

Third-Generation Quantitative Assessment of Athletic Identity: Clarifying the Concept

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An expanded and reconceptualized version of the Athletic Identity Measurement Scale (AIMS) was developed through a process that consisted of item pool generation, administration of items to a development sample of college student sport participants (N = 408), item evaluation, and administration of items to validation samples of 350 intercollegiate student-athletes, 54 intercollegiate student-athletes, and 104 college student sport participants, respectively. The process yielded a unidimensional athletic identity scale, two subscales assessing athletic identity properties (i.e., prominence, self-worth contingency), and two subscales assessing athletic identity processes (i.e., self-presentation, social reinforcement). Support was obtained for the internal consistency, temporal stability, and factorial, convergent, and divergent validity of scores on the resulting Athletic Identity Measurement Scales-Third Generation (AIMS-3G). The AIMS-3G has potential utility for assessing athletic identity and associated properties and processes.

KEY WORDS: Self-Identity, Sport, Measurement.

From the seminal writings of James (1890) and Cooley (1902) to the present day, the self has been a topic of interest in psychology. A recent query of the PsycINFO database yielded more than four-dozen terms with the *self* prefix that featured in more than a quarter-million abstracts (Leary & Tang-

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ney, 2012). One aspect of the self that has been widely explored is identity (or self-identity), which refers to “a clearly delineated self-definition...comprised of those goals, values, and beliefs which the person finds personally expressive, and to which he or she is unequivocally committed” (Waterman, 1985). Identity is considered a socially constructed mental construct that is represented in memory, can be accessed through introspection, and can mediate and motivate behavior (Oyserman et al., 2012).

Paralleling the rise of the self as a topic of interest in psychology, the self has become a burgeoning area of research in sport psychology. Self-related topics have garnered increased attention in the field over the past three decades (Horn, 1992, 2002, 2008; Horn & Smith, 2019). In the context of sport, identity has been examined primarily in the form of athletic identity, which has been defined as “the degree to which an individual identifies with the athlete role” (Brewer et al., 1993, p. 237). Essentially, athletic identity refers to the sport-related portion of a multidimensional self-concept (Gergen, 1971; Harter, 1990; Markus & Wurf, 1987; Marsh & Shavelson, 1985). Using both quantitative and qualitative methods across more than 100 published studies, researchers have examined athletic identity in various populations (e.g., athletes with disabilities, elite athletes, intercollegiate athletes, young athletes) and in association with a wide array of psychological phenomena, including adjustment to sport transitions, burnout, career development, and psychopathology (for a review, see Ronkainen et al., 2016).

Quantitative Assessment of Athletic Identity

A substantial portion of research on athletic identity has involved the use of quantitative methods (Ronkainen et al., 2016). Quantitative measures have, therefore, played an important role in facilitating the acquisition of knowledge on the development, correlates, dynamics, and potential consequences of athletic identity. Quantitative assessment has progressed through two previous generations in a roughly chronological sequence, with a third generation on the horizon.

First-Generation Quantitative Assessment

Designed to operationalize a construct that had long been alluded to in scholarly writings (e.g., Danish, 1983; Deutsch, 1985; Eldridge, 1983; Heyman, 1986; Little, 1969; Schafer, 1969), first-generation quantitative measures of athletic identity were developed in the 1980s and 1990s. Examples of such questionnaires include the Self-Role Scale (Curry & Parr, 1988; Curry

& Weaner, 1987; Curry & Weiss, 1989), the Athletic Identity Measurement Scale (AIMS; Brewer et al., 1993), and the athletic identity scales created by Webb, Nasco, Riley, and Headrick (1998). For the most part, the first-generation measures were developed without extensive and sophisticated psychometric evaluation for rapid deployment in research testing hypotheses involving athletic identity (e.g., Brewer, 1993; Curry & Parr, 1988; Curry & Weaner, 1987; Curry & Weiss, 1989; Webb et al., 1998).

Among the early measures of athletic identity, the AIMS gained traction with scholars and is well-represented in quantitative athletic identity research (Ronkainen et al., 2016). Although the 10-item AIMS was found to be unidimensional in an initial validation study (Brewer et al., 1993), several different multidimensional solutions were obtained for the AIMS in subsequent investigations (e.g., Hale et al., 1999; Martin et al., 1997; Martin et al., 1994). Questions regarding dimensionality of the AIMS prompted the development of an updated version of the AIMS in what can be considered a second-generation quantitative measure of athletic identity.

Second-Generation Quantitative Assessment

In the second wave of quantitative measures of athletic identity, researchers adapted, expanded, and/or refined first-generation measures. Examples in which first-generation measures (or items from such scales) were adapted to specific populations include instruments tailored to assess identities associated with participation in swimming (Raedeke, 1997), basketball (Cox & Whaley, 2004), and dance (Langdon & Petracca, 2010). In an example of an expansion of a first-generation measure, Cieslak (2004) added 12 items to the AIMS and created the AIMS-Plus. Similarly, Nasco and Webb (2006) added to the items they had used in a previous investigation (Webb et al., 1998) to create the Public-Private Athletic Identity Scale (PPAIS). Refinement of a first-generation measure is exemplified by modifications made to the AIMS based on an investigation in which support was obtained for a “multidimensional model in which three highly correlated first order factors (social identity, exclusivity, and negative affectivity) are subordinate to a higher order athletic identity factor” (Brewer & Cornelius, 2001, p. 103). The updated version of the AIMS had three fewer items than the original version, with one 3-item subscale and two 2-item subscales (i.e., 7 items in total). Additional support for the factor structure of the updated version of the AIMS was documented in subsequent research (Li & Andersen, 2008; Vissek et al., 2008).

