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Leaving elite sport, abandoning athletic identity? Development and predictors of athletic identity post-retirement

Introduction

Elite athletes invest a large proportion of their time and energy into training and competing. Depending on the length and intensity of their athletic careers, their lives are strongly shaped by sport in a variety of ways. Many athletes begin their journey into elite sport during late childhood or early adolescence, a period in which the formation of an identity is an important developmental task (Erikson, 1968). Brewer, van Raalte, and Linder (1993), drawing on identity and self-concept theory (e.g., multifaceted structure of the self-concept; Marsh & Shavelson, 1985), defined athletic identity as "the degree to which an individual identifies with the athlete role" (p. 237) and also developed a measure of athletic identity (i.e., Athletic Identity Measurement Scale [AIMS]). Since the seminal paper by Brewer et al. (1993), sport psychology research has displayed considerable interest in the construct and has identified numerous positive and negative effects of a strong athletic identity. For example, a strong athletic identity is associated with high levels of sport motivation (Brewer et al., 1993), physical activity (Reifsteck, Gill, & Labban, 2016), and performance (Lochbaum, Cooper, & Limp, 2022). Conversely, the literature shows that a strong and exclusive athletic identity may entice athletes to train overly hard (i.e., overconformity; Coker-Cranney, Watson, Bernstein, Voelker, & Coakley, 2018) and leave them vulnerable when faced with career transitions such as injuries, deselection from a team, or career termination (Brewer & Petitpas, 2017).

Based on the current scientific knowledge regarding identity formation and development across the span of a career (for an overview, see Brewer & Petitpas, 2017), we can assume that athletic identity increases from the age of 10–15 years and subsequently remains relatively constant unless events are experienced that threaten or limit an athlete's ability to perform. It has also become evident that the development of (athletic) identity emerges from an interaction between context and person (e.g., Bosma & Kunnen, 2001), and thus varies greatly from person to person. Regarding context, it is particularly evident that the social environment (coaches, training group; Stephan & Brewer, 2007) has an influence on an athlete's identity: When social circles coalesce around sports, individuals tend to identify more strongly with their role as an athlete than with other roles. Personal factors include the following, according to the available empirical sport psychology literature: (1) (Career) age: The older and the more advanced in their athletic careers athletes are, the less pronounced their athletic identity. This can be explained by taking new responsibilities outside of sport and devoting increasingly more attention to other areas of life, such as family, partnership, or work (Brewer et al., 1993; Houle & Kluck, 2015; J. Schmid & Seiler, 2003). (2) Gender: While in the early research (Brewer et al., 1993) female athletes were found to identify less with their athlete roles than male athletes, currently gender appears to have no effect once confounders such as amount of training or performance level have been taken into account (C. B. Anderson, Mâsse, & Hergenroeder, 2007; Nasco & Webb, 2006; J. Schmid & Seiler, 2003). (3) Training effort: Several studies found a relationship between training volume and athletic identity, in the sense that athletes with a large training effort often identify more strongly with the role as an athlete (e.g., Johansson, Tranaeus, Asker, & Skillgate, 2022; J. Schmid & Seiler, 2003). This is likely to be the case in elite sport, where multiple training sessions per day are often required to achieve athletic excellence, and sport thus becomes life-determining, while other areas of life play a subordinate role (Stephan & Brewer, 2007). Closely associated with this is status as an athlete, and thus whether the athletes engage in sport professionally or semi-professionally (i.e., dual career athlete). (4) Objective and subjective success in sports: It was found that a high athletic level (Lochbaum et al., 2022) and subjective positive evaluation of one's athletic performance (e.g., over one season) is associated with a stronger athletic identity (Brewer, Selby, Under, & Petitpas, 1999). (5) Critical life events: It has been shown that injury (Brewer, Cornelius, Stephan, & van Raalte, 2010), deselection (Grove, Fish, & Eklund, 2004), and retirement from sport (e.g., Lally, 2007; Lavallee, Grove, & Gordon, 1997) can cause a decrease in athletic identity. Therefore, it

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is important to consider under what circumstances retirement takes place (e.g., voluntary vs. involuntary; J. Schmid, Conzelmann, Engel, Kuettel, & Schmid, 2023). (6) Other life roles: The number of roles (i.e., involvement in other areas of life) or their diversity can be co-determining for the formation and expression of an athletic identity—a finding related to age (J. Schmid & Seiler, 2003). An interesting finding in this context is that self-complexity—that is, "the number of aspects that one uses to cognitively organize knowledge about the self, and the degree of relatedness of these aspects" (Linville, 1985, p. 97)—might function as a resource in transitions (e.g., Aidman & Schofield, 2004).

Athletic identity and career termination

The literature on athletic identity and career termination is extensive. Our starting point is the assumption that athletic career termination results in major changes in an athlete's life, which in turn influence an individual's identity. Indeed, this conjecture can be traced back to early transition theories by counseling psychologist Schlossberg (1981) according to whom transitions produce "a change in assumptions about oneself and the world and requires a corresponding change in one's behaviour and relationships" (p. 5). Coakley (1983), a sport sociologist, conceptualized retirement from sports "as a role transition through which athletes disengage from some activities and relationships to seek others" (p. 2). Therefore, it is quite probable that retirement-related changes regarding lifestyle, preferred activities, physical fitness, social or physical environment, interests, or values will not leave identity untouched. In fact, the idea that career termination has implications for identity is empirically supported: Lally (2007) conducted an idiographic study and interviewed six student-athletes three times over a period of 2 years during which they terminated their athletic careers. Findings revealed that athletes proactively diminished their athletic identity and begin to draw on other sources of identity prior to retirement and in doing so reduced the risk of identity issues upon and following athletic retirement. However, a decrease in athletic identity may come at a cost, as the complete abandonment of "an [sport] activity-based identity is likely to be detrimental to sustained engagement in sport, exercise, and physical activity" (Reifsteck et al., 2016, p. 34).

