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ATHLETIC IDENTITY IN CLIMBING: THE ROLES OF COMMITMENT, ENJOYMENT, AND SOCIAL INFLUENCE

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ABSTRACT

Sports climbing, as both recreation and competition, has reached a level of popularity that demands physical and psychological strength, as well as a high level of commitment. This study expands upon widely accepted models of sports identity by testing the prediction of athletic identity from sports commitment and enjoyment, as well as from social constraints for climbers, a relationship well known in sports but rarely tested in climbing. A total of 131 climbers from 31 countries took part in a validated online survey. Using multiple regression and path analysis, the model explained 55% of the variance in athletic identity. Sports commitment was the strongest predictor ($r = .72, p < .05; \beta = .636$), while sports enjoyment showed no significant direct effect. Furthermore, enjoyment indirectly influenced athletic identity through its impact on commitment and social constraints. The model explained 26% of the variance in sports commitment. Climbers who competed reported significantly higher levels of athletic identity, sports commitment, and social constraints than climbers who did not compete, while they reported similar levels of enjoyment. The implications of this study suggest that, in climbing, identity is more strongly linked to commitment than to enjoyment, which could be important for developing athletes. Although this study was naturally limited by its cross-sectional design and reliance on self-reported data, it offers some possibilities and insights into how social and psychological factors influence athletic identity in less well-attended sports. There is practical value in the information provided for coaching and outdoor programs designed to foster deeper motivation and commitment among climbers.

Keywords: athletic identity, sports commitment, climbing, sports enjoyment, social constraints.

INTRODUCTION

Climbing as a sport means different things to different people; some see it as leisure, others as a way of life or a serious athletic pursuit, which is why it is important to understand the sense of identity, commitment, and factors that keep people engaged over time. The classification of climbing within the broader context of action, adventure, extreme, or lifestyle sports remains complex, with diverse definitions and limited sociological considerations (Breivik, 2010; Cohen et al., 2018; Wheaton, 2015). Fur-

thermore, climbing has been variously framed as sports, leisure, or even a form of conquest (Rak, 2020; Wheaton, 2015). In the context of this study, climbing refers primarily to bouldering, rock climbing, sports climbing, and ice climbing, all of which involve some form of competitive sports (Donnelly & Young, 1988). In recent years, extreme sports such as sports climbing have rapidly grown as recreational activities, while also evolving into recognized competitive disciplines (Hoibian, 2017). Sports climbing had its official Olympic debut

in the 2020 Games in Tokyo, followed by inclusion in the 2024 Paris Olympics. According to the International Federation of Sports Climbing (2018), around 1,000 people in the U.S. try climbing for the first time each day, and approximately 25 million people climb regularly worldwide.

This research assessed the relationship between athletic identity and sports commitment among climbers, a growing population globally. By assessing the roles of enjoyment and social constraints, we aimed to understand better the factors influencing participation and identity development in climbing. Athletic identity can be defined as the extent to which individuals identify with the role of athlete and the value they ascribe to their participation in sports (Brewer et al., 1993). In climbing, this includes the extent to which individuals see themselves as athletes and how integral climbing is to their self-identity and the community. Equally important, sports commitment, or the psychological propensity to continue sports participation, can be influenced by factors such as enjoyment, perceived social pressures, alternative opportunities for involvement, commitment of personal resources, and access to participation (Scanlan et al., 1993). As an extension, this study also examined the demographic and involvement variables of gender, experience level, and level of competitive involvement to determine whether any differences exist in athletic identity and sports commitment among climbers. It is important to understand these factors, as they may play a role in the movement from casual involvement to serious competitive commitment among climbers and, in so doing, alter their perceptions of self and commitment.

The climbing population is diverse. They range from older individuals who practice a lifelong attitude of sustainability, to the increasingly sports-oriented individuals who ap-

pear in climbing-related media, to the younger climber who climbs with a parent rather than watching television or engaging in other sedentary pursuits. The diversity of climbing speaks to its accessibility across age groups and abilities. However, while some may climb for years without significant progress due to inconsistent practice or shifting priorities, others achieve notable improvement in just a year of focused training and commitment. The diversity shown here simply reflects the complexity of the relationship between identity and commitment in a steadily growing climbing community.

Climbing from Lifestyle to Olympics

Rock climbing, sports climbing, and mountaineering fall in the category of adventure and action sports, also known as lifestyle or extreme sports. They became popular in the 1960s and 1970s, especially among middle-class people who wanted to break away from the traditional, organized, and overly strict sports. Williams and Donnelly (1985) suggested that climbing is unique because it operates differently from other popular sports, highlighting the balance between individual freedom and social limitations. Climbing, along with other lifestyle sports such as BMX and snowboarding, has become well entrenched and mediated within the global sports industry (Arsova & Adjanin, 2024; Wheaton, 2015). Following its debut at the Tokyo 2020 Olympics, sports climbing has received significant publicity, and an increasing number of participants have become involved at various levels of participation, ranging from casual leisure to serious leisure to full professional, highly competitive sports (Batuiev & Robinson, 2022). With speed climbers again participating in the 2024 Paris Olympics and almost double the number of athletes compared to Tokyo 2020, climbing is increasingly evident and specialised, with events presented as medal events on a standalone basis for both

genders (NBC Olympics, n.d.).