Third-Generation Quantitative Assessment

Given the ubiquity of the AIMS in quantitative athletic identity research (Ronkainen et al., 2016) and several key psychometric limitations of the updated inventory, the AIMS is a logical candidate for revision. Issues requiring attention in a third-generation version of the AIMS include: (a) lack of a theoretical basis for the three first-order factors in the 7-item second-generation version of the AIMS (Brewer & Cornelius, 2001); (b) the small number of items on the “subscales” of the 7-item version; and (c) variability in the extent to which the item content of the 7-item version reflects athletic identity.

When it is considered that the content of the original 10-item version of the AIMS was to reflect “both strength and exclusivity of identification with the athlete role” and represent “social, cognitive, and affective aspects of athletic identity” (Brewer et al., 1993, p. 242), it is not surprising that factor analyses revealed multidimensional solutions in some studies (e.g., Hale, et al., 1999; Martin et al., 1997; Martin et al., 1994). Although interpretation of the higher-order athletic identity factor documented in the updated, 7-item version of the AIMS is “consistent with a conceptualization of athletic identity as a superordinate construct incorporating disparate aspects of sport-specific self-identity” (Brewer & Cornelius, 2001, p. 104), it is less clear how to interpret the three first-order factors of the AIMS. Because of the positive associations among the first-order factors, the factors are likely to perform similarly in most analyses. When they don’t, however, as in the study by Burns et al. (2012), interpretation of the findings can be both intriguing and challenging. Because the labels of the first-order factors (and indeed the factors themselves) were not theoretically grounded and were instead inferred retrospectively from the results of factor analyses, it is difficult to be sure of exactly what constructs are assessed by the factors.

Another limitation of the 7-item version of the AIMS is that the subscales feature only 2 to 3 items, which jeopardizes the reliability of measurement. To address this issue, a third-generation version of the AIMS should have a higher items-to-factors ratio than the 7-item second-generation version (Brewer & Cornelius, 2001).

Of potentially greater importance than the structural issues with the 7-item second generation version of the AIMS are concerns associated with the item content of the scale. Examination of the content of the items on the 7-item AIMS reveals variability in terms of how well the items reflect the construct of identification with the athlete role. Only the first item on the scale (“I consider myself an athlete”) seems match the construct of identification with the athlete role unambiguously. In contrast, other items appear to correspond to cognitive

(“I have many goals related to sport,” “I spend more time thinking about sport than anything else”), affective (“I feel bad about myself when I do poorly in sport,” “I would be very depressed if I were injured and could not compete in sport”), or social (“Most of my friends are athletes”) concomitants or consequences of identifying with the athlete role. Moreover, some of the items also reflect not the *absolute* level of identification with the athlete role, but instead the *relative* level of identification (“Sport is the most important part of my life,” “I spend more time thinking about sport than anything else”). Even though individuals who are highly identified with the athlete role would be expected to endorse all the items, that does not mean that all the items tap identification. It is important for a putative measure of athletic identity to have more than two items assessing the primary construct of interest.

The Current Investigation

In light of the shortcomings identified for the 7-item version of the AIMS and with consideration of the issues requiring attention in an update of the AIMS, the purpose of the current investigation was to take preliminary steps toward the development and validation of a third-generation measure of athletic identity. Specifically, primary goals were to: (a) ensure that items on the scale assessing athletic identity are aligned with the construct on which the AIMS was originally based (i.e., “the degree to which an individual identifies with the athlete role” [Brewer et al., 1993, p. 237]); (b) expand the AIMS to include preliminary scales assessing athletic identity properties and athletic identity processes; and (c) generate pools of items that are sufficiently large to result in the development of scales consisting of more than two items.

Assessing athletic identity properties and athletic identity processes is important because they represent constructs of potential theoretical importance that are similar to – but not the same as – athletic identity proper. Distinguishing athletic identity from its properties and processes can help clarify the athletic identity construct. Athletic identity properties “refer to descriptive characteristics of athletic identity” (Brewer et al., 2018, p. 155), whereas athletic identity processes “pertain to dynamic elements that act upon and produce systematic changes in athletic identity” (Brewer et al., 2018, p. 155). Examples of athletic identity properties include how salient the identity is in comparison with other possible identities and the degree to which an individual’s self-worth is based on performing and being involved in the athlete role. In contrast, receipt of social reinforcement for being an athlete and self-presentation of oneself as an athlete to others are examples of athletic

identity processes. Because strong intercorrelations were expected among athletic identity, athletic identity properties, and athletic identity processes, it was necessary to evaluate the items assessing each construct separately to maintain conceptual independence across items.

To illustrate the distinctions among the three constructs, consider a hypothetical situation in which the identity of oranges (the fruit) is examined. The “orangeness” of a given piece of fruit could be ascertained through ratings of the extent to which it is an orange. Properties of oranges include sphericity and orange color. Most oranges are reasonably spherical and orange-colored, but spherical and orange-colored objects are not necessarily oranges. Consequently, rating the sphericity and color of a piece of fruit is not tantamount to rating the orangeness of that fruit. Similarly, rating the extent to which a piece of fruit has been subjected to the process of squeezing is also not the same as rating the fruit’s orangeness. Although far afield from athletic identity, the orange example highlights the conceptual independence of identity, identity properties, and identity processes that underlay the development of a third-generation version of the AIMS. Consistent with scale development guidelines (DeVellis, 2003; Holmbeck & Devine, 2009), the following steps were included in the current investigation: (a) item pool generation; (b) item administration to a development sample; (c) item evaluation; and (d) administration of scales to validation samples.

Item Pool Generation

A pool of more than 100 items was generated to assess athletic identity, two athletic identity properties (i.e., exclusivity and self-worth contingency), and two athletic identity properties (i.e., self-presentation and social reinforcement) by writing new items and adopting or adapting items from previous versions of the AIMS and other scales measuring constructs related to athletic identity (e.g., Nasco & Webb, 2006). Athletic identity was defined as “the extent to which one identifies with the athlete role.” Athletic identity exclusivity was described as “the extent to which involvement is exclusive of involvement in other roles,” whereas self-worth contingency was described as “the extent to which self-worth is contingent on performance of and involvement in the athlete role.” The definitions for athletic self-presentation and social reinforcement were “the extent to which one seeks to present oneself to others as an athlete” and “the extent to which one’s involvement in sport and the athlete role is reinforced by others.” A research team consisting of 8 faculty members and doctoral students with knowledge of theory

and research pertaining to self-identity in sport reviewed the items for clarity and adherence to the constructs of interest. Items for which consensus was not achieved with respect to the construct to which they most closely corresponded were eliminated from further consideration. This process reduced the number of items in the pool to 41. In addition, to better align the content of the items with the relevant construct, the label of athletic identity exclusivity was changed to athletic identity prominence (Brenner et al., 2014) and the corresponding description was modified to “the extent to which involvement in the athlete role is placed above involvement in other roles.”

Administration of Items to a Development Sample and Item Evaluation

Responses to the pool of 41 items deemed acceptable after internal review were obtained from a development sample of athletes. The main purposes of this portion of the research were to: (a) examine the factor structures of the items written to assess athletic identity, athletic identity properties, and athletic identity processes; (b) assess the internal consistency of scores on scales created from items that cluster together as factors; and (c) examine the magnitude of associations between the items and the tendency to give socially desirable responses.

Method

PARTICIPANTS

Participants were 408 college students in the United States (239 women, 167 men, 2 other gender) who indicated that they participated in sport. The mean age of participants was 19.41 ($SD = 1.27$) years. Participants were enrolled at National Collegiate Athletic Association (NCAA) Division I ($n = 115$) and Division III ($n = 293$) institutions. Sports with the largest representation among participants were soccer ($n = 78$), track and field/cross country ($n = 48$), lacrosse ($n = 33$), basketball ($n = 31$), American football ($n = 28$), swimming and diving ($n = 26$), and baseball ($n = 21$).

This and subsequent components of the project were approved by the Institutional Review Board (IRB) approval at the site where the research was coordinated. The pool of items was randomized and then, to enhance participant access to the study and facilitate the involvement of members of intercollegiate teams in the research, administered to participants via a paper-and-pencil questionnaire in person ($n = 145$) or an online survey platform ($n = 263$). Each of the 41 items featured a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Also administered were a demographic questionnaire and the 20-item Marlowe-Crowne Social Desirability Scale short form (Strahan & Gerbasi, 1972).

DATA ANALYSIS

For this sample, data were analyzed with IBM SPSS Statistics (Version 26). Because of the preliminary nature of inquiry into athletic identity properties and processes, the approach to item reduction was conservative. Accordingly, separate series of principal component analyses with varimax rotation were performed on the items deemed to reflect athletic identity (8 items), athletic identity properties (16 items), and athletic identity processes (17 items), respectively. After each of the analyses, items with cross-loadings ($\geq .40$) were discarded and the analysis was conducted again until there were no longer any items with cross-loadings. Cronbach's alpha was calculated for each of the factors, and items were deleted from factors when Cronbach's alpha would increase substantially as a result of doing so. Separate series of final principal component analyses with varimax rotation were performed on the remaining athletic identity, athletic identity properties, and athletic identity processes items. Pearson correlations between Marlowe-Crowne Social Desirability Scale short form scores and individual athletic identity, athletic identity properties, and athletic identity processes item scores were calculated. A one-way multivariate analysis of variance (MANOVA) was performed on the items that were retained from the principal component analyses and other continuous variables assessed in this study (i.e., age, M-CSDS short form scores) to assess differences as a function of data collection mode (i.e., online versus paper-and-pencil).

Results and Discussion

As shown in Table I, the 8 items written to reflect athletic identity loaded on a single factor with an eigenvalue greater than 1.00, accounting for 58% of the variance. A Cronbach's alpha coefficient of .89 was obtained for a scale created from the items. Deleting one or more of the items would not have increased the internal consistency of the scale.

TABLE I
Factor Loadings and Initial Eigenvalue Based on a Principal Components Analysis with Varimax Rotation for Athletic Identity Items (N = 408)

Item	Component
	1
I am strongly committed to being an athlete.	.81
Being an athlete is an important part of who I am.	.81
I would describe myself as an athlete.	.79
I consider myself an athlete.	.77
I am an athlete.	.76
It is in my nature to be an athlete.	.75
Sport is a self-defining activity for me.	.71
Being an athlete is central to my sense of self.	.68
Initial Eigenvalue	4.63

Due to cross-loadings, 7 of the 16 items written to represent athletic identity properties were deleted after the first two principal components analyses. As expected, the 9 items written to represent athletic identity properties loaded on two factors with eigenvalues greater than 1.00, accounting for 68% of the variance. As shown in Table II, factor loadings for the first factor – which consisted of items pertaining to athletic identity prominence – were all .79 or greater. Factor loadings for the second factor, which corresponded with items pertaining to self-worth contingency, were all .69 or greater. One item cross-loaded on the first factor but was retained for further analysis to keep the factor from dropping to 3 items. Cronbach's alpha coefficients of .89 and .80 were obtained for the two factors, respectively. Deleting one or more of the items would not have increased the internal consistency of either of the scales.