Longitudinal studies on athletic identity

From a methodological point of view, in order to examine changes in an athlete's identity, prospective longitudinal studies are called for; however, only few have been conducted (Lochbaum et al., 2022). A review of the literature reveals a wide range in the observation periods: Grove et al. (2004) measured changes in athletic identity of 47 female athletes who were vying for selection in all-star teams three times over 2 weeks, while Brewer et al. (2010) assessed the development in athletic identity among 108 injured athletes three times over a period of 2 years. Finally, Fraser (2012) investigated whether voluntariness of retirement influenced levels of athletic identity over 5 years in 62 elite athletes who either retired from sport or intended to retire. To the best of our knowledge, apart from Fraser's (2012) study, which was also published in Martin, Fogarty, and Albion (2014), measurements over more than two years have not been reported in the literature. In addition, most athletic identity studies have examined small samples and rely on aggregated data (i.e., they focus on group average change). This approach treats all individuals within the group as having the same form of change over time and neglects possible between-unit variability (Ployhart & Vandenberg, 2010) such as Lally (2007) encountered in her study.

Purpose of the present study

The aim of the present study was to assess the development of athletic identity over several years spanning from the athletic to the post-athletic career. Furthermore, we examined to what extent factors cited in the existing literature, in particular gender, age, career age, sporting success, voluntariness of career termination, post-career involvement in sport, and life roles, explain interindividual differences in levels and trajectories of athletic identity. These objectives are achieved by analyzing data from a prospective longitudinal study with hierarchical linear modeling.

Methods

Participants and procedures

We recruited the participants in this prospective study via the Swiss Olympic Association. In doing so, we conducted a survey of the entire carded population of 903 German-speaking elite athletes (t_1; response rate: 68%). At the second time of measurement (t_2) 12 years later, we contacted the athletes again (response rate: 46%). Due to expired contact data, 78 of the (former) athletes (8.6%) could not be reached. Only athletes who had ended their careers in elite sports were included. This criterion resulted in a final sample of 290 athletes (32% of the population). The sample consisted of 32.8% women and 67.2% men from 64 different sports. Overall, 63% of the athletes were participating in individual sports and 37% in team sports. On average, the sample started performance-oriented training at the age of 13.1 years ($SD = 5.4$) and retired from elite-sports at the age of 29.4 years ($SD = 5.9$). During their career, 99 athletes (34.1%) won at least one medal at one of the major competitions such as Olympic Games, World and European Championships. At the time of the first survey, the athletes were 25.0 years old on average ($SD = 6.0$). When they completed the second survey, they were 36.8 years of age and had retired from elite sport for an average of 7.3 years ($SD = 3.3$).

To check for possible selection bias, we compared the final sample of 290 ath-

Supplementary Information

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letes with the remaining 613 (former) athletes of the population in terms of gender, age, type of sport (individual vs. team), and performance level (elite, pre-elite, and junior elite athletes, assessed at the first measurement time point, t_1). Logistic regression to predict participation in the study revealed no significant differences, $\chi^2 = 4.178$, $N = 903$, $df = 5$, $p = 0.524$; R^2 (Nagelkerke) = 0.006, which indicates that the sample—at least with respect to the available information—is a good representation of the population. At the time of data collection, ethical review and approval were not required for the study on human participants according to local legislation and institutional requirements. All procedures of the study were conducted according to the ethical principles of the Declaration of Helsinki (World Medical Association, 2013).

Measures

At the participants' discretion, the questionnaire was administered using a paper-and-pencil or a web-based format. Besides sport-specific information (type of sport, start/end of career, achievements), the questionnaire included the following measures:

Athletic identity was assessed with the German version (AIMS-D; J. Schmid & Seiler, 2003) of the Athletic Identity Measurement Scale (AIMS; Brewer et al., 1993). In accordance with the literature (e.g., Visek, Hurst, Maxwell, & Watson, 2008), the participants responded to seven items on a seven-point Likert-scale from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher values indicating a higher athletic identity. In the present sample, McDonald's (1999) ω was estimated to be 0.77, 95% CI [0.73, 0.82] at t_1 and 0.86 [0.83, 0.88] at t_2.

As an indicator of (athletic) career age, we used the inverse of time to retirement. This period was derived as the difference in months and years between t_1 and athletic retirement, which was at some point before t_2. Hence, a long period indicated a young career age.

To determine training effort, participants first reported how many years they spent in the development and mastery stages of their athletic career. Then they indicated how many hours on average they invested weekly in training during these phases. The weighted mean of weekly hours over the two stages was taken as a rough indicator for training effort. Status as an athlete was established by asking the participants whether they had been a semi-professional (dual-career) or professional athlete (i.e., no other occupation beside sport such as studies or profession) at or around the height of their career (0 = *semi-professional*, 1 = *professional*).

Objective sporting success was assessed with supporting information from public records at t_2. First, it was determined in how many of the major competitions such as Olympic Games, World and European Championships an athlete could have taken part while being in his or her mastery phase as an athlete. Then, this information was brought together with an athlete's actual record in terms of participation and success at these major international competitions. Based on terciles, the sample was split into three groups. Eventually, we worked with a three-point scale measuring the aggregated market share of an athlete, which considers the importance of a completion in a particular sport as well as the frequency of these competitions and the associated chances of taking part therein (see supplemental online material for a detailed description). A value of 2 indicates a very successful career (2 = *above average*), whereas a value of 1 and 0 are indicative of less success in an athlete's career (1 = *average*, 0 = *below average*).

Assessment of subjective sporting success was guided by Abele, Spurk, and Volmer's (2011) work on the construct and measurement of professional career success and its adaption on athletic careers by Engel (2014). We used six items asking about an athlete's satisfaction with several aspects of his or her athletic career, including the extent to which career objectives were attained, the balance of (tangible and intangible) costs and benefits, and sports performance at major international competitions such as Olympic Games, World Championships, or Continental Championships. An example item is, "To what extent have you achieved the goals you set out to achieve in your sports career?" Responses were measured on a 7-point Likert scale. Exploratory factor analysis revealed that the six items could be condensed into one single factor. It accounted for 53% of the variance in the data and was extracted to provide an overall (standardized) factor score for subjective sporting success, with high values corresponding to high subjective sporting success.

Voluntariness was measured using a six-point Likert scale asking the participants if they would describe their career termination as *involuntary* (0) or *voluntary* (5).

Abstract

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Leaving elite sport, abandoning athletic identity? Development and predictors of athletic identity post-retirement

Abstract

The purpose of this study was to examine how athletic identity develops beyond a career in elite sport and which factors contribute to this development. A two-wave 12-year longitudinal survey of 290 Swiss elite athletes ($M_{age} = 36.8$ years at t_2; 32.8% women, 67.2% men; 63% individual sports, 37% team sports athletes) was conducted during (t_1) and after their career (t_2). Multilevel models revealed that athletic identity was high at t_1 and decreased over time. However, there was considerable heterogeneity across athletes. Particularly, the status as an athlete (i.e., professional vs. semi-professional), career age, and self-complexity predicted athletic identity at t_1. A slower decline in athletic identity was found for athletes who earned their living in sports, participated in (recreational) competitive sport, were satisfied with their sport career, and did not increase their self-complexity at t_2. Therefore, when seeking to reduce athletic identity, it is recommended to promote self-complexity through exploratory behavior.

Keywords

Identity · Career transition · High-performance athletes · Withdrawal · Self-complexity

Involvement in sports after career termination: Recreational participation in competitive sport was addressed by asking about active participation in sports competitions after retirement from elite sport (0 = *never* or *no sports activity* to 3 = *often*). Spectating sport and occupation in the field of sport were assessed using a yes/no question.

The salience of different life roles (i.e., sport, education, occupation, leisure, relationships, family, political/social activity, religious/church activity) was conceptualized based on the construct of self-complexity (Linville, 1985). It can be understood as the counterpart to exclusivity of the role as an athlete (Samuel & Tenenbaum, 2011) and was measured with eight items (each representing a particular role) at t_1 and t_2: Based on the work of Fadjukoff, Kokko, and Pulkkinen (2010), participants rated on a five-point scale how important their athlete role and the other seven roles were to their identity. The variable for self-complexity was derived by a procedure known as intra-individual standardization or ipsatization (e.g., Moeller, 2015): In the first step, the participant's mean score of all salience items is subtracted from a participant's response to the sport salience item. In the second step, this difference is divided by the participant's standard deviation of all salience items. An (ipsatized) score of zero means that, in terms of salience, a participant rated sport similarly to other roles. By contrast, a negative (ipsatized) score indicates that their athlete role surpasses the other roles with respect to its salience. In conclusion, low levels of the thus derived variable for both t_1 and t_2 were taken to reflect low degrees of self-complexity, and high values, however, to indicate high self-complexity.

Time was coded as 0 for the first and 1 for second measurement. The interpretation of the time variable would then be the change in athletic identity over 12 years.

For ease of interpretation, the continuous predictors were centered on the grand mean of the sample of individuals, in particular age at the first measurement point, career age, training effort, and subjective sporting success. As outlined earlier, the time-varying predictor self-complexity represents a person-mean centered variable.

Data processing

On the 55 variables of interest, there were complete data from 207 participants, while the remaining 83 cases accounted for the 1.2% of the missing data. Incomplete reporting was mainly related to two variables: participation in competitive (recreational) sport after athletic retirement from elite sport (17 cases, 5.9%) and time elapsed since career termination (13 cases, 4.5%). A non-significant Little's MCAR test, $\chi^2(2757) = 2457.742$, $p > 0.999$, revealed that the data were missing completely at random. With data missing completely at random and a small portion of data missing (e.g., less than 5% overall), single imputation using the expectation maximization algorithm has been shown to provide unbiased parameter estimates and improve statistical power of analyses (Enders, 2010). Missing data were imputed accordingly.

By using Mahalanobis distance with a criterion of $p < 0.001$, derived from the 14 variables in the (full) model, two cases were identified as multivariate outliers. They were involved in equestrian sports and were relatively old. Moreover, with respect to training effort, three cases had standardized scores above 3.29 ($\alpha = 5\%$) and were identified as potential univariate outliers. Because parameter estimation may be unduly influenced by extreme values, winsorizing was used on (grand mean centered) age at the first measurement point (values > 19 years of age) as well as (grand mean centered) training effort (values > 22 weekly hours).

Statistical software

We conducted multilevel model analysis in R (version 4.2.2; R Core Team, 2022) with the package nlme (v3.1-162; Pinheiro, Bates, & R Core Team, 2023) and maximum likelihood estimation. We visualized results using ggplot2 (Wickham, 2016). For imputation of missing data and all other analyses, IBM SPSS Statistics (Version 29) was employed.

Statistical analysis

To examine whether variation in athletic identity could be explained by the predictors in the present study, we adopted multilevel modeling (MLM; e.g., Heck & Thomas, 2020). This technique is appropriate for analyzing data in which repeated measurement occasions (level 1) are nested within individuals (level 2). The reason for this is that MLM accounts for dependencies among observations and thus prevents underestimation of standard errors and ultimately erroneous conclusions about the empirical relationships under consideration.

Also, MLM has the virtue of not only modeling fixed, but also random effects, which makes it possible to model individual levels of a particular outcome variable and individual trajectories of its change over time. Specifically, the initial level of athletic identity during the career and the rate of change in athletic identity beyond the retirement from elite sport are modeled by reference to two types of random effects and models: While (1) in the random intercept model, the intercept (e.g., the mean of athletic identity scores) is allowed to vary between individuals, (2) in the random slope model, the slope of the regression line (e.g., the change over time in athletic identity scores) is allowed to vary between individuals. On this basis, it can be assessed whether there are systematic inter-individual differences in change over time in athletic identity.

Model building

Following a strategic procedure proposed by Heck and Thomas (2020), we developed and tested seven two-level hierarchical models. First-level units were time points of measurement (i.e., during and after the athletic career) resulting in a total of 580 time points for analysis. Second-level units were the 290 participants. Models 1 and 2 were relevant in terms of the analytic strategy, that is, to determine whether the basic assumption of variation regarding level and trajectories of athletic identity was tenable. Models 3–6, however, were of substantive interest.

Model 1: First, we specified the unconditional means model, which estimates the grand mean across the two measure-

ment occasions for the outcome, on the one hand, and the variance associated with the individual means (level 1) and the grand mean (level 2), on the other hand. This model was used to partition the variance in the grand mean estimate of athletic identity outcomes into its within- and between-individual components, regardless of time. From these components the proportion of the variance that lies between individuals was estimated. Besides, model 1 was used as a baseline for deciding whether the model fit improves when additional fixed and random effects of predictors are entered in the model. *Model 2*: We then defined the unconditional growth model with a random time parameter, which includes the initial status and growth parameter (time) specified at level 1. The random-effects covariance matrix at level 2 was chosen to be unstructured. In model 3, gender, (chronological) age at the first measurement point, and three other time-invariant between-subjects predictors relating to the active athletic career were included. In particular, we introduced in the model training effort, status as a semi- or professional athlete, and career age. Moreover, the interaction terms between these five predictors and the time-related variable were integrated in the model to examine whether, for example, status as a professional or semi-professional athlete was related to change in athletic identity over time. It was assumed that all main and interaction effects were not varying at the individual level. In model 4, three variables referring to the athletic career and its end were added to model 3 to explain variation between participants in the change of AIMS scores over time, namely, circumstances of career termination (voluntariness) as well as subjective and objective sporting success. Following Long's (2012) model formulation guidelines, the main effects of these level-2 predictors were added to the model alongside their interaction with time. In model 5, three level-2 predictors relating to the involvement in sports after leaving elite sport were integrated in the model: involvement in sports by virtue (a) of spectating at sport events, (b) of participating in competitive (recreational) sports, and (c) of a sport-related occupation. Again, the focus was on the interaction effects, but the main effects were also added to the model. In model 6, self-complexity, a time-varying level-2 predictor, was considered. To disentangle between-person and within-person effects, we included levels of self-complexity at t_1 and changes in self-complexity between t_1 and t_2 in the model (Viechtbauer, 2021). In view of the complexity of the full model 6, we anticipated to estimate a final, more parsimonious post hoc model (model 7) from which negligible effects were eliminated.

Model evaluation

To compare fits of nested models, we applied likelihood ratio tests (e.g., Heck & Thomas, 2020). However, because they may not be reliable when nested models differ by more than a few degrees of freedom (Long, 2012), we also adopted the multimodel (inference) approach (D. R. Anderson, 2008). It is based on Akaike's information criterion and has the capacity to rank-order models in terms of fit. Referring to Long (2012), we employed three relative effect size measures (Burnham & Anderson, 2004): (a) Delta (Δ_i), which is the difference between the bias-corrected AIC (AICc) of the *i*th model and the smallest AICc of the candidate models; (b) Akaike weight (W_i), which is the proportion of the total amount of predictive power provided by the *i*th model in relation to all other candidate models considered; and (c) evidence ratios (E_i), which express the difference between the best-fitting model and *i*th model, a worse-fitting model, in terms of odds. The higher the odds, the more confidence that the *i*th model is not the best approximating model.

Being relative indices, Δ_i, W_i, and E_i do not help in detecting particularly relevant predictors in a model or in judging the worthiness of any one model in isolation. As to the first concern, we relied on *t* ratios of individual parameter estimates. They may be regarded as standardized effect sizes and used as a relative measure without regard to statistical tests or cutoff values (Long, 2012). Concerning the second issue, we favored two options of the R^2 statistic proposed by Nakagawa, Johnson, and Schielzeth (2017) and implemented in the R package sjPlot (Lüdecke, 2018): This statistic is the R^2 from traditional regression applied to MLM and represents an index for global effect size. Although R^2 is a measure of absolute fit, no generally applicable benchmarks are available (Long, 2012).

Using the R package nlmeU (Gałecki & Burzykowski, 2013), post hoc power analysis was performed. While ideally power analysis is conducted a priori, realistically, post hoc power analysis was the only feasible option, because sample size was limited due to a finite population (elite athletes at a particular point in time) and drop-out in our longitudinal study. However, caution must be exercised in interpreting the observed post hoc power values because post hoc observed power is a re-expression of a *p* value. Hence, it does not add new information to the statistical analysis (Gałecki & Burzykowski, 2013). It is, nonetheless, of value because post hoc power provides information about the probability of rejecting the null hypothesis if the effects in a future study were of the same magnitude as the ones we have observed. For example, checking on the power ($1-\beta$) of both the main and interaction effect of gender (0.12, 0.07), voluntariness (0.32, 0.06), and objective sporting success (0.14, 0.18), we found that the study did not have sufficient power (e.g., 0.80) to detect small effects.

Results

Analysis of mean-level change in athletic identity

As shown in **Fig. 1**, athletic identity decreased over the 12 years. On average, the reduction was 1.73 points, while the standard deviation increased by 0.34 points (t_1: $M = 5.36$, $SD = 0.95$; t_2: $M = 3.63$, $SD = 1.29$). A dependent samples *t* test showed a significant difference between the two measurement time points, $t(289) = 22.084$, $p < 0.001$, $d = 1.30$ (strong effect).

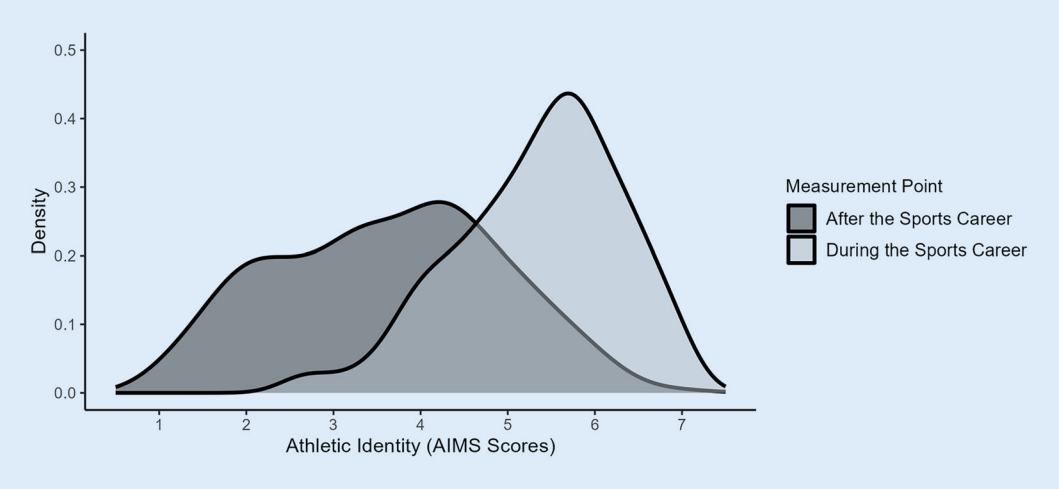

Fig. 1 ◀ Athletic identity during and after the sports career ($N = 290$)

Multilevel models

Overall assessment of the estimated models

Fit information and estimates of explained variance for all hypothesized models are shown in **Table 1**. Inspection of the AICc values for the models of substantive interest (i.e., ignoring models 1 and 2) reveals that by and large the sequential addition of predictors (from model 3 to the full model 6) increased a model's plausibility of being the best approximation model. The parsimonious model 7, however, fitted best to the data. This is also reflected in its weight of evidence ($W_7 = 0.991$) and the evidence ratio of the other models (e.g., E_6), suggesting that—given the data, all the considered models, and the unknowable true model—model 7 was clearly the best approximating model. The predictors at both levels in model 7 explained via their fixed effects 51.1% of the total variance at level 1, slightly less than the predictors of the full model (52.5%). Thus, our focus henceforth will be on model 7. First however, a few comments are in order concerning the estimation results for the models that have led up to the final model.

The two basic models 1 and 2, the unconditional means model and the unconditional growth model with a random time parameter, have been proposed to examine the necessity of including random components within the basic growth model. The fit measures in **Table 1** clearly indicated that both the intercept (i.e., the initial status of AIMS scores) as well as the slope of the regression line (i.e., the change over time in AIMS scores) are not descriptive of the entire sample and should be allowed to vary between participants (AICc = 2060.13 vs. AICc = 1739.99; LR test: $\Delta\chi^2 = 326.240$, $df = 3$, $p < 0.001$). In total, model 2 explained 32.7% of the variance in the scores of the dependent variable on the occasion level (i.e., within individuals).

To improve model prediction, models 3, 4, 5, and 6 were developed by adding four sets of level-2 predictors to the model. Particularly, model 3 included five variables of a more sociodemographic character, that is, gender, age, career age, training effort, and status as a semi- or professional athlete, to address potential intercept effects. The interaction of these variables with time were also added to investigate whether potential level effects persisted over time. Marginal R^2 for model 3 was 0.43 and improved imperceptibly to 0.44 in model 4, when three variables pertaining to the athletic career and its end (i.e., subjective and objective sporting success, voluntariness of career termination) were added. Model prediction was further enhanced when three variables relating to the continued involvement in sports after career termination were included as level-2 predictors (model 5, $R^2 = 0.50$) and when self-complexity was added to the full model (model 6, $R^2 = 0.53$). As demonstrated by the relatively large differences in AICc between model 2 and models 3–6 and the amount of explained variance, the four predictor sets have enhanced model prediction. We finally advanced a more parsimonious model 7 from which all predictors were removed that did not contribute significantly to the full model 6. In terms of the AICc, model 7 fit slightly less well than model 6. Similarly, R^2 for model 7 was (slightly) lower than for model 6 (0.51 vs. 0.53). However, this is of no concern because R^2 does not penalize complex models and is not appropriate for model selection. Unfortunately, there are no standards for evaluating the magnitude of R^2 and the issue remains whether an explained variance of about 50% should be classified as a small, medium, or large effect (Long, 2012).

Results from the final (parsimonious) model

Table 2 provides the main findings for the parsimonious model 7, that is, (unstandardized) estimates of the fixed effects and variance components. Where applicable, we also present 95% confidence intervals of the estimates, and both t and p values (tests of the ratio of the estimate to its standard error), recognizing that these tests should be considered as rough guidelines only (Heck & Thomas, 2020). For purposes of reference and to pay attention to all specified effects, albeit nonsignificant, the findings relating to the full model 6 are also given.

Apart from the intercept, of the 25 fixed effects estimated in model 6, ten were significantly associated with athletic identity at the 5% level, while 15

Table 1 Fit information for seven hypothesized multilevel models to predict level and change of athletic identity among 290 athletes followed up from active career to athletic retirement

Model	*K*	LogLik	Deviance	AICc	Δ	*W*	*E*	Marginal R^2	Conditional R^2
1	3	−1027.04	2054.09	2060.13	419.523	< 0.001	1.25e + 91	0.000	0.000
2	6	−863.92	1727.85	1739.99	99.388	< 0.001	3.82e + 21	0.372	0.902
3	16	−863.92	1674.41	1707.38	66.770	< 0.001	3.15e + 14	0.429	0.910
4	22	−837.20	1664.64	1710.46	69.856	< 0.001	1.48e + 15	0.438	0.912
5	28	−832.32	1614.61	1673.56	32.952	< 0.001	1.43e + 07	0.496	0.917
6	30	−807.30	1586.68	1650.07	9.460	0.009	1.13e + 02	0.525	0.920
7	18	−793.34	1603.39	1640.61	0.000	0.991	1.00e + 00	0.511	0.918

K number of parameters in the model, *LogLik* log-likelihood of the models, *AICc* bias-corrected AIC, Δ difference in *AICc* score between the best model and the model being compared, *W* (*AICc*) weight of evidence, which is the proportion of the total amount of predictive power provided by a given model in relation to the totality of the candidate models considered, *E* evidence ratio (i.e., ratio of model weights), R^2 conditional and marginal R^2 statistics (Nakagawa et al., 2017). The marginal R^2 considers only the variance of the fixed effects, while the conditional R^2 takes both the fixed and random effects into account

were not. Specifically, there was no level effect for gender, objective and subjective sporting success, and voluntariness of career termination. This was also true for the variables relating to post-career involvement in sports, be it as a spectator, a competitive recreational athlete, or a (self-)employed person in the field of sport. In addition, several slope effects were found to be negligible, including the ones for gender, age, career age, training effort, status as an athlete, and objective sporting success. In line with our more exploratory approach, we removed all nonsignificant main effects from the full model, unless an associated interaction effect was significant (Harrell, 2015), for example, in the case of occupation in sport.

As the comparison of the two models in **Table 2** reveals, the estimates for model 6 and model 7 were by and large stable, indicating that the reduction in model complexity by dropping insignificant predictors did not negatively impact model performance. However, as reflected in the statistically significant level-1 residual (σ), there is still room to improve model 7, 0.41, 95% CI [0.005, 36.366].

Detailed inspection of the intercept and slope estimates of model 7 in **Table 2** reveals that (former) athletes' AIMS scores dropped on average markedly from an initial level of 5.24 to 2.88 on a scale from 1 to 7 over the period of 12 years, $b = -2.36$, 95% CI [−2.60, −2.11]. Estimates of the variance components indicate that there were systematic inter-individual differences on both levels and changes over time in athletic identity, $\tau_{00} = 0.59$ [0.05, 7.49] and $\tau_{11} = 1.17$ [0.09, 14.67], respectively. As is apparent from the covariance between the variance in intercepts and the variance in slopes between participants, individuals who scored high on athletic identity during their athletic careers tended to change more over time than did individuals with low AIMS scores, $\rho_{01} = -0.43$, [−0.87, −0.07].

Focusing again on the fixed effects of model 7, we find that at both time points, older (former) athletes identified themselves less with the athlete role than younger athletes did. However, on a scale of 1 to 7, the observed effect was negligible ($b = -0.02$) and the confidence interval included zero (95% CI [−0.03, 0.00]). By contrast, career age, after controlling for age differences, had a significant level effect: On average, athletes who were more advanced in their athletic careers tended to have lower AIMS scores at both times than athletes who were early in their careers ($b = -0.05$).

Athletes with a large training effort identified on average more strongly with the role as an athlete, $b = 0.02$, 95% CI [0.01, 0.03]. Whether an individual was a semi-professional or professional athlete also had a notable effect: Over and above the effect of training effort, during their active careers, professional athletes tended to have a more pronounced athletic identity than semi-professional athletes, $b = 0.37$, 95% CI [0.06, 0.67].

No statistically significant links were found between both objective and subjective sporting success and levels of athletic identity. Nevertheless, there was an interaction between subjective sporting success and time. Thus, while there is no evidence that AIMS scores increased with objective or subjective sporting success, there are indications that the rate of decrease in athletic identity was significantly less pronounced for former athletes who were satisfied with how their careers had developed, $b = 0.23$, 95% CI [0.09, 0.38]. Continued involvement in sport after athletic retirement also proved to be relevant for prediction of athletic identity: As mirrored by a t ratio of 5.02, a quite strong effect was noted for participating in recreational competitive sport beyond the career in elite sport, $b = 0.38$ [0.24, 0.53]. The same applies to whether or not someone works in the field of sport after athletic retirement, $b = 0.57$ [0.27, 0.88], $t = 3.65$. The positive sign of the regression estimates showed that participating in recreational (competitive) sport and holding a full- or part-time job in sport were associated with a markedly slower rate of decrease in athletic identity over time.

Finally, self-complexity was found to be an important predictor of the level of athletic identity. As expected, self-complexity during the athletic career was related to low athletic AIMS scores, $b = -0.43$, 95% CI [−0.59, −0.27]. From a between-subjects perspective, this result suggests that two individuals who differed in their self-complexity by 1 *SD* were 0.40 points apart with respect to the AIMS scale. A similar effect can be observed for the variable reflecting change in self-complexity, $b = -0.32$,

Table 2 Multilevel models to predict level and change of athletic identity among 290 athletes followed up from active career to athletic retirement