Due to the growth of sports climbing as a competitive discipline intended for inclusion in the Olympics, there has arisen an interest amongst researchers across various domains of science, from sports psychology to biomechanics. As stated by Sanchez et al. (2019), researchers have mainly considered motivational and risk bracketing profiles (e.g., Arsova & Adjanin, 2024; Jones et al., 2017), physiological aspects (e.g., Española-Romero et al., 2012), and biomechanical attributes (e.g., Vigouroux et al., 2011). Moving beyond the psychological and physiological avenues of thought, this study examined how climbers in these situations develop their athletic identity and level of commitment. The area of athletic identity was initially researched by sports psychologists in the 1990s, with the development of the Athletic Identity Measurement Scale (AIMS), which has since become a significant tool for assessing athletic identity. The literature on athletic identity is vast, with research on various topics previously covered. The description of the construct of AIMS appeared in the paper entitled *Athletic Identity: Hercules' Muscles or Achilles Heel* (Brewer et al., 1993). They explored two main ideas: individuals who are more involved in sports tend to identify more strongly as athletes and therefore score higher on the scale, and athletic identity is linked to both positive factors (such as intrinsic motivation) and negative factors (such as negative emotions). Gould et al. (2002) emphasized that sports commitment, especially in high-performing athletes, is a key driver of athletic success and identity formation.

Stryker and Burke (2000) offered three distinct usages of the concept of identity: (a) associating identity with the culture of a people, often overlapping with ethnicity; (b) defining identity as a shared affiliation with a group or social category that fosters collective culture

(Bauman, 2000); and (c) understanding identity as parts of the self-defined by the meanings people attach to the various roles they play in society. Taking into account definitions (b) and (c), and in close association with the current study, we refer to the work of Donnelly and Young (1988), who emphasized the multi-layered process of identity construction in action and adventure sports as a subculture. Discussing the concepts of career and identity, they proposed that new members of these subcultures actively adopt specific attitudes, speech, and behaviors to gain social acceptance. Donnelly and Young (1988) also compared climbers and rugby players to illustrate how roles and identities within sports subcultures are not static but continuously shaped by both internal and external influences.

Socialization in sports is an ongoing process, and stages of acceptance or rejection often recur. Several scholars have pointed out that social relationships are fundamental to identity construction (Bauman, 2000; Birrell & Donnelly, 2004; Donnelly & Young, 1988). These relationships offer a critical context in which individuals define and negotiate their sense of self. Identity is not formed in isolation; it is shaped by both self-perception and how individuals are perceived within their communities. Accordingly, in this study, we explored climbers' identity as influenced by their self-image, the climbing setting, and interpersonal dynamics within the sport.

Demographic and Involvement Differences

Dilley and Scraton (2010) noted that limited attention has been paid to gender identity, social context, belonging, the interplay between sports and personal identity, and motives in extreme sports (Bikker & Fink, 2022). In line with this gap, our study considered gender differences and social constraints as relevant factors in shaping athletic identity and influenc-

ing climbers' levels of commitment. Tušak et al. (2005) reported studies on the relationship between athletic identity and athlete personality involving 330 athletes at varying levels of performance. Athletic identity was found to be closely related to motivation, especially goal orientation and competitiveness. For males, the strongest predictors of athletic identity were the urge to win and positive motivation, whereas for females, the key factors were competitiveness and negative motivation. They suggested that athletic identity is an important aspect not only for personal development but also for national pride and excellence in performance. Interestingly, their findings suggested that a mutually reinforcing relationship exists: athletic identity leads to motivation and effort, which in turn improve high performance. The social factors associated with status, power, and recognition were associated with identity but were not significant. More recently, research has continued looking at the dynamism and contextual specificity of athletic identity. A systematic review by Knight et al. (2023) notes that athletic identity is dynamic and changes over the course of an athlete's life, through development, performance, and decline, necessitating ongoing work on identity to enable the acceptance of multiple roles (i.e., student, professional, athlete). This is more evident in non-structured sports such as climbing, where performance histories may differ from those in organised and institutionalised sports. Lifestyle athletes (including climbers) may still maintain a strong athletic self-identity that governs their health behaviors and enables sustained activity regardless of performance outcomes (Helms & Morris, 2022). Martin et al. (2017) found that social identity, particularly with the sports community, emphasises commitment to sports, personal effort, and a sense of belonging. Thus, for example, research on youth sports shows that identifying with the team or

peer group increased motivation, enjoyment, and participation (Martin et al., 2017). The expansion of the relationship between athletic identity and experience, as described by Lamont-Mills and Christensen (2006), examined three levels of sports participation: elite, recreational, and non-participants. Their findings showed that non-exponents scored lower overall on athletic identity than elite athletes. Lamont-Mills and Christensen (2006) suggested that if sports are important for elite athletes, they also have a major impact on the lives of the less competent participants. Specific to this study is information on demographics, such as level of experience and competitive factors, as determinants of athletic identity and, in turn, commitment to the sports. Thus, building on the connection between levels of experience and athletic identity, it may be relevant to investigate how identity plays a factor in long-term commitment to such sports.

Constructs in Sports Commitment and Athlete Identity

According to Horton and Mack (2000), a strong athletic identity can lead to a high level of sports commitment, referring to the factors that support persistence in an activity despite challenges. The Sports Commitment Model, developed by Scanlan and colleagues (1993), adapted this concept from adult-focused contexts like work or relationships to the sports domain, involving both youth and adults. The athlete's psychological attachment to their sport depended on factors such as loyalty, a desire to excel, and a willingness to make sacrifices for it (Scanlan et al., 1993). For example, climbers' extended stays and substantial spending in Lander, Wyoming, highlight their strong commitment and enjoyment of the climbing in that specific area (Bradley & Mapples, 2024). High levels of sports commitment are often associated with long-term participa-

tion and improved performance. An important predictor of sports commitment is sports enjoyment (Scanlan et al., 1993), which is an indicator of pleasure derived from sports participation (Carpenter et al., 1993) and satisfaction. This concept was confirmed in recent research, such as that by Yukhymenko-Lescroart (2022), which suggests that athletic identity is strongly influenced by enjoyment and passion for sports. Scanlan et al. (1993) defined social constraints as social expectations or norms that create a sense of obligation to remain in the activity. The social constraints construct specifically addressed the sense of social pressure to participate. The more pressure an individual perceives from others to continue, the greater his or her commitment.

While there is a significant body of literature exploring athletic identity in relation to commitment to sports, scholarship specific to climbing is lacking. Enjoyment and social constraints are important components influencing sports commitment and participation, which are treated as separate constructs in our current research. Similarly, despite growing research interest in climbing and its inclusion in the Olympic Games, academic attention to sociological perspectives remains limited (Pfister & Gems, 2019). However, despite growing academic interest in sports climbing, no previous study has systematically examined the combined predictive ability of sports commitment, enjoyment, and social constraints on individual athletic identity in climbing using a validated quantitative model. This study fills that gap by applying validated sports identity models to the context of climbing, providing one of the first empirical evaluations based on a global sample.

Purpose and Research Questions

The objective of this study was to examine the relationships between athletic identity, sports commitment, sports enjoyment, and so-

cial constraints within the climbing community. Additionally, this research aimed to explore how demographic and contextual factors such as gender, climbing experience level, and competitive involvement are associated with variations in athletic identity and related psychological constructs.

By investigating these factors together, the study provides a more comprehensive understanding of how personal characteristics and social environments shape athletes' identification with their sports, levels of enjoyment, and perceptions of others' expectations or pressures. The research also highlights how differences in performance orientation, social support, and climbing participation context (e.g., recreational vs. competitive) may contribute to meaningful distinctions in athletic self-concept across groups.

This knowledge has practical implications for athlete engagement, retention, and community-building efforts within the climbing industry and among recreational and competitive climbing organizations. Insights from these findings can support the development of inclusive programming and more effective approaches to fostering long-term sports involvement.

The study was guided by two research questions and five hypotheses, detailed further in the Methods section:

Research Questions:

1. Is there a difference in athletic identity among climbers based on gender, climbing experience, and competitive involvement?
2. To what extent do sports commitment, sports enjoyment, and social constraints predict athletic identity among climbers?

METHODOLOGY

This study employed a quantitative, cross-sectional survey design to examine relation-

ships among psychological variables within the climbing community. This design lends itself to analyzing interactions among variables and testing five hypotheses about the relationships among athletic identity, sports commitment, sports enjoyment, and social constraints. Participants in the current study were self-identified climbers, including sports climbers, ice climbers, and mountaineers, from an international population. Climbers were asked to participate voluntarily in an anonymous, Google Form-administered online survey through purposive and snowball sampling techniques. The survey was administered in English because it is the common language of international climbing organizations and communities involved in recruitment. Recruitment occurred through various means, including postings in climbing-related groups on Facebook and Instagram, announcements in climbing gyms, and email solicitations from climbing and mountaineering organizations such as the Interna-

tional Union of Alpinist Associations (UIAA) and the Macedonian Climbing and Mountaineering Federations. Inclusion criteria for the research required participants to be over 18 years old and actively involved in climbing. The institutional review board approved the study after ethical approval was granted. Data were collected in the spring of 2024, and 131 climbers from 31 countries completed the survey (Table 1). Participants were from 31 nations because recruitment occurred through international climbing organizations and social media groups with international audiences. The distribution was not meant to ensure country-level representativeness, but to capture a diverse cultural and geographical context of climbers. Thus, the analyses were conducted at an individual level rather than at the country level. Due to Google Forms' design, only fully completed responses were recorded and retained, limiting insight into partial responses that drop out.

Table 1. *Frequencies of country*

Country	Counts	% of Total	Cumulative %
Argentina	1	0.8%	0.8%
Austria	4	3.1%	3.8%
Belarus	5	3.8%	7.6%
Bolivia	4	3.1%	10.7%
Bosnia Herzegovina	5	3.8%	14.5%
Bulgaria	1	0.8%	15.3%
Canada	3	2.3%	17.6%
Chile	2	1.5%	19.1%
China	1	0.8%	19.8%
Colombia	3	2.3%	22.1%
Croatia	2	1.5%	23.7%
Czech Republic	1	0.8%	24.4%
Ecuador	6	4.6%	29.0%
France	3	2.3%	31.3%
Germany	5	3.8%	35.1%
Hungary	1	0.8%	35.9%
Italy	5	3.8%	39.7%
Japan	1	0.8%	40.5%
Kosovo	1	0.8%	41.2%
Macedonia	7	5.3%	46.6%

Table 1. *Frequencies of country*

Montenegro	1	0.8%	47.3%
Netherlands	1	0.8%	48.1%
Poland	10	7.6%	55.7%
Serbia	1	0.8%	56.5%
Slovenia	1	0.8%	57.3%
Spain	8	6.1%	63.4%
Sweden	1	0.8%	64.1%
Switzerland	2	1.5%	65.6%
United Kingdom	3	2.3%	67.9%
United States	41	31.3%	99.2%
Uruguay	1	0.8%	100.0%

Instruments

To ensure sufficient reliability, we verified the reliability and stability of our measurements. Rather than developing new tests, we studied well-known, well-established psychological self-report tests and made minor language changes to make them more applicable to climbers. These changes were slight and intended to enhance relevance for climbers who use English as their primary language. A pilot study was required to verify that these slight changes would still render claims to content and construct validity, and these claims were confirmed by knowledgeable climbers. Cronbach's alpha for each of these scales was determined, and for all scales, reliability was found to be acceptable (see Table 1). Insoluble variance due to respondents' response bias was avoided by using neutral wording throughout this survey, and procedural rules to prevent data-entry errors were adopted. Our survey attempted to measure four main variables: athletic identity, sports enjoyment, social constraints, and sports commitment. The 35 items and question headings made up the four sections of this survey. The first gathered demographic information, while the remaining sections included: the Athletic Identity Measurement Scale (Brewer et al., 1993), the Sports Enjoyment Scale (Kendzierski & DeCarlo, 1991; Scanlan et al., 1993), the Social Constraints Scale (Scanlan et

al., 1993; White, 2008), and the Sports Commitment Scale (Scanlan et al., 1993).

Athletic Identity Scale

To measure athletic identity, we used the original 10-item Athletic Identity Measurement Scale (AIMS), developed by Brewer et al. (1993). Many studies (Brewer & Cornelius, 2001; Hadley et al., 2018; Lamont-Mills & Christensen, 2006; Rogen et al., 2021), used a single construct, with reliability that was established through measures of internal consistency (Cronbach's $\alpha = .89$). For the studies by Hadley et al. (2018) and Brewer and Cornelius (2001) the value was Cronbach's $\alpha = .81$. Example questions include and were not limited to: (1) "I consider myself an athlete," (2) "I have many goals related to sports," and (3) "I need to participate in sports to feel good about myself." Following the original model, we employed a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Since the AIMS was developed for athletes in general, we modified some language in the survey instrument to better suit the climbing population.

Sports Commitment Scale

The Sports Commitment Model (Scanlan et al., 1993) was grounded in commitment theories from social and organizational psy-

chology that explain why individuals maintain relationships or engage in activities. Scanlan and colleagues outlined the development of survey measures to assess the Sports Commitment Model in youth sports. In the Scanlan et al. (1993) study, results demonstrated strong internal consistency for the following scales: sports commitment ($\alpha = .88$), sports enjoyment ($\alpha = .90$), and social constraints ($\alpha = .87$). In this study, Cronbach's alpha values similarly indicated strong internal consistency: sports commitment ($\alpha = .83$), sports enjoyment ($\alpha = .91$), and social constraints ($\alpha = .90$). In this study the survey instrument measured sports commitment on a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Example questions include and were not limited to: (1) "I dedicate a substantial amount of time to climbing and training" and (2) "I am determined to get better at climbing."

Sports Enjoyment Scale

Sports enjoyment is defined as "a positive affective response to the sports experience that reflects generalized feelings such as pleasure, liking, and fun" (Scanlan et al., 1993a). The Sports Enjoyment 4-item scale measures the extent to which participants experience enjoyment through their involvement in sports. The positive relationship indicated in the model suggests that as Sports Enjoyment increases, Sports Commitment is also likely to increase. In this study, we have employed a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree), including items addressing the sports enjoyment among climbers, such as: (1) "I enjoy climbing this season" and (2) "I'm happy climbing in my local gym this season."

Social Constraints Scale

Scanlan et al. (1993) identified social constraints as expectations that create a sense of obligation to continue in a sport, in this case,

climbing. In this study, we used a 4-item scale that recognized that climbers may feel pressure to continue climbing because of expectations from others, such as friends, family, fans, or sponsors. Examining constraints in climbing, our survey instrument included items such as: (1) "I feel I have to climb so that I can be with my friends" and (2) "I feel I have to climb to please my followers on social media/or surrounding" measured in a five-point Likert scale ranging from 1 (Not at all) to 5 (Very much).

To maximize internal validity, we offered equal participation opportunities to a diverse international population. We assessed content validity to ensure our survey covered the full range of our topic, and we checked construct validity by comparing our results with related measures. We also considered cross-cultural validity, given that the survey was administered across different cultural contexts. Throughout this study, we continuously refined our survey instruments to ensure accurate and meaningful results. Since the survey was sent out only in English, there were no translations. Therefore, cross-cultural equivalence of meaning was checked during the pilot test, which involved multilingual climbers who said that this item's phrasing was clear and culturally valid across a variety of settings.

