

Contrasting resistance and technique training perception in advanced female rock climbers

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Introduction

Recreational participation in climbing has increased rapidly over the last decade, and progress in climbing performance is something that the growing climbing community is increasingly striving for. While prolonged participation in the sport is advisable, research has shown that climbing-specific resistance training (RT) in addition to climbing is key to progressing in climbing performance. This training may include exercises designed to strengthen the finger flexors, elbow flexors or shoulder extensors, as well as on-the wall training such as intentional bouldering or system-wall climbing [1]. Whilst many climbing gyms offer training equipment, only a small number of recreational climbers, mostly male, can be observed to train regularly and in a planned way. Research on the effects of RT interventions on climbing performance mostly focuses on male athletes [2]. In addition, studies in other sports have shown that women are less likely to participate in RT than men [3, 4]. Researchers [4] list commonly observed barriers such as gender stigma, negative comments and discouragement, but also boredom and lack of knowledge about RT as possible explanations. Enjoyment, comfort, and perceived usefulness of training on the other hand are prominent factors influencing willingness to continue training for both men and women [4, 5]. Finally, time was reported to be another significant barrier to participation in training [6]. Hence, it is of interest to identify the effects of minor and time efficient additions to existing training routines. While research can provide knowledge about the efficacy of RT methods in climbing, it is still unknown how climbers perceive and experience such training. The aim of our study was thus to examine exercise enjoyment, exercise (dis-)comfort, rate of perceived exertion, and intrinsic training motivation in relation to a five-week training intervention involving either off-the-wall resistance training or intentional on-wall climbing in beginner to advanced climbers. Because female climbers may face more significant barriers to regular climbing training [3, 4] and are underrepresented in the climbing literature [2], only female climbers were included.

Method

A total of 21 advanced female climbers were recruited for this study. They had to have a maximum performance level of IRCRA 20, climb at least once a week, and be free of injury. Participants should also not have performed intentional climbing-specific training before. They were randomly assigned to a resistance-training (RT) or a technique training group (TT). Both groups were instructed to perform a prescribed 30-minute training at the start of their usual bouldering and climbing routine twice a week. Participants in the RT group were instructed to do ring-rows and a fingerboard protocol, while the TT group was instructed to practice certain

boulder problems on the Kilterboard (Kilter, LLC, Boulder, Colorado, United States). All participants were asked to adjust the intensity of the exercises individually for the subsequent training session according to their subjective perception during the prior session. Subjects were instructