

DIFFERENCES IN PERCEPTION OF BODY WEIGHT AND FITNESS COMPONENTS ON PERFORMANCE
IN ROCK CLIMBERS

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Introduction: The purpose of the study was to examine climber perception of fitness components and body weight as they relate to performance and if differences in these perceptions exist based on demographic variables and scores on the Eating Attitudes Test (EAT-26). **Methods:** Participants completed an online survey comprised of demographics, climbing specific questions, performance perception items, and the EAT-26. **Results:** A total of 605 participants completed the survey with 463 (75.8%) males and 142 (23.2%) females of ages ranging from 18 to 69 ($M = 31.92$, $SD = 9.45$). Climbers identifying as advanced or elite and those who scored at or above 20 on the EAT-26 had significantly higher agreement ($p < .05$) that body weight and body fat would affect climbing performance. **Conclusion:** The findings suggest that differences exist in the perception of the role of body weight and body fat on performance in those of higher climbing abilities as well as those at increased risk of disordered eating.

Keywords: climbing, sports, performance, eating disorders, body weight

Introduction: Le but de l'étude était d'examiner la perception par les grimpeurs des composantes de la condition physique et du poids corporel en fonction des performances et de voir si des différences dans ces perceptions existent en fonction des variables démographiques et des scores du test d'attitude alimentaire EAT-26. **Méthodes:** Les participants ont rempli un sondage en ligne comprenant des données démographiques, des questions spécifiques sur l'escalade, des éléments sur la perception de la performance et le test EAT-26. **Résultats:** Un total de 605 participants ont répondu à l'enquête avec 463 (75,8%) hommes et 142 (23,2%) femmes de 18 à 69 ans ($M = 31,92$, $SD = 9,45$). Les grimpeurs identifiés comme avancés ou élités et ceux ayant obtenu un score égal ou supérieur à 20 au test EAT-26 étaient en meilleur accord ($p < 0,05$) avec le fait que le poids et la graisse corporelle affectent la performance en escalade. **Conclusion:** Les résultats suggèrent qu'il existe des différences dans la perception du rôle du poids et de la graisse corporelle sur la performance chez ceux qui ont des capacités d'escalade plus élevées ainsi que chez ceux qui présentent un risque accru d'alimentation désordonnée.

Mots-clés: escalade, sport, performance, troubles alimentaires, poids corporel

Introduction: As the number of indoor climbing facilities has increased in recent decades, the sport of rock climbing has become more popular and accessible to a wide range of ages and abilities. For many, rock climbing is a form of recreational physical activity. Evidence suggests that indoor and outdoor climbing enhances several health-related components of fitness as well as mental and social elements of wellness (Mermier, Robergs, McMinn, & Heyward, 1997; Shostak-Kinker, Titiana Tanner-Jospe 2012; Kurten, 2009). Some individuals engage in climbing as a competitive sport and venues range from local competitions to International World Cup Championships. Rock climbing is also slated to make its debut on the Olympic stage in 2020, which may further increase its popularity.

In order to improve climbing ability and the grade at which one can climb, additional technical skills and climbing-specific strength and endurance are necessary (Grant, Hasler, Davies, 1999; Giles, Rhodes, & Taunton, 2006). Anecdotally, there is a common belief that having less body fat will contribute to improved performance via higher strength to body mass ratio. However, to date, there is no supportive evidence that reducing body fat has this effect but little research has attempted to answer such questions (Sheel, 2004). It is unclear the extent to which climbers believe a lower body weight or body fat level will improve performance. Additionally, in sports where leanness is a determinant in success, either for aesthetic reasons, making specified weight classes, and/or for strength to weight benefits, athletes may be more vulnerable to develop disordered eating (Garner and Garfinkel, 1980; Stoutjesdyk & Jevne, 1993).

With the increased popularity of rock climbing, it is important to understand potential health concerns associated with the sport. Therefore, the primary objective of this study was to examine the perceptions of fitness and body weight as they relate to climbing performance, in a heterogeneous sample of climbers. Secondly, to examine if these perceptions differ by climbing ability or by disordered eating risk.

Methods: *Participants:* We solicited the IRCRA delegation (45 members) with an email introducing the research project. Delegates then distributed the web link survey among their respective international climbing communities. The survey was also posted on climbing-related social media sites. Participants included volunteers 18 years or older who self-identified as rock climbers and have been active in the sport within the past three years. Participants were limited to those who currently participate in traditional, sport, speed and top-rope climbing, as well as bouldering and free-soloing. Each participant completed an anonymous on-line survey. *Instrument:* The survey consisted of demographic questions, training and physical activity-specific items, performance perception questions (PPQ), and the EAT-26. With the exception of the EAT-26, all items were developed by the research team using recommendations from Draper et al., 2016. Self-reported skill level was determined by best redpoint (clean ascent with no falls or weighting the rope) and has been found to be a valid measure of climbing skill (Draper et al., 2011). Climbers were then classified into one of five possible ability levels; lower grade, intermediate, advanced, elite, and higher elite, as defined by Draper, et al. 2016. Performance perception questions asked the participant's perception on how fitness components, body weight and composition affect climbing performance. The EAT-26 was used to determine those at risk for disordered eating. The EAT-26 has been shown to be a valid and reliable measure of disordered eating attitudes (Garner, Olmsted, Bohr, & Garfinkel, 1982). Scores were coded, summed and interpreted as recommended by <http://www.eat-26.com>, with scores ≥ 20 suggesting a high level of concern for dieting, weight and problematic eating behaviors. *Analysis:* Analysis was performed with SPSS Version 22. Descriptive statistics along with t-tests and Analysis of Variance were used to determine if differences existed based on gender, self-reported skill level, and EAT-26 scores. Alpha was set at .05 a priori for all tests.

Results. A total of 605 participants completed the survey with 463 (75.8%) males and 142 (23.2%) females, ages 18 to 69 ($M = 31.92$, $SD = 9.45$). A wide range of climbing experience was reported (1 month to 50 years) and IRCRA redpoint abilities ranged from 3 to 32. Participants represented 36 different countries with the majority from the US (61.5%). Mean participant agreement on the performance perception questions are presented in Table 1.

Table 1. Means and Standard Deviations (*SD*) of Agreement with the PPQ

Item	Performance Perception Question	Mean	<i>SD</i>
1	My climbing performance would improve if I lost body weight	3.45	1.20
2	My climbing performance would improve if I lost body fat	3.81	1.12
3	My climbing performance would improve if I gained muscle mass	3.72	1.01
4	I try to decrease my body weight and body fat to improve climbing performance	3.46	1.15
5	My climbing performance would improve if I gained muscle strength	4.56	0.62
6	My climbing performance would improve if I gained muscle endurance	4.63	0.58
7	My climbing performance would improve if I improved flexibility	4.37	0.79
8	I am worried that if I were to gain weight, my climbing performance would decrease	3.45	1.10

Note: Statements were rated on a Likert scale of strongly disagree (1) to strongly agree (5).

Differences on performance items were analyzed based on demographic variables. An independent t-test showed a

significant difference ($p < .05$) on the statement “My climbing performance would improve if I improved flexibility”, with males in higher agreement ($M = 4.46$, $SD = 0.71$) compared to females ($M = 4.08$, $SD = 0.95$). No other differences were seen between genders. A one-way ANOVA showed differences ($p < .05$) in IRCRA scores under performance item 3 $F(4, 496) = 6.39$, $p = .000$, performance item 4 $F(4, 496) = 4.36$, $p = .002$ and performance item 8 $F(4, 494) = 6.93$, $p = .000$ (Table 2).

Table 2. Significant Differences between Agreement with PPQ Based on IRCRA Categories

Item	Performance Perception Question	IRCRA Category and (M)
3	My climbing performance would improve if I gained muscle mass	Higher Elite (2.82) and Lower Level (3.79) Higher Elite (2.82) and Intermediate (3.84) Elite (3.32) and Intermediate (3.84) Advanced (3.50) and Intermediate (3.84)
4	I try to decrease my body weight and body fat to improve climbing performance	Intermediate (3.29) and Advanced (3.61) Intermediate (3.29) and Elite (3.88)
8	I am worried that if I were to gain weight, my climbing performance would decrease	Lower Level (3.37) and Advanced (4.00) Intermediate (3.20) and Advanced (3.57) Intermediate (3.29) and Elite (4.00)

Note: Analysis included those reporting redpointing for roped (sport, trad, and top rope) climbing only. Statements were rated on a Likert scale of strongly disagree (1) to strongly agree (5).

Multiple independent t-tests with Bonferroni corrections showed significant differences on the weight/body fat PPQ between individuals who scored ≥ 20 on the total EAT-26 and individuals who scored < 20 (Table 3).

Table 3. Significant Differences between PPQ Based on EAT-26 Scores

Item	Performance Perception Question	EAT-26 < 20 M (SD)	EAT-26 ≥ 20 M (SD)	t , p value
1	My climbing performance would improve if I lost body weight	3.37 (1.19)	4.12 (1.00)	$t(566) = -5.05$, $p = .000$
2	My climbing performance would improve if I lost body fat	3.74 (1.13)	4.52 (0.73)	$t(566) = -0.83$, $p = .000$
4	I try to decrease my body weight and body fat to improve climbing performance	3.35 (1.14)	4.42 (0.80)	$t(566) = -8.80$, $p = .000$
8	I am worried that if I were to gain weight, my climbing performance would decrease	3.34 (1.07)	4.40 (0.89)	$t(564) = -8.06$, $p = .000$

Note: Statements were rated on a Likert scale of strongly disagree (1) to strongly agree (5).

Discussion: Studies have shown that in addition to skill, certain physiological and anthropometrical strengths become beneficial as climbers move into the higher grades (Grant et al. 2001, Watts, Martin, & Durtschi, 1993). However, in this study, we aimed to understand how climbers themselves view components of fitness and body weight as they relate to their own climbing performance. Descriptive statistics showed that participants had the highest agreement with statements that strength, endurance and flexibility would improve their climbing performance and the lowest agreement on statements regarding body weight and body fat. This suggests that overall climbers perceive muscular changes as being of more value in improving performance than weight or body fat loss.

When examining differences based on climbing ability, participants in the lower grade and intermediate categories

placed more value on gaining muscle mass when compared to each of the three higher level categories. Lower ability or novice climbers may believe that lack of muscle mass is a limiting factor, whereas more advanced climbers may focus on other factors (i.e. finger strength, strength to weight ratio) as more beneficial because they have already attained a high strength to body weight ratio. Also of note, advanced and elite climbers had higher agreement with two of the body fat/ body weight questions when compared to the lower grade and intermediate categories which suggests that individuals in these categories place more importance on leanness as a determinant of improved climbing performance; however, higher elite was not well represented in this data set (n=7). When examining differences based on EAT-26 scores, participants who scored ≥ 20 (higher risk for disordered eating) were in higher agreement on all four body weight/body fat questions compared to those who scored below 20. Stoutjesdyk and Jevne, 1993, found that athletes who engaged in activities that emphasized leanness had higher EAT scores when compared to those participating in nonweight-restricting activities. Similarly, the current study has shown that those with EAT-26 scores above the cutoff may be emphasizing leanness as a determinant of climbing performance. Individuals who overvalue weight as a component of performance may be at an increased risk for eating disorders (Killen et al., 1996). *Future Directions:* Future research should evaluate performance perceptions and include questions to assess the value the climber places on improved performance and any behavior related to these perceptions. Future studies should also target competitive climbers and climbers in the higher elite category.

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