Coding

After data collection, all survey responses were coded to prepare for analysis. Some of the answers were coded as dichotomous variables (1 = yes, 0 = no), while others were coded as they were presented on the original scale, when appropriate for the analysis. For questions containing multiple answers, each category marked was allotted a score of one, while those not marked were scored as zero (0). The factor scores were derived from the means of these values. Since no responses were missing, all cases were included in the

analysis. The group variables and the variable used to determine respondents' age categories were coded as nominal variables to facilitate comparisons among groups in the analyses.

Data Analysis

The analysis of the survey data was directed, first of all, at obtaining the sample means, standard deviations, and distributions for each of the variables under consideration. Second, the correlation analyses indicated the possibility of significant relationships among the variables. A path analysis was employed to determine the degree to which athletic identity in climbers could be predicted from sports commitment, sports enjoyment, and social constraints. Based on the modified scales, a proposed model was developed for the study, and five hypotheses were tested (Figure 1). The analyses of the data were carried out using Jamovi version 2.11.6. Initial checks indicated

that the assumption of normality was not warranted. This phenomenon is consistent with the discussion in the paper by Clason and Dormandy (1994), which states that data collected on Likert-type scales usually do not follow a normal distribution. Some parametric tests, such as ANOVA and T tests, are known to be fairly robust to violations of the assumption of normality (Hoekstra et al., 2012; Stevens, 2013), whereas structural techniques are more susceptible to such violations. In the present instance, bootstrapping, a nonparametric resampling method, was used to improve the fit (or accuracy) of the parameter estimates when non-normality was anticipated. Bootstrapping would therefore allow the estimation of a more valid standard error and the derivation of confidence intervals from the parameter estimates, thus making the results more robust despite the distributional limitations of the data.

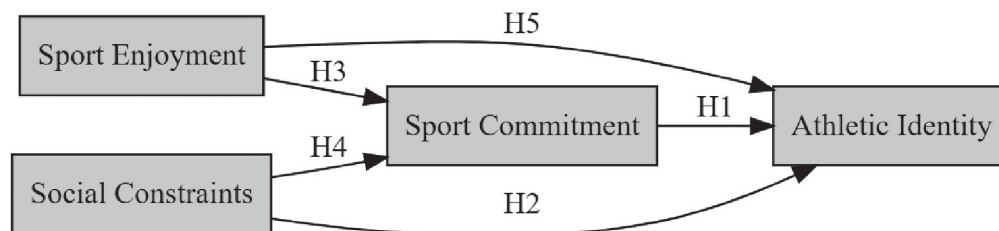


Figure 1. *Proposed Model*

Hypotheses:

- H1: Sports commitment has a significant direct effect on a climber's athletic identity.
- H2: Social constraints have a significant direct effect on a climber's athletic identity.
- H3: Sports enjoyment has a significant direct effect on a climber's sports commitment.
- H4: Social constraints have a significant direct effect on a climber's sports commitment.
- H5: Sports enjoyment has a significant direct effect on a climber's athletic identity.

RESULTS

Preliminary analysis

In the preliminary analysis of the descriptive data, we examined background information about the population, including age, gender, average climbing level, and preferred climbing activity. There were 131 participants in total, 69 of whom identified as male climbers and 62 as female climbers. The majority of the participants were coming from the U.S., followed by Poland, North Macedonia, and Ecuador. The average age was $M_{age} = 34$ ($SD = 9.6$),

where the youngest participant was 18, and the oldest was 64. Sports climbing and bouldering were the preferred climbing activities of most participants at the intermediate (57%) and advanced (27.5%) levels; beginners were the third group at 13%, and professional level

2.3% (e.g., the French scale and/or UIAA). The data were completed with no missing values. For this study, examination of sample means for four variables revealed a high Cronbach's alpha coefficient, supporting reliability in the instrumentation for this sample (See Table 2).

Table 2. *Descriptive Statistics for Direct Measure*

Factors	N	Mean (SD)	Cronbach's Alpha
Athletic Identity	131	3.64 (.69)	.86
Sports Commitment	131	3.59 (.85)	.83
Social Constraints	131	2.00 (1.1)	.90
Sports Enjoyment	131	4.46 (.67)	.91

Prior to testing the study hypotheses, Pearson Product-Moment correlation analyses were conducted to discern if significant relationships existed between variables and athletic identity. All variables of interest were at the ratio level, with corresponding pairs. Inspection of a scatter plot revealed a potential linear relationship and homoscedasticity between variables. However, one non-significant relationship emerged between athletic identity and sports enjoyment (Table 3). Hence, the

strongest positive relationship was between sports commitment and athletic identity ($r = .72, p < .05$). Furthermore, descriptive statistics were used to investigate climbers' perceptions of sports climbing and mountaineering. Seventy-one percent of respondents identified sports climbing as a sport, while 16.8% considered it a hobby and 12.2% viewed it as both. For mountaineering, 38.9% saw it as a hobby, 40.5% as a sport, and 20.6% as both.

Table 3. *Relationship between Factors and Athletic Identity*

	Athletic Identity	Sports Commitment	Social Constraints	Sports Enjoyment
Athletic Identity	1	.721***	.191*	.191*
Sports Commitment	.721***	1	.434**	.434**
Social Constraints	.475**	.434**	1	.032
Sports enjoyment	.191*	.299**	.032	1

Note. * = $p < .05$, ** $p < .01$, *** $p < .001$

Research Question 1

In order to address research question one: Is there a difference in athletic identity among climbers based on gender, climbing experience, and competitive involvement? The robust Welch's F test for ANOVA and Welch's independent t tests were used.