	(Full) Model 6				(Parsimonious) Model 7			
	b	**95% CI**	***t***	***p***	***b***	**95% CI**	***t***	***p***
Intercept and slope								
Intercept	5.06	(4.71, 5.41)	27.75	< 0.001	5.24	(5.05, 5.43)	53.79	< 0.001
Time slope (0 = *during career*, 1 = *post-career*)	−2.63	(−3.12, −2.15)	−10.44	< 0.001	−2.36	(−2.60, −2.11)	−18.78	< 0.001
Time-invariant variables								
Gender (0 = *male*, 1 = *female*)	−0.10	(−0.32, 0.12)	−0.790	0.367	–	–	–	–
Age[a] (years)	−0.02	(−0.04, −0.00)	−2.38	0.018	−0.02	(−0.03, 0.00)	−1.87	0.063
Career age[a] (years)	−0.04	(−0.07, −0.01)	−2.29	0.022	−0.05	(−0.08, −0.02)	−2.82	0.005
Training effort (hours/week)	0.02	(0.00, 0.03)	2.10	0.036	0.02	(0.01, 0.03)	2.82	0.005
Status as an athlete (0 = *semi-professional*, 1 = *professional*)	0.49	(0.14, 0.83)	2.68	0.008	0.37	(0.06, 0.67)	2.35	0.020
Objective sporting success (0 = *below avg.*, …, 2 = *above avg.*)	0.00	(−0.14, 0.13)	−0.04	0.969	–	–	–	–
Subjective sporting success[a]	−0.05	(−0.16, 0.06)	−0.82	0.413	−0.07	(−0.17, 0.04)	−1.24	0.217
Voluntariness (0 = *involuntary*, …, 5 = *voluntary*)	−0.04	(−0.10, 0.03)	−1.07	0.287	–	–	–	–
Spectating sport (0 = *no*, 1 = *yes*)	0.12	(−0.05, 0.30)	1.37	0.172	–	–	–	–
Recreational participation in competitive sport (0 = *never/no sport*, …, 3 = *often*)	−0.04	(−0.15, 0.08)	−0.61	0.542	−0.04	(−0.16, 0.07)	−0.75	0.457
Occupation in sport (0 = *no*, 1 = *yes*)	−0.07	(−0.29, 0.15)	−0.61	0.551	−0.07	(−0.29, 0.15)	−0.59	0.555
Time × gender	0.10	(−0.21, 0.40)	0.62	0.538	–	–	–	–
Time × age	0.02	(−0.01, 0.05)	1.51	0.133	–	–	–	–
Time × career age	−0.02	(−0.07, 0.03)	−0.82	0.415	–	–	–	–
Time × training effort	0.01	(−0.01, 0.03)	0.72	0.474	–	–	–	–
Time × status as an athlete	−0.45	(−0.93, 0.04)	−1.75	0.081	–	–	–	–
Time × objective sporting success	0.05	(−0.14, 0.24)	0.51	0.613	–	–	–	–
Time × subjective sporting success	0.18	(0.02, 0.34)	2.22	0.027	0.23	(0.09, 0.38)	3.20	0.002
Time × voluntariness	0.01	(−0.08, 0.10)	0.14	0.892	–	–	–	–
Time × spectating sport	0.19	(−0.05, 0.43)	1.51	0.133	–	–	–	–
Time × recreational participation in competitive sport	0.35	(0.19, 0.50)	4.32	< 0.001	0.38	(0.24, 0.53)	5.02	< 0.001
Time × occupation in sport	0.52	(0.21, 0.84)	3.22	0.001	0.57	(0.27, 0.88)	3.65	< 0.001
Time-variant variables								
Self-complexity[b] (t_1)	−0.41	(−0.57, −0.26)	−5.09	< 0.001	−0.43	(−0.59, −0.27)	−5.32	< 0.001
Self-complexity change (t_2–t_1)	−0.29	(−0.42, −0.17)	−4.43	< 0.001	−0.32	(−0.45, −0.19)	−4.93	< 0.001
Random effects								
Intercept variance (τ_{00})	0.57	–	–	–	0.59	–	–	–
Slope variance (τ_{11})	1.14	–	–	–	1.17	–	–	–
Intercept-slope covariance (ρ_{01})	−0.43	–	–	–	−0.43	–	–	–
Level-1 residual (σ^2)	0.16	–	–	–	0.17	–	–	–
ICC	0.83	–	–	–	0.83	–	–	–

b Unstandardized regression coefficients, *ICC* Intraclass correlation coefficient
[a]The predictors are grand mean centered
[b]The predictor is group mean (individual) centered

[–0.45, –0.19]. From a within-subjects perspective, the finding indicates that forming a more complex self-identity over time (by, say, 1 *SD*) was associated with a pronounced decrease in AIMS scores (by 0.32 points).

In conclusion, several predictors were not associated with the level of athletic identity or its change over time and, therefore, were not included in model 7, namely, gender, chronological age, objective sporting success, voluntariness of career termination, and post-career involvement in spectator sport.

Discussion

This research aimed to examine how athletic identity develops from active participation in elite sport until after athletic retirement and which factors influence its trajectory using a longitudinal prospective study design. The analysis revealed that on average, athletic identity decreased over time. However, we discovered notable heterogeneity both in the initial levels in athletic identity as elite athletes and in its development beyond retirement, which merited clarification. While most individuals' athletic identity decreased after retirement, there were also former athletes who identified with their athlete role to the same extent or even more strongly after their careers.

Similar to other studies, we found that the professional status as an athlete (i.e., professional vs. semi-professional), high training effort, and low self-complexity (i.e., an exclusive identification with the role as an athlete) predicted high athletic identity during the athletic career (for an overview, see Lochbaum et al., 2022). In turn, an increase in self-complexity following retirement is associated with a more pronounced decrease in athletic identity.

In addition, athletes who were more advanced in their athletic careers and thus closer to retirement tended to have a lower athletic identity at the first measurement point. This is in line with the results of Lally (2007), who found that "athletes proactively decreased the prominence of their athletic identities as retirement approached" (p. 96). The underlying assumption is that redefining the self can help athletes to protect their overall identities when leaving elite sport (see also Martin et al., 2014). Interestingly, chronological age did not contribute to levels of athletic identity once the effect of career age had been controlled for. This result extends prior research on the link between age and athletic identity (Houle & Kluck, 2015; J. Schmid & Seiler, 2003) and underscores the importance of career age rather than chronological age.