In the first principal component analysis performed on the 17 items written to represent athletic identity processes, four factors emerged with eigenvalues greater than 1.00. An item that cross-loaded and 5 items that constituted the third and fourth factors were deleted on theoretical grounds, and the principal component analysis was repeated with the items that were retained. The second principal components analysis resulted in the deletion of two more cross-loaded items, so a third principal component analysis was conducted. In the third analysis, the remaining 9 items loaded on two factors with eigenvalues greater than 1.00, accounting for a combined 61% of the

TABLE II
*Factor Loadings and Initial Eigenvalues Based on a Principal Components Analysis with Varimax
Rotation for Athletic Identity Properties Items (N = 408)*

Item	Factor	
	1	2
My life revolves around sport participation.	.83	
Almost every decision I make is influenced by my sport involvement.	.83	
I spend more time thinking about sport than anything else.	.82	
Just about everything I do is related to my sport participation.	.81	
Sport is the most important part of my life.	.79	
I feel good about myself when I perform well in sport and bad about myself when I perform poorly.		.83
My fitness level has a strong influence on how I feel about myself.		.75
When things are not going well in my sport, it is hard to feel good about myself.		.72
How I feel about myself depends a lot on how I perform as an athlete.	.46	.69
Initial Eigenvalue	4.60	1.51

Note. Factor loadings < .46 are suppressed.

variance in responses to the items. Item content of the first factor corresponded with the self-presentation athletic identity process, whereas item content of the second factor pertained to the social reinforcement athletic identity process. Internal consistency analyses revealed Cronbach's alpha coefficients of .82 and .71 for the two factors, respectively. Because deletion of one item on the first factor increased the Cronbach's alpha to .84, that item was deleted and a fourth principal component analysis was conducted, the results of which are displayed in Table III. The two factors again accounted for 61% of the variance. Factor loadings were all .76 or above for the first factor and .58 or above for the second factor.

The Pearson correlations between scores on the Marlowe-Crowne Social Desirability Scale short form and the individual item scores were |.22| or lower for all items and |.09| or lower for approximately two-thirds (16/25) of the items, indicating weak associations of the items with a socially desirable response tendency.

In the MANOVA, the multivariate effect of data collection mode was statistically significant, $F(23, 360) = 4.22$, Wilks' lambda = .79, $p < .001$, partial eta-squared = .21. Follow-up univariate analyses revealed that compared to participants whose data were collected through an online survey, participants whose data were collected through a paper-and-pencil questionnaire were significantly older ($p = .001$, partial eta-squared = .04) and scored sig-

TABLE III
Factor Loadings and Initial Eigenvalues Based on a Principal Components Analysis with Varimax Rotation for Athletic Identity Processes Items (N = 408)

Item	Factor	
	1	2
When I meet new people, it is important to me that they know about my involvement in sport.	.88	
When I meet someone new, I introduce myself as an athlete.	.82	
It is important that other people know about my sport involvement	.78	
It is important that I look like an athlete to others.	.76	
My family and friends are very willing to accommodate my involvement in sport.		.81
My family and friends are enthusiastic about any progress I make in my sport involvement.		.77
I receive encouragement from others for participating in sport.		.72
Most of my friends are athletes.		.58
Initial Eigenvalue	3.24	1.65

Note. Factor loadings < .40 are suppressed.

nificantly higher on 13 of the 21 items pertaining to athletic identity. Partial eta-squared values were all $< .09$ (i.e., a small effect size) and were less than .01 for 8 items. The age difference (19.62 years versus 19.14 years) does not seem to be meaningful and although differences in responses to identity-related items as a function of across modes of data collection would not be predicted on the basis of theory, it may be that items with sport-related content may be endorsed more strongly in the presence of teammates.

Administration of the Items to Validation Samples

After administering the pool of items to a development sample and conducting preliminary psychometric analyses, the remaining items were administered to three independent samples to: (a) confirm the factor structures of the athletic identity, athletic identity properties, and athletic identity processes items; (b) assess the test-retest reliability of scores on the athletic identity, athletic identity properties, and athletic identity processes scales; and (c) examine the convergent and divergent validity of scores on the scales, respectively. No new items were written for the validation phase.

CONFIRMING THE FACTOR STRUCTURE (VALIDATION SAMPLE 1)

It was anticipated that the factor structures documented in the development phase would be replicated. Separate confirmatory analyses were performed on the athletic identity, athletic identity properties, and athletic identity processes items, respectively.

Method. Items retained from the development phase were administered to 350 intercollegiate sport participants in the United States (192 women, 158 men), a sample size sufficient for confirmatory factor analysis (Wolf et al., 2013). The mean age of participants was 19.50 ($SD = 1.12$) years. Participants represented either an NCAA Division I ($n = 196$) or an NCAA Division III ($n = 154$) institution. Sports represented by participants in the study included American football, baseball, golf, soccer, softball, track and field, and water polo. Items were administered to Division III participants in a random order via an online survey platform ($n = 154$) and to Division I participants via an in-person, paper-and-pencil questionnaire ($n = 196$).

A series of confirmatory factor analyses (CFAs) was performed on the items with EQS 6.1. As evidenced by Mardia's coefficients of 12.76, 20.37, and 21.63 that were obtained for the athletic identity, athletic identity properties, and athletic identity processes items, respectively, the data deviated from

multivariate normality. Consequently, robust maximum likelihood methods, which do not carry the assumptions that variables in the model are continuous and have multivariate normal distributions, were used. The models were evaluated with the Satorra-Bentler chi-square ($SB\chi^2$) test, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). To parallel the analyses conducted in the initial revision of the AIMS (Brewer & Cornelius, 2001) in light of the substantial gender difference documented for that scale, measurement invariance was examined between genders for the three models by comparing models sequentially, restricting residuals, intercepts, and loadings to be equivalent between women and men. Evidence of measurement invariance was examined using the lavaan package in R (v 0.6-7; Rosseel, 2012) and inferred from the Satorra and Bentler (2010) adjusted chi-square invariance test and changes in CFA and RMSEA fit indices of $< .01$ (Putnick & Bornstein, 2016). Internal consistency of the scales representing the factors obtained in the principal components analyses (and examined in the CFAs) was assessed by computing omega (ω) coefficients. A one-way multivariate analysis of variance (MANOVA) was performed on age and the pool of athletic identity, athletic identity properties, and athletic identity processes items to examine differences as a function of NCAA divisional status (and, given the different data collection procedures for Division I and Division III participants, data collection mode [i.e., online versus in person]).