Gender Difference and Level of Experience in Athletic Identity

First, to better understand whether demographic groups differ, an independent Welch's t-test was conducted to evaluate differences in athletic identity between gender groups among climbers. There was no statistically significant difference among genders on athletic identity,

$t(129) = .084, p = .771$ (Table 4), nor for any other factor. Second, athletic identity was examined across different levels of climbing experience using a one-way ANOVA. The analysis revealed a statistically significant effect, Welch's $F(3, 9.10) = 11.20, p < .05$, suggesting that athletic identity varies depending on

climbers' experience levels. Post hoc comparisons indicated that climbers with more experience reported higher athletic identity scores. Specifically, participants at the advanced and pro levels reported a higher mean athletic identity score ($M = 4.09, SD = 0.78$) than beginner climbers ($M = 2.92, SD = 0.79$).

Table 4. *Group Descriptives*

Variable	Male (Mean, SD)	Female (Mean, SD)	p-value
Athletic Identity	3.62 (0.72)	3.66 (0.77)	.77
Sports Commitment	3.62 (0.81)	3.56 (0.81)	.66
Enjoyment	4.45 (0.66)	4.47 (0.69)	.82
Social Constraints	2.28 (1.05)	1.98 (1.1)	.82

Competitive Involvement

To assess differences in competitive involvement, the ANOVA assumptions were first examined. The assumption of independence was met, and visual inspection suggested no deviations from normality. However, Levene's test indicated a violation of the homogeneity of variances assumption ($p < .05$). Therefore, Welch's t -test, which does not assume equal variances, was conducted. The results showed

that competitive climbers reported significantly higher athletic identity scores than non-competitive climbers, $t(129) = 2.56, p = .012$. Significant differences were also found for sports commitment and social constraints. No statistically significant difference in sports enjoyment was observed, suggesting that climbing enjoyment is common regardless of competitive involvement (Table 5).

Table 5. *Independent Samples Welch's T-Test Comparing Competitive and Non-Competitive Climbers*

Factors	Statistic	df	p-value
Athletic Identity	2.56	129	.012
Sports Commitment	4.29	129	<.001
Social Constraints	2.77	129	.006
Sports Enjoyment	1.89	129	.062

Note. $H_a \mu_1 \neq \mu_2$

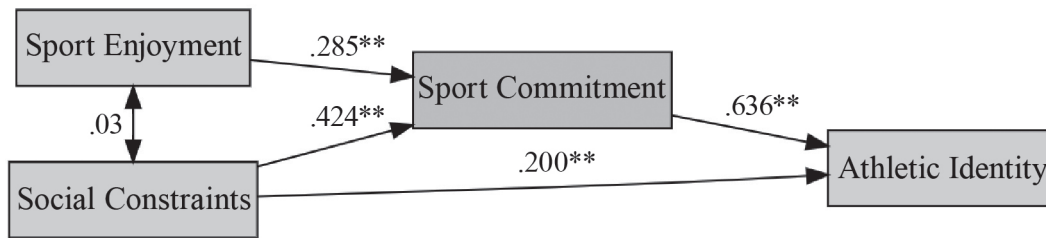
Research Question 2

To address the research question: To what extent do sports commitment, sports enjoyment, and social constraints predict athletic identity among climbers? A path analysis was conducted to examine the direct and indirect relationships between the predictor variables and athletic identity in the hypothesized model (see Figure 1 and Table 5). To predict ath-

letic identity among climbers using Jamovi 2.6.11, the present analysis was constructed using the following variables: sports commitment, social constraints, and sports enjoyment. The path from sports enjoyment to athletic identity had a non-significant negative weight ($\beta = -.000, p = .921$); therefore, it was removed for the final model (Figure 3). In the final model, 55.3% of the variance in

athletic identity was explained by the predictor variables ($R^2 = .553$), primarily through the direct effects of sports commitment and social constraints. The model also explained

26% of the variance in sports commitment, with sports enjoyment and social constraints directly predicting it ($R^2 = .260$).



Note. ** = $p < .05$ **

Figure 2. Final Model

The path coefficient from sports commitment to athletic identity had the most considerable standardized regression weight (.636; $p < .001$).

The chi-square test of model fit was significant, $\chi^2 (5) = 46.4$, $p < .001$, indicating that the model did not provide a perfect fit to the data. However, given the chi-square statistic’s sensitivity to sample size, additional fit indices were considered. These indices suggested that the final model provided an acceptable fit to the data. The standardized regression weights showed positive and significant direct effects of sports commitment ($\beta = .636$, $p < .001$) and social constraints on athletic identity ($\beta = .200$, $p < .001$), as well as sports enjoyment ($\beta = .285$, $p < .001$) and social constraints ($\beta = .424$, $p < .001$) on sports

commitment (Table 6) which means the model fits the data well. The standardized regression weights showed positive significant direct effects of sports commitment ($\beta = .636$, $p < .001$) and social constraints on athletic identity ($\beta = .200$, $p < .001$), as well as sports enjoyment ($\beta = .285$, $p < .001$) and social constraints ($\beta = .424$, $p < .001$) on sports commitment (Table 6). Further, the indirect effect of social constraints through sports commitment was also statistically significant ($\beta = 0.269$, $p < .001$). Sports enjoyment also demonstrated a statistically significant indirect effect on athletic identity via sports commitment ($\beta = 0.181$, $p = .017$), contributing to the model’s total effect. Bootstrapping (1,000 samples) confirmed the robustness of the significant paths, producing narrow confidence intervals.

