

TRAINING BEHAVIORS AMONG A HETEROGENEOUS SAMPLE OF FEMALE CLIMBERS AND
BOULDERERS

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Abstract

Introduction The purpose of this study is to describe relevant characteristics and training behaviors among a heterogeneous sample of female climbers and determine if differences exist between advanced/elite (A/E) sport lead (SL) climbers vs. lower ability/intermediate (L/I) SL climbers, between A/E boulderers vs. L/I boulderers, and between A/E SL climbers vs. A/E boulderers. **Methods** A web-based survey was distributed to an international climbing population. Questions asked included demographics, climbing ability and primary style, and weekly volume of climbing and non-climbing related training. **Results** 139 females completed the survey. Significant differences in weight, height, BMI, SL ability and nonclimbing training volume were found between A/E (n=23) and L/I SL (n=31) ($p < 0.05$). A/E SL and A/E boulderers (n=29) train similarly but boulderers spend a greater proportion of climbing-training indoors and are taller, heavier, and younger than A/E SL ($p < 0.01$). Women who identify as primarily A/E SL are equally good at bouldering (mean boulder ability 20.7 ± 3.4) however A/E boulderers are not as good at SL (14.8 ± 5.4). **Discussion** This novel study attempted to identify important training characteristics among SL climbers and boulderers. Based on our findings A/E SL spend about one hour each day climbing and about two hours each week performing non-climbing-specific training with varying amounts of aerobic, anaerobic and resistance exercise. It appears that non-climbing-specific training is not a priority among A/E climbers nor is it positively associated with SL ability ($r = 0.14$) or bouldering ability ($r = -0.13$).

Keywords: sports, rock climbing, training volume

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Abstrait

Introduction Le but de cette étude est de décrire les caractéristiques pertinentes et les comportements d'entraînement parmi un échantillon hétérogène de grimpeuses et de déterminer s'il existe des différences entre les grimpeurs sportifs avancés / élites (A/E) et les capacités inférieures / intermédiaires (L/I) les grimpeurs du SL, entre les blocs A/E et les blocs L/I, et entre les grimpeurs A/E SL et les blocs B/E. **Méthodes** Une enquête en ligne a été distribuée à une population grimpeuse internationale. Les questions posées comprenaient les caractéristiques démographiques, la capacité d'escalade et le style primaire, ainsi que le volume hebdomadaire de formation liée à l'escalade et à la non-escalade. **Résultats** 139 femmes ont répondu au sondage. Des différences significatives dans le poids, la taille, l'IMC, la capacité SL et le volume d'entraînement non escalade ont été trouvées entre A/E (n = 23) et L/I SL (n = 31) ($p < 0,05$). Les boulderers A/E SL et A/E (n = 29) s'entraînent de la même façon mais les boulderers passent une plus grande partie de l'escalade à l'intérieur et sont plus grands, plus lourds et plus jeunes que les A/E SL ($p < 0,01$). Les femmes qui s'identifient comme principalement A/E SL sont aussi bonnes au bloc (capacité moyenne de $20,7 \pm 3,4$) mais les blocs A/E ne sont pas aussi forts chez SL ($14,8 \pm 5,4$) **Discussion** Cette étude a tenté d'identifier les caractéristiques d'entraînement importantes chez SL grimpeurs et rochers. Sur la base de nos résultats, A/E SL passe environ une heure par jour à grimper et environ deux heures par semaine à effectuer des exercices non spécifiques à l'escalade avec des exercices d'aérobic, d'anaérobic et de résistance. Il semble que l'entraînement non spécifique à l'escalade n'est pas une priorité chez les grimpeurs A/E ou est-il positivement associé à la capacité SL ($r = 0,14$) ou à la capacité de bloc ($r = -0,13$).

Mots-clés: Sport, Escalade, Volume

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Introduction Rock climbing will have its Olympic debut in the 2020 Tokyo Games however little research has examined training characteristics among advanced/elite (A/E) climbers. Research has established that A/E climbers tend to be small and lean with a high strength-to-weight ratio (Watts, Martin & Durtschi, 1993; Watts et al., 2003; Novoa-Vignau et al. 2017) but less well studied are potential anthropometrical differences between climbers who specialize in a specific climbing style (e.g. bouldering vs. sport lead (SL) climbing) and, in general, female climbers are somewhat underrepresented in the current body of climbing literature. Therefore the purpose of this study is to describe relevant characteristics and training behaviors among a sample of female climbers and determine if differences exist between advanced/elite (A/E) SL climbers vs. lower ability/intermediate (L/I) SL climbers, between A/E boulderers vs. L/I boulderers and between A/E SL climbers vs. A/E boulderers.