Also, athletes who remained involved in the world of sport beyond their athletic retirement, either by working in sport or through participation in recreational competitive sport, exhibited a slower decline in athletic identity. The finding regarding recreational sport is somewhat expected, as Lamont-Mills and Christensen (2006) observed that the extent of participation in sport was linked to athletic identity, with recreational athletes scoring higher than non-athletes. In addition, it has also been shown that the degree of athletic identity in former athletes can predict physical activity (Reifsteck et al., 2016). By contrast, the potential relationship between athletic identity and vocational career paths is only partially understood. For example, Cabrita, Rosado, Leite, Serpa, and Sousa (2014) reported that during their careers, athletes with higher levels of athletic identity express a stronger intention to choose a sport-related occupation. In the present study, former athletes who maintained their involvement in sport (i.e., occupation in sport) tended to also preserve an athletic identity. However, causality remains unknown because athletic identity may stay high as a result of the job, or a job may be chosen appropriate to the strong athletic identity. When exploring alternative career options, it is conceivable that athletes identifying strongly with the athlete role and with lower self-complexity have built up fewer resources outside of sport (e.g., education, work experience; M. J. Schmid, Örencik, Schmid, & Conzelmann, 2023) and may be limited in their decision-making. Moreover, former athletes working in the field of sport benefit from continuity within their athletic identities and occupational context (Aston et al., 2022).

A finding of particular interest is the effect of subjective versus objective sporting success on athletic identity. Individuals who were satisfied with their sport career regardless of objective success, tended to retain higher levels of athletic identity after sport, while individuals who were not satisfied despite objectively successful careers in terms of achievements did not demonstrate a unique relationship. This contradicts past research that has found a positive association with athletic identity and athletic level (for an overview, see Lochbaum et al., 2022), albeit without taking both subjective and objective success into account. There was also no relationship between voluntariness of retirement and athletic identity. In other words, objective success in sport and having free choice of terminating one's career were found as not relevant in understanding identity changes after retirement.

Finally, we observed no differences between gender, despite other studies indicating such an effect (e.g., Brewer et al., 2010). Considering that our participants were elite athletes and that gender differences may be less pronounced or absent at higher levels of athletic involvement (e.g., J. Schmid & Seiler, 2003) helps to explain this finding.

Limitations and future research

First, with two time points, we were able to fit a linear growth model to the data. Whether a linear curve indeed provides a good approximation of the change under scrutiny is a question that may only be answered based on a larger number of observed time points with shorter intervals.

Second, self-complexity as a predictor of change in athletic identity is a compelling finding and future research should aim to cover athletes' engagement with other life roles (e.g., family, work, recreational sport, spirituality, community) in a more differentiated and comprehensive way than was possible in the present study. For example, building conceptual links to qualitative research on athletes' identity intersections (e.g., Blodgett, Ge, Schinke, & McGannon, 2017) and devel-

oping longitudinal mixed methods designs could usefully shed light on how athletes' life roles evolve and potentially conflict with one another during and after their athletic careers. In addition, the further development of the questionnaire is an important step toward a better operationalization of athletic identity. However, regarding self-complexity, what Aidman and Schofield said 20 years ago (2004) still holds true, namely, that researchers face the challenge to develop reliable and valid sport and exercise-contextualized measures.

Third, reducing the salience of sport in one's identity once the athletic career has come to an end is regarded as beneficial (Benson, Evans, Surya, Martin, & Eys, 2015). Although, on average, we found such a decrease, it is not reflected in the data whether this change was sufficient, adequate, or even beneficial. Therefore, we cannot make recommendations on courses of action to athletes, coaches, sport service providers (i.e., applied sport psychologists, clinical psychologists, and other professionals involved in the athlete care setting), clubs, or federations. To do so, information is needed about the (mis-)match of the roles with which individuals identify themselves and the roles with which they are identified by their relevant social environment (family, work site, leisure time, etc.). See Curry (1993) for the concept of self-role merger in the literature on athletic identity and Conzelmann, Nigg, and Schmidt (2023) for a similar argument in the context of the physical self and its veridicality.

Fourth, in light of the current trends in career research, such as the holistic approach over the life span (e.g., Wylleman, 2019), and development theories in personality research (e.g., Conzelmann et al., 2023), it could be worth investigating identity development holistically. In terms of methodology, person-oriented analysis strategies should also be considered to better map different predictor patterns (characteristics of the athletic and post-athletic career) and their effect on identity development. This study may have helped to identify relevant influencing factors.

Fifth, only Swiss (former) athletes who essentially competed in the 1990s and early 2000s were surveyed. Given possible sociocultural and epochal specificities, future studies should aim for a better generalizability of the results by using samples of (former) athletes from other contexts (see also J. Schmid et al., 2023).

Conclusion

On average, the role as an athlete decreases in importance and is possibly replaced in an individual's identity by other roles that may have become more salient in life after sport. Sport may continue to shape former athletes' identity, particularly if their athletic careers have been subjectively satisfying and their occupation or recreational activities continue to revolve around sports. If athletic identity needs to be changed within a sport psychology intervention, the recommended starting point is the enhancement of self-complexity. This can be done, for example, through sport psychology interventions that promote "exploratory behavior in service of cultivating a new identity, including garnering new experiences, and developing interests and skills outside of their sport" and that are likely to be beneficial in this context (Aston et al., 2022, p. 18). Future research would benefit from a richer understanding of how athletes reshape their identities upon career termination and what sources of meaning provide them with environments they can thrive in (for an overview, see Ronkainen, Kavoura, & Ryba, 2016).

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Declarations

Conflict of interest. M.J. Schmid, H. Hlasová, N.J. Ronkainen, A. Conzelmann and J. Schmid declare that they have no competing interests.

All studies mentioned were in accordance with the ethical standards indicated in each case.

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