Table 6. Analysis of hypotheses

Hypothesis – Relation path	β	p -value
H1: Social Constraints → Athletic Identity	.200	.000***
H2: Sports Commitment → Athletic Identity	.636	.000***
H3: Sports Enjoyment → Sports Commitment	.285	.000***
H4: Social Constraints → Sports Commitment	.424	.000***
H5: Sports Enjoyment → Athletic Identity	-.006	.921

Note. *= $p < .05$; **= $p < .01$; ***= $p < .001$

Thus, this study found that sports commitment and social constraints have a substantial impact on climbers' athletic identity. In contrast, sports enjoyment directly affects sports commitment and, indirectly, athletic identity.

DISCUSSION

Understanding the factors that shape athletic identity is essential for recognizing how individuals define themselves in relation to their level of sports participation. This is particularly relevant in climbing, where participation ranges from recreational to competitive levels. Several scholars have highlighted the need for a more nuanced approach to investigating athletic identity, especially in the context of climbing as a unique sport (Donnelly & Young, 1988; Wheaton, 2015). While prior research (Tušak et al., 2005) has shown that demographic and experiential factors can shape athletic identity, less is known about how these dynamics play out within the climbing community. Specifically, is there *a difference in athletic identity among climbers based on gender, climbing experience, and competitive involvement?*

Exploring gender differences, climbing experience, and competitive involvement in athletic identity among climbers can help enhance training programs, understand and address challenges and barriers, and potentially foster a more inclusive climbing environment (Bikker & Fink, 2022; Wheaton, 2015). Similar to the findings of Tušak et al. (2005), our analysis did not find any statistically significant differences in athletic identity between genders. Previous studies have yielded mixed results on whether and to what extent experience level or, in some cases, success can influence perceptions of athletic identity. While Horton and Mack (2000) confirmed these findings, Tušak et al. (2005) found no statistically significant differences in athletic identity by athletes' level

of success. However, it tended to be strongest among the most successful athletes. Athletic identity remained high even in those without categorization, likely due to the influence of social status, power, and rewards in sports.

By exploring the differences in climbing experiences, we could better understand the transitions from beginner to intermediate and from advanced to pro. This study found statistically significant differences in athletic identity and sports commitment across all levels, with the most significant gap between the beginner and advanced/pro levels. Recognizing that the beginner stage can be particularly challenging, it is crucial for retention efforts and for climbing organizations and clubs to foster a stronger sense of commitment at that stage. Interestingly, social constraints were not significant, suggesting that there is no difference among beginners, intermediates, advanced, and professional climbers in terms of social pressure and similar constraints.

Athletic identity is shaped by a range of psychological and social factors, yet how these factors interact in non-traditional sports like climbing remains underexplored. Hence, this study explored the extent to which sports commitment, sports enjoyment, and social constraints predict athletic identity among climbers. While previous research has established these relationships in traditional sports, less is known about how they function within the climbing community, where participation spans casual recreational to competitive sports. Our research addressed the question: *To what extent do sports commitment, sports enjoyment, and social constraints predict athletic identity among climbers?*

The strongest relationship was found between athletic identity and sports commitment ($r = .72, p < .05$). Similar results were presented in the literature review, which can be linked to Brewer et al.'s (1993) early work, suggest-

ing that individuals who are more involved in sports tend to have a stronger athletic identity.

On the other hand, the results indicated that sports enjoyment does not have a statistically significant direct relationship with athletic identity among climbers, a finding that differs from earlier studies. While sports enjoyment plays an important role in sports commitment (Scanlan et al., 1993), our results showed only a significant indirect effect on climbers' athletic identity through sports commitment. Sports enjoyment reflects the pleasure and satisfaction gained from participating in sports (Carpenter et al., 1993). Other studies reviewed earlier, such as Yukhymenko-Lescroart (2021), confirmed that athletic identity was significantly influenced by the enjoyment and passion athletes feel for their sports. Our significant indirect effect may suggest the need for additional research further to explore the relationship between sports enjoyment and athlete identity.

This finding could underscore the difference between recreational and competitive athletes. Many climbers may enjoy the sport but do not view themselves as athletes unless their commitment increases through participation in competitions, goal-setting, or social recognition. Elite athletes, on the other hand, often identify enjoyment as the spark of initial involvement. However, years of dedication, overcoming challenges, and remaining deeply committed to the sport are crucial to the formation of their athletic identity. This idea resonates with Gould et al. (2002), who noted that sports commitment is a key driver of athletic success and identity formation, especially among high-performing athletes. We concluded that sports commitment positively influences athletic identity, with a significant standardized regression weight of .636, indicating a strong relationship between these factors. In the final hypothesized model, 55% of the variance in athletic identity was explained

by the predictor variables ($R^2 = .553$). We attributed a primary reason for this result to the direct impact of sports commitment and social constraints. The model also explained 26% of the variance in sports commitment, which was directly predicted by sports enjoyment and social constraints.