Methods

Participants: We solicited the International Rock Climbing Research Association (IRCRA) delegation with an email introducing the research project with a web link to the survey. Delegates then distributed the link among respective international climbing communities. Participants gave informed consent after reading the first page of the web-

based, anonymous, survey which explained the purpose of the research and described questions. This study was approved by the IRB of Northern Michigan University (HS17-869).

Survey: The survey was piloted by 7 advanced level climbers; informal feedback was utilized to reword any confusing questions. There were 42 total questions in 3 main sections. Section 1 included basic demographics (self-reported age, gender, height, and current weight). Section 2 asked about climbing characteristics including years climbing, primary and secondary climbing style (sport-lead, boulder, trad, or top-rope) and ability for each selected style. Ability was reported using the IRCRA scale (1-32) that corresponded to difficulty of closest current clean ascent with no falls after having one or more practice attempts (redpoint). The IRCRA scale was developed as a comparative grading scale for standardization of various regional scales and ability groupings (Draper, N. et. al, 2015). Participants were provided other common comparative grading scales for cross reference. Self-reported SL climbing ability has been shown to be a valid and reliable predictor of on-site ability in experienced, competitive climbers (Draper et. al, 2011). Participants were also asked to estimate usual volume of climbing and non-climbing training in minutes per week. Non-climbing categories included aerobic exercise, anaerobic exercise, and resistance exercise, respectively. Definitions and examples of specific activities in each category were given. Section 3 included the EAT-26, used with permission. Results from this portion of the survey are disseminated in other submitted works.

Data Analysis: Data was downloaded from Qualtrics into Excel for analysis. Individuals not actively climbing and/or <18 years of age were disqualified. Incomplete surveys were included in analyses if sections 1 and 2 were adequately completed. Body Mass Index (BMI) was calculated from self-reported height and weight in kg/m². Mean \pm standard deviations are reported for all descriptive data. Between group differences were calculated via independent samples t-test, significance set at $p \leq 0.05$ for all analyses. Correlations were determined via Pearson Product Moment.

Results 810 men and women responded to the survey, 599 (n = 460 males; n = 139 females) completed parts 1 and 2. Self-reported primary climbing discipline was used to sort and describe groups; SL (n=54), boulder (n=43), trad (n=11), and top rope (n=33). Based on self-reported IRCRA SL ability, female SL climbers were divided into two groups; A/E SL climbers (IRCRA SL rating ≥ 18) and L/I SL climbers (<18). Grouping criteria are based on suggestions by Draper, N. et. al, 2016. A/E and L/I SL climbers are described and compared in Table 1. Boulders were grouped according to the same criteria but using bouldering ability. There were no statistically significant differences between A/E boulderers (n = 29) vs. L/I boulderers (n = 13) on any of the comparison measures except bouldering ability (A/E 20.10 \pm 2.58 vs. L/I 16.15 \pm 0.90; $p < 0.01$). A/E SL climbers and A/E boulderers are compared in Table 2. Among those who identified as primarily SL climbers there was a moderate inverse relationship between body weight and SL ability ($r = -0.53$) as well as BMI and SL ability ($r = -0.57$) and a weak positive relationship between climbing-specific training volume and SL ability ($r = 0.28$). Among those who identified primarily as boulderers these relationships were unremarkable; body weight and bouldering ability ($r = 0.04$); BMI and bouldering ability ($r = 0.08$); and climbing specific training volume and bouldering ability ($r = 0.08$).

Table 1. Characteristics of advanced/elite (A/E) female sport lead climbers and lower level/intermediate (L/I) sport lead climbers (mean \pm standard deviation).