Results and Discussion. To obtain an adequate fit of the hypothesized one-factor model for the athletic identity items, it was necessary to delete the 4 items with the lowest factor loadings. The chi-square value was not statistically significant, $SB\chi^2_{51} = 3.96, p = .14$, and the other fit indices revealed a good fit of the data to the proposed model, CFI = .99, RMSEA = .05 (90% CI = .00 -.13). All 4 of the standardized factor loadings (which are displayed in Figure 1) were greater than .60 and were statistically significant. In the

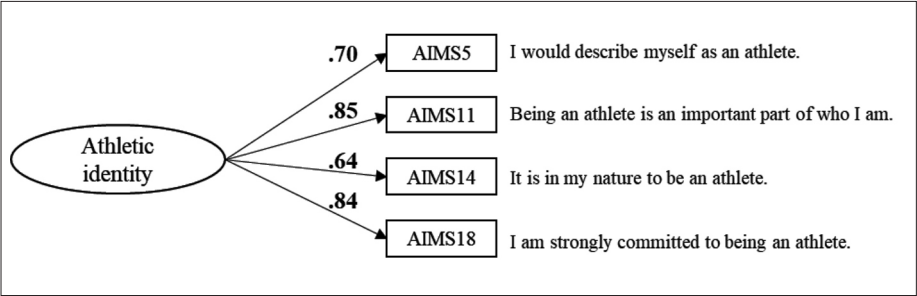


Fig. 1. - Factor loadings of the athletic identity items.

assessment of measurement invariance between women and men using multigroup CFA, the model demonstrated strict invariance, with a nonsignificant chi-squared test and difference in RMSEA and CFI of less than .01 between successively constrained models.

In the test of the hypothesized two-factor (correlated) model for the athletic identity properties items, the chi-square value was statistically significant, $\chi^2_{26} = 44.55$, $p = .01$, but the other fit indices revealed a good fit of the data to the proposed model, CFI = .98, RMSEA = .05 (90% CI = .03 - .08). All the standardized loadings for both factors (see Figure 2) were greater than .50 and were statistically significant. In the assessment of measurement invariance between women and men using multigroup CFA, the model demonstrated strict invariance, with a nonsignificant chi-squared test and difference in RMSEA and CFI of less than .01 between successively constrained models.

In the test of the hypothesized two-factor (correlated) model for the athletic identity processes items, the chi-square value was statistically significant, $\chi^2_{18} = 41.33$, $p < .001$, but the other fit indices revealed a good fit of the data to the proposed model, CFI = .96, RMSEA = .06 (90% CI = .04 - .09). All the standardized loadings for both factors (see Figure 3) were greater than .45 and were statistically significant. In the assessment of measurement invariance between women and men using multigroup CFA, the model demonstrated strict invariance, with a nonsignificant chi-squared test and difference in RMSEA and CFI of less than .01 between successively constrained models.

The reliability analyses revealed that the athletic identity, prominence,

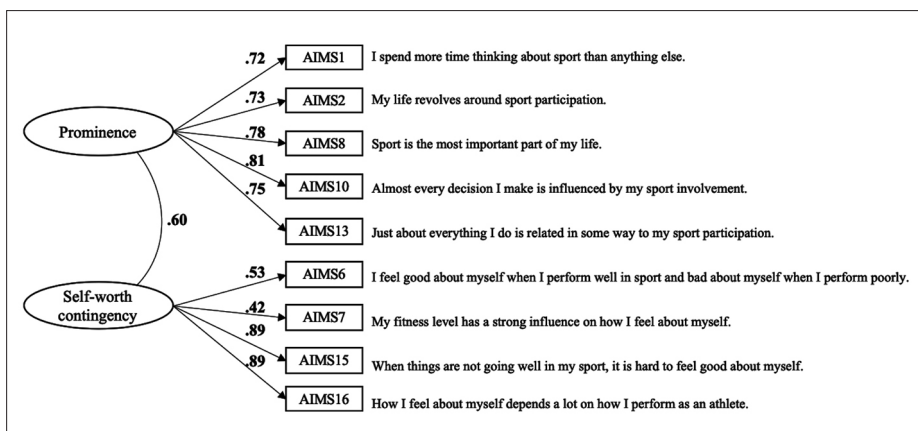


Fig. 2. - Factor loadings of the prominence and self-worth contingency items and correlation between factors.

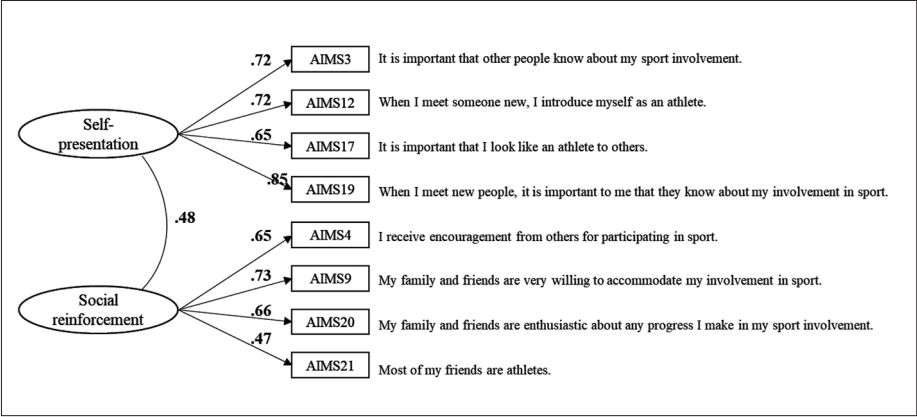


Fig. 3. - Factor loadings of the self-presentation and social reinforcement items and correlation between factors.