These findings were supported by the reviewed literature, such as Brewer et al. (1993), who suggested that individuals more involved in sports tend to identify more strongly as athletes, noting that athletic identity is linked to both positive and negative factors. Additionally, our findings relate to the work of Donnelly and Young (1988), considering that the climbing career has expanded since climbing became a more mainstream activity. Professional and competitive climbing adds even more factors into the process of identity construction among climbers. Media coverage, sponsorships, more challenging routes, safer conditions, more inclusivity, but also more factions within the subculture, are only a few to mention. Additionally, competitions may impact athletic identity in several ways. Our findings demonstrated a statistically significant difference in athletic identity, sports commitment, social constraints, and sports enjoyment between climbers who participate in competitions and those who do not. However, no significant difference was found in sports enjoyment, which makes sense because people enjoy climbing whether they compete or not. Although the path from sports enjoyment to athletic identity was not significant and had a negative weight, it is important to note that sports enjoyment indirectly influenced athletic identity through sports commitment and social constraints.

Theoretical and Practical Implications

From a theoretical perspective, this research builds on the concept of athletic iden-

tivity by providing more detailed insights into the psychological and social aspects of climbing and mountaineering, viewed as both a competitive sport and a recreational activity. First of all, the results showed that climbing experience has a significant impact on athletic identity, especially during the transition from a beginner to an advanced climber. Secondly, the study underscores that the mere enjoyment of sports is misleading in fostering a strong athletic identity. It is stated that the aspects of ongoing commitment and social expectations exert a much greater influence on athletic identity. Along with contributions to the academic field, this research may have practical implications for different stakeholders in the climbing industry, such as teachers, athletes, and other administrators.

According to the findings, coaches should consider both individual motivating factors and social factors to help their athletes and climbing societies. A realistic approach is needed to understand the influence of athletes' sports commitment, athletic identity, and talent on performance enhancement. Furthermore, from the first research question, it appears that it is important for coaches to be aware of individual factors, such as gender and level of experience among climbers, so that coaching and pedagogical strategies can be adapted accordingly to make them much more effective. Owners of climbing gyms, private climbing areas, and gear shops can be challenged to build a society or community while helping meet the individual needs of every climber by providing equal opportunity and a safe environment. Owners of gyms and other leaders can help by assisting novice climbers and those who want to challenge their skills. Lastly, climbers themselves are key stakeholders in discussing the implications of this research, as they represent the sample group. For athletes, these findings can promote greater self-awareness, helping

them understand what drives them and how that impacts their athletic identity.

Limitations and Future Research

While this study utilizes valid and reliable quantitative methods to answer the research questions and provide essential findings to the literature, it has limitations and gaps in its research and methodology, which offer opportunities for future research. From a methodological perspective, the sample size ($n = 131$) can be seen as a limitation (Ross & Bibler, 2019). Our final model had eight parameters, which falls midway between the recommendations of 10-20 parameters made by Kline (1998). Although the sample was diverse, representing 31 countries, the distribution of countries was unequal, which created methodological limitations. A second limitation in the recruitment of subjects is that social media snowball recruitment is effective because it can reach a larger community quickly.

However, the design of our survey in Google Forms did not allow us to know how many did not complete the survey, nor how many began, and there were also language barriers that might have limited participants' ability to interpret some items. These limitations in the data reduced our insight into the dropout rate among participants and the response rate, as our sampling technique was snowball, and we could not determine how many subjects did not respond. The study provides valuable insights into academics and the climbing industry, but leaves gaps for future research. Regarding the further discussion of athletic identity in climbing, one avenue of research remains the analysis of similar constraints. However, they must more evenly represent athletes from different geographic areas so that insight can be gained into whether an individual's background affects the perspective on athletic identity. Since this study found that social constraints directly

affect sports commitment and athletic identity, future research might well take into account the relationships climbers have within their communities, the social interactions, and the societal influences that can shape awareness of athletic identity. Taking a theoretical perspective, the effect of sports enjoyment and its influence on the development of athletic identity might be a valuable means of developing a more global theoretical model. Also, it might be best to include additional constructs, as discussed in the literature, such as personal investments, to understand better how this condition affects athletic identity. The addition of subscales would likely yield a clearer, more relevant understanding of the factors that affect athletic identity. Lastly, there is space in the research to compare these findings in climbing with those in other sports to determine whether climbing is a unique case or resembles other sports in the development of athletic identity.

CONCLUSION

Expanding on existing discussions about categorizing climbing as a sport and climbers as athletes, our study highlights a strong positive relationship between athletic identity and sports commitment. Our findings confirm the previous research, which suggests that the more you are involved in any sport of climbing, the greater the sense of athletic identity. Thus, we have identified sports commitment as an essential component for climbers who identify as athletes, especially as they progress through different levels of climbing experience. The findings of this study also show that while sports enjoyment is important for growth as a climber, it is not a direct influence on climbers' athletic identity. Lastly, no significant gender differences in athletic identity were noted; however, novice climbers did show significant differences in athletic identity and commitment as they progressed to become advanced

or professional climbers. These findings allow us to suggest targeted retention strategies in order to improve beginner climbers' experiences. Recognizing the various factors that impact athletic identity and sports commitment can help create a more supportive, inclusive environment for climbers at all levels, from leisure to pro climbers competing at world championships and Olympic-level games.

Ethics Statement

Institutional Review Board (IRB) Approval Code: 2223-019 was blinded for review.

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