Characteristic	A/E (n=23)	L/I (n=31)
Age (years)	37.6 \pm 8.3	33.8 \pm 10.6
Height (cm)	160.9 \pm 6.1	163.6 \pm 6.3
Weight (kg)	52.7 \pm 5.9*	61.6 \pm 8.1
BMI (kg/m ²)	20.3 \pm 1.6	23.0 \pm 2.6
Years climbing	12.1 \pm 7.9	8.7 \pm 7.4
Indoor climbing	50% \pm 27%	56% \pm 30%
IRCRA sport lead climbing ability	22 \pm 3*	13 \pm 3
Climbing volume (min p/week)	380 \pm 220	304 \pm 162
Non-climbing volume (min p/week)	118 \pm 137*	196 \pm 128

BMI, body mass index; Indoor climbing given as a percentage of total climbing over the previous 6 months. Sport lead climbing ability groupings IRCRA \geq 18 and $<$ 18 based on International Rock Climbing Research Association (IRCRA) conversion scale and suggestions by Draper N. et al (2016). * Significantly different from A/E $p < 0.05$.

Table 2. Characteristics of advanced/elite (A/E) boulderers vs. advanced/elite sport lead (SL) climbers (mean \pm standard deviation).

Characteristic	A/E Boulder n=29	A/E SL n=23
Age (years)	28.8 \pm 7.1*	37.6 \pm 8.3
Height (cm)	165.9 \pm 6.7*	160.8 \pm 6.1
Weight (kg)	57.9 \pm 7.4*	52.7 \pm 5.9
BMI (kg/m ²)	21.0 \pm 2.2	20.3 \pm 1.6
Years climbing	6.9 \pm 5.8*	12.1 \pm 7.9
IRCRA boulder ability	20.1 \pm 2.6	20.7 \pm 3.4
IRCRA sport-lead ability	14.8 \pm 5.4*	22.0 \pm 3.2
Climbing volume (min p/week)	278 \pm 187	378 \pm 220
Indoor climbing (% total)	80% \pm 19%*	50% \pm 27%
Aerobic exercise volume (min p/week)	131 \pm 109	105 \pm 57
Anaerobic exercise volume (min p/week)	120 \pm 80	76.0 \pm 77
Resistance exercise volume (min p/week)	105 \pm 49	86 \pm 74

BMI, body mass index; IRCRA B and IRCRA SL, bouldering and sport lead climbing ability, respectively, based on International Rock Climbing Research Association conversion scale. Indoor climbing given as a percentage (%) of total climbing over the previous six-months. * Significant difference between groups $p < 0.01$.

Discussion To the best of our knowledge, this is the first study to examine training behaviors among a large heterogeneous sample of female climbers. Based on our findings it appears that the A/E female sport-lead climber

spends just over half of her climbing time indoors, if she is a boulderer, its closer to 80%. The best SL climber is also equally good at bouldering (based on the IRCRA scale). She spends about one hour each day climbing (actual time on the wall) and about two hours each week performing non-climbing-specific training with varying amounts of aerobic, anaerobic and resistance exercise. However it appears that non-climbing-specific training is not a priority among A/E climbers nor is it positively associated with SL ability ($r = 0.14$) or bouldering ability ($r = -0.13$). L/I SL climbers spend more time performing non-climbing-specific training compared to A/E SL climbers ($p = 0.04$). It is likely that L/I SL climbers have more diverse interests and this phenomena is not cause and effect. The A/E female boulderer is likely in her late twenties and is taller and heavier (165 cm, 65 kg) than A/E SL climbers. She has been climbing for about 6 years and typically isn't as strong of a SL climber (IRCRA 14.8 ± 2.6) as she is a boulderer (IRCRA 20.1 ± 5.4). We found no statistically significant differences between A/E boulderers and L/I boulderers on any of the comparison measures except bouldering ability. We hypothesize this is due to over-estimation of bouldering ability by many of the respondents. When sorting data based on bouldering ability 73 of the 139 women reported bouldering at an IRCRA ranking ≥ 18 compared to just 31 women who reported SL at an IRCRA ranking ≥ 18 . Self-reported bouldering ability may be inflated when using the IRCRA scale. Additionally self-report of climbing ability may not reflect an accurate representation of true climbing ability in L/I climbers and/or individuals who primarily top rope or participate in traditional climbing. Future research should investigate if the IRCRA scale is a valid tool for self-reporting bouldering ability as well as climbing ability in L/I populations.

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