self-worth contingency, self-presentation, and social reinforcement scales all showed acceptable internal consistency, with omega coefficients of .85, .87, .79, .82, and .72, respectively. In the MANOVA comparing Division I and Division III participants (and online and pencil-and-paper modes of data collection), the multivariate effect of divisional status (and mode of data collection) was not statistically significant, $F(22, 216) = 1.57$, Wilks' lambda = .86, $p = .06$, partial eta-squared = .14. The nonsignificant difference between Division I and Division III participants on the athletic identity, athletic identity properties, and athletic identity processes scales is consistent with NCAA data indicating that Division I and Division III student-athletes are equally likely to strongly identify as athletes (National Collegiate Athletic Association, 2013). Research directly involving the AIMS has bolstered this conclusion. Higher AIMS scores for Division I student-athletes than Division III student-athletes have been documented in two studies (Huml, 2018; Mathews et al., 2021), nonsignificantly different AIMS scores for the two divisional statuses have been documented in two studies (Moiseichik et al., 2019; Sturm et al., 2011), and higher AIMS scores for Division III student-athletes than Division I student-athletes has been documented in one study (Griffith & Johnson, 2006).

ASSESSING TEST-RETEST RELIABILITY (VALIDATION SAMPLE 2)

Athletic identity can be affected by situational factors and may vary over time (e.g., Brewer, Cornelius et al., 2010; Brewer, Selby et al., 1999;

Grove et al., 2004). It was, however, expected that the scales developed from the factor analyses would be at least moderately stable over a two-week period.

Method. The athletic identity, athletic identity properties, and athletic identity processes scales (collectively known as the Athletic Identity Measurement Scales-3rd Generation [AIMS-3G]) were administered via an online survey to 54 intercollegiate student-athletes (34 women, 20 men) in the United States twice approximately two weeks apart. This is an adequate sample size for examining test-retest reliability (Bujang & Baharum, 2017). Participants were an average of 19.46 ($SD = 1.08$) years of age. Among the sports represented by participants were American football ($n = 5$), baseball ($n = 5$), field hockey ($n = 8$), lacrosse ($n = 9$), soccer ($n = 5$), and track and field/cross country ($n = 9$). Test-retest reliability was assessed with intraclass correlation coefficients (ICCs). The ICCs were based on a single-rating, absolute-agreement, 2-way mixed-effects model (Koo & Li, 2016) and were calculated between the values obtained for the AIMS-3G scores at Time 1 and those at Time 2.

Results and discussion. For this sample, data were analyzed with IBM SPSS Statistics (Version 26). Means and standard deviations of the athletic identity, athletic identity properties, and athletic identity processes scales are shown in Table IV. As presented in Table V, the results of the test-retest reliability analysis indicated that the scores of all the scales were stable over the two-week assessment period, with ICCs ranging from .74 to .95.

Examining Convergent and Divergent Validity (Validation Sample 3)

To explore the convergent and divergent validity of the athletic identity, athletic identity properties, and athletic identity processes scales, associations

TABLE IV
Descriptive Statistics for Validation Sample 2 (N = 54)

Variable	Time 1		Time 2	
	M	SD	M	SD
Athletic identity	5.81	1.00	5.67	1.14
Prominence	4.10	1.41	4.15	1.35
Self-worth contingency	5.28	1.04	5.13	1.06
Self-presentation	3.85	1.25	4.01	1.37
Social reinforcement	5.79	0.75	5.70	0.86

TABLE V
Results of Intraclass Correlation Analysis for Validation Sample 2

	Intraclass Correlation	95% Confidence Interval		F test with true value 0			
		Lower Bound	Upper Bound	Value	df1	df2	p
Athletic identity	.85	.75	.91	12.31	53	53	<.001
Prominence	.81	.70	.89	9.61	53	53	<.001
Self-worth contingency	.74	.59	.834	6.69	53	53	<.001
Self-presentation	.79	.66	.87	8.52	53	53	<.001
Social reinforcement	.79	.66	.87	8.37	53	53	<.001

among the scales and measures of constructs similar to and distinct from athletic identity were examined. It was expected that athletic identity, athletic identity properties, and athletic identity processes scales would all be positively correlated with each other and the 2001 version of the AIMS, and only weakly associated with a general measure of identity foreclosure. It was also expected that among the athletic identity, athletic identity properties, and athletic identity processes scales: (a) the athletic identity scale would be most strongly associated with a measure of private athletic identity; (b) the self-worth contingency subscale would be most strongly associated with a measure of self-worth contingent on sport competence; and (c) the self-presentation subscale would be most strongly associated with a measure of public athletic identity and an item assessing the use of social media to tell others about their sport involvement. In addition, a subsample of nonathletes was recruited to compare AIMS-3G scores across multiple levels of sport involvement. Consistent with the preliminary validation of the original 10-item AIMS (Brewer et al., 1993), AIMS-3G scores should be higher for individuals intensively involved in sport than for those less intensively involved in sport.

Method. An online battery of questionnaires was administered to 168 (128 women, 40 men) college students enrolled in psychology courses. This sample size was adequate to detect a small ($r > .13$) correlation as significant. Participants were an average of 19.41 ($SD = 2.06$) years of age. Participants reported being involved in sport at the intercollegiate ($n = 65$), or club, recreational, or intramural ($n = 38$) levels. The remaining participants ($n = 65$) reported no sport involvement. Sports represented with the greatest frequency in the athlete portion of the sample were track and field/cross country ($n = 17$), soccer ($n = 11$), swimming/diving ($n = 10$), gymnastics ($n = 8$), gymnastics ($n = 8$), and American football ($n = 7$). In addition to items pertaining

to demographic and sport participation details, the battery of questionnaires featured: (a) AIMS-3G scale and subscales; (b) the 7-item version of the AIMS; (c) the Objective Measure of Ego Identity Status foreclosure subscale (OMEISF; Adams et al., 1979); (d) the Public-Private Athletic Identity Scale (PPAIS; Nasco & Webb, 2006); (e) the Competence subscale of the Contingencies of Self-Worth Scale (CSWS; Crocker et al., 2003) as adapted by Curran (2018); and (f) a single item pertaining to the use of social media to display one's involvement in sport to others. For this sample, data were analyzed with IBM SPSS Statistics (Version 26).

Cronbach's alpha coefficients of .86, .89, .65, .83, and .75 were obtained for the AIMS-3G athletic identity, prominence, self-worth contingency, self-presentation, and social reinforcement scales, respectively, in the athlete portion of the sample. An α of .80 was found in the current study for the AIMS in the athlete portion of the sample.

The OMEISF assesses identity foreclosure, which refers to the tendency to commit to an ideology or occupation without having engaged in exploratory behavior. The subscale consists of 6 items (e.g., "My parents had it decided a long time ago what I should go into and I'm following their plans."), responses given on a 6-point Likert scale with *strongly agree* and *strongly disagree* as endpoints. Adams et al. (1979) provided evidence for the internal consistency ($\alpha = .76$) and construct validity of scores on the OMEISF. In the current study, a Cronbach's α of .72 was obtained for the subscale in the athlete portion of the sample.

The PPAIS (Nasco & Webb, 2006) has two subscales, one assessing private athletic identity ("the degree to which a person describes her- or himself as an athlete owing to internalization of the athlete role," p. 438) and the other assessing public athletic identity ("the degree to which a person describes her- or himself as an athlete due to the external rewards associated with being an athlete," p. 438). The PPAIS private athletic identity subscale consists of 5 items (e.g., "Athletics help me express my emotions and feelings"), with responses given on a 5-point scale with endpoints of *Strongly Disagree* and *Strongly Agree*. The PPAIS public athletic identity subscale also has 5 items (e.g., "My popularity with others is related to my athletic ability") and has the same response format as the PPAIS private athletic identity subscale. Nasco and Webb presented evidence in support of the internal consistency ($\alpha = .75$ for the private athletic identity subscale and $\alpha = .74$ for the public athletic identity subscale), convergent validity, and concurrent validity of scores on the PPAIS subscales. In the current study, Cronbach's α values of .79 and .72 were obtained for the private athletic identity and public athletic identity subscales, respectively, in the athlete portion of the sample.

As adapted by Curran (2018), the CSWS competence subscale consists of 5 items (e.g., “Doing well in sport gives me a sense of self-respect”) designed to assess the extent to which one’s self-worth is contingent on competence in sport. Curran reported a Cronbach’s α of .72 for the subscale. A Cronbach’s α value of .79 was obtained in the current study in the athlete portion of the sample. Responses to the single item pertaining to social media use (“I use social media to tell others about my sport involvement”) were given on a 7-point Likert scale with endpoints of *strongly disagree* and *strongly agree*.

Results and Discussion

Pearson correlations among the scales that were administered were calculated for the athlete portion of the sample. Along with descriptive statistics, the resulting correlations are displayed in Table VI. Correlations among the AIMS-3G scales ranged from .36 to .72, suggesting that they assess related yet distinct constructs. As expected, all the AIMS-3G scales were positively correlated with the 7-item version of the AIMS (range = .58 to .83) and weakly

TABLE VI
Means and Standard Deviations of and Pearson Correlations Between AIMS-3G Scores and AIMS, OMEISF, PPAIS, CSWC, and Social Media Use Scores.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1 Athletic identity	5.31	1.21	--									
2 Prominence	3.47	1.36	.72**	--								
3 Self-worth contingency	5.31	1.02	.49**	.44**	--							
4 Self-presentation	3.60	1.38	.60**	.67**	.61**	--						
5 Social reinforcement	5.61	0.91	.70**	.58**	.76**	.50**	--					
6 AIMS	4.91	1.06	.83*	.83**	.58**	.67**	.72**	--				
7 OMEISF	3.26	0.96	.03	.10	.02	.13	.18	.13	--			
8 PPAIS private athletic identity	4.07	0.69	.79**	.63**	.47**	.51**	.60**	.76**	.05	--		
9 PPAIS public athletic identity	2.40	0.78	.25*	.46**	.46**	.63**	.28*	.43**	.18	.23*	--	
10 CSWS competence	4.67	0.82	.44**	.40**	.68**	.42**	.39**	.53**	.00	.53**	.27*	--
11 Use social media	4.25	1.76	.48**	.44**	.38**	.53**	.39**	.47**	-.08	.46**	.37**	.29*

* $p < .05$, ** $p < .001$ $N = 64$; * $p < .05$; ** $p < .005$.

associated with the OMEISF (range = .02 to .18), a general measure of identity foreclosure. Also as predicted, among the AIMS-3G scales: (a) the athletic identity scale demonstrated the strongest association with private athletic identity; (b) the self-worth contingency subscale was most strongly associated with a measure of self-worth contingent on sport performance; and (c) the self-presentation subscale was most strongly associated with a measure of public athletic identity and an item pertaining to the use of social media to tell others about one's sport involvement. The differences in the magnitudes of the correlations were generally small but were nevertheless consistent with what one would expect given the content of the items on the various scales.

