundation for Statistical Computing (Comprehensive R Archive Network) and the R library "survival".

Results

Most athletes failed to complete all questionnaires during the follow-up (n=672, 80%), meaning that they did not provide 100% of the expected responses to the weekly questionnaire (i.e., they did not provide the 39 required weekly responses). Twenty percent of included athletes had 100% response rate to the weekly questionnaire. The first non-response to a weekly questionnaire was after an average of 7.0±9.1 weeks. The time to non-response to the weekly questionnaire was lower for athletes in the intervention group, female athletes, younger athletes, athletes performing explosive disciplines, and athletes with higher non-specific sport training (table 1).

Nearly all athletes included in the analysis failed to comply with the intervention (n=443; 98.7%), meaning that only 6 athletes completed at least two unsupervised exercise-based injury prevention program sessions per week. The first non-compliance with the intervention was after an average of 1.0±0.1 weeks, and the rates were similar amongst athletes with different characteristics (table 1).

Discussion

Our main findings were that 1) athletes in the intervention group, female athletes, younger athletes, athletes in explosive disciplines and athletes with higher non-sport specific training failed faster than others to complete all weekly questionnaires, while 2) there were no differences in the time to non-compliance according to athletes' characteristics.

We acknowledge some limitations about this study. This is a secondary analysis of RCT data (3). The sample size could be considered as small. The present study only reports association between parameters, no cause-consequence relationships can be concluded from the present study; this was not a causal study. Other parameters, not measured or not known (e.g., physical, psychological or societal parameters), could be associated to the time to non-response to a weekly questionnaire and/or to non-compliance with the intervention. In addition, the reasons for failing to complete the questionnaires and to comply with the AIPP were not explored. There is thus a need to continue such analysis using further quantitative and/or qualitative approach.

However, this study provides additional information that can be of help when preparing injury surveillances and interventional studies in athletics. As a strength, we can also report that the intervention content was known and the compliance with the intervention was objectively measured, unlike in a recent survey (9).

Based on our findings, strategies to ensure more responses should be reinforced specifically for female athletes, younger athletes, athletes in explosive disciplines and athletes with higher sports practice outside athletics, and, in the context of RCTs, for participants in the intervention group. Although the other groups of athletes (e.g., male athletes, older athletes) failed later, their response rates were also low over the study period. This means that efforts to encourage higher response rates should also target these athletes. Several proposals have been made by Edouard et al. (3): e.g., automatic reminders, education on the interest of injury data monitoring, feedback to the athletes, individual monitoring of response rate. Further studies could examine the effectiveness of these strategies in the improvement of response rates in sports injury epidemiological studies. Focusing only on the intervention group athletes, we hypothesize that the fact that nearly all failed to comply with the AIPP could have made many of them less likely to provide the questionnaires, as these athletes could be reluctant to admit that they failed to comply.

Regarding the compliance with the AIPP, the present analysis did not find any athletes' characteristics associated with failing to comply. Our results thus did not find any specific athletes' characteristics that turned out to be significant for attempts to improve compliance with the intervention. Future research should be conducted to understand the barriers and facilitators for complying with injury risk reduction programs in athletics. Based on these barriers and facilitators, further strategies should be developed to improve compliance. Some possible approaches could be: improving the presentation and implementation of injury risk reduction programs, having study personnel supervising the execution of the intervention, providing incentives to athletes who comply with the intervention, and/or education about the interest of injury risk reduction programs (3). Another approach could be by maximizing the individualization of the injury risk reduction approach including the individualization of the intervention as well as its implementation (6).

Conclusion

In conclusion, this study shows that novel ways have to be found in order to improve both 1) athletes' self-reported responses to weekly questionnaires on health-related and risk exposure data and 2) athletes' compliance with an injury risk reduction program. Education and/or digital solutions might be potential opportunities for both and could help overcome shortcomings of unsupervised prevention programs. ■

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Ethics Approval

In the present study, we used data from a randomized controlled trial that was approved by the Committee for the protection of persons (CPP Ouest II—Angers, number: 2017-A01980-53), and was registered in the ClinicalTrials.gov (ClinicalTrials.gov Identifier: NCT03307434).

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Conflict of Interest
The authors have no conflict of interest.

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