A one-way MANOVA performed on AIMS-3G scores indicated a significant effect of level of sport involvement, $F(10, 322) = 18.80$, Wilks' lambda = .40, $p < .001$, partial eta-squared = .37. Follow-up univariate analyses revealed significant level of sport involvement effects for the athletic identity scale, $F(2, 165) = 90.20$, $p < .001$, partial eta-squared = .52, the prominence subscale, $F(2, 165) = 38.40$, $p < .001$, partial eta-squared = .32, the self-worth contingency subscale, $F(2, 165) = 27.49$, $p < .001$, partial eta-squared = .25, the self-presentation subscale, $F(2, 165) = 27.96$, $p < .001$, partial eta-squared = .25, and the social-reinforcement subscale, $F(2, 165) = 66.76$, $p < .001$, partial eta-squared = .45. As shown in Table VII, the results of Bonferroni post hoc comparisons indicated that with the exception of the difference between the intercollegiate athletes and the club/intramural/recreational athletes on the self-worth contingency subscale, all other differences among the three levels of sport involvement were statistically significant for all AIMS-3G variables. Thus, further support for the convergent validity of the AIMS-3G scores was garnered by demonstrating that the scores increase with level of sport involvement.

TABLE VII
Means and Standard Deviations of AIMS-3G Scores Across Levels of Sport Involvement ($N = 168$).

Variable	Level of Sport Involvement					
	Intercollegiate		Club/Intramural/ Club		Nonathletes	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Athletic identity	5.76 ^a	0.92	4.55 ^b	1.32	2.78 ^c	1.52
Prominence	3.93 ^a	1.27	2.71 ^b	1.19	2.09 ^c	1.16
Self-worth contingency	5.33 ^a	1.03	5.26 ^a	1.02	3.93 ^b	1.36
Self-presentation	3.82 ^a	1.31	3.17 ^b	1.38	2.15 ^c	1.20
Social reinforcement	5.90 ^a	0.76	5.11 ^b	0.95	3.62 ^c	1.50

Note. Means with different superscripts differ significantly in Bonferroni comparisons.

Summary and Conclusions

Conceptual and psychometric limitations of prominent first- and second-generation quantitative measures of athletic identity sparked the current investigation, in which an updated and expanded version of the AIMS was developed to promote conceptual clarity by distinguishing athletic identity from properties and processes of athletic identity. The third-generation measure consists of three correlated but conceptually independent scales: (a) a unidimensional athletic identity scale, which is the putative successor to the 7-item AIMS; (b) an athletic identity properties scale consisting of prominence and self-worth contingency subscales; and (c) an athletic identity processes scale consisting of self-presentation and social reinforcement subscales. Psychometric analyses performed on development and validation samples provided evidence supporting the factorial validity, internal consistency, temporal stability, convergent validity, and divergent validity of scores on the resulting AIMS-3G.

The 4-item AIMS-3G athletic identity scale was designed as an improved, unidimensional version of the 7-item version of the AIMS, devoid of items that do not unambiguously reflect identification with the athlete role. Although none of the original AIMS items were retained in the final version of the AIMS-3G athletic identity scale, the strong correlation between scores on the scale and scores on the 7-item version of the AIMS suggest that there will be continuity between findings obtained with the two scales when used in the same way (i.e., to assess the construct of “athletic identity”).

The athletic identity properties subscales and the athletic identity processes subscales can be used to augment the athletic identity scale and offer a more comprehensive and nuanced view of athletic identity than provided by the AIMS. For example, the two athletic identity properties for which subscales were developed – prominence and self-worth contingency – have item content that overlaps with or closely resembles the “exclusivity” and “negative affectivity” aspects of the 10- and 7-item versions of the AIMS. Consequently, the prominence subscale may be useful in investigations of variables with which exclusivity has shown a pattern of associations divergent from those of other aspects of athletic identity (e.g., Burns et al., 2012). Similarly, the self-worth contingency subscale may have explanatory utility over and above the athletic identity scale in predicting difficulties adjusting to sport career transitions (Brewer, 1993; Manuel et al., 2002; Park et al., 2013). Although the internal consistency of the self-worth contingency subscale ($\alpha = .65$) was below the conventional .70 threshold for Cronbach’s

alpha in Validation Sample 3, the subscale demonstrated acceptable levels of internal consistency in the Development Sample ($\alpha = .80$) and Validation Sample 1 ($\omega = .79$). Further evaluation of the internal consistency of the self-worth contingency subscale is warranted.

As with the athletic identity properties subscales, the athletic identity processes subscales may have utility as predictors of selected sport behaviors over and above the athletic identity scale. For example, it would be expected that scores on the self-presentation subscale would be correlated with such public-facing behaviors as social media use and apparel choices, even when statistically controlling athletic identity scale scores. Likewise, scores on the social reinforcement subscale may explain variability in sport-related motivation beyond that accounted for by scores on the athletic identity scale.

Because the development of the AIMS-3G was a revision of an existing measure with an established track record, the process departed from contemporary best practices (Boateng et al., 2018) in several ways. For instance, the items were not pretested and evaluated for difficulty and representativeness of people's experience of athletic identity prior to administration of the items to the development sample. Given that scale development is an iterative and ongoing process, concerns regarding at least some of the deviations from best practice guidelines can be redressed in future studies. Among the potential short-term directions for future research with the AIMS-3G are examination of discriminant validity of the scales and administration of the scales to athletes outside of the college environment. Although the 10- and 7-item versions of the AIMS (Brewer & Cornelius, 2001; Brewer et al., 1993) were developed primarily with college-based samples, they have been used successfully in research with athletes across a wide variety of sport settings (Ronkainen et al., 2016). Also, whereas the AIMS-3G athletic identity scale can probably supplant the second-generation version of the AIMS (Brewer & Cornelius, 2001) to assess athletic identity as a higher-order construct, the utility of the athletic identity properties and athletic identity processes scales remains to be determined. Further inquiry with the AIMS-3G has the potential to enhance understanding of identity-related phenomena in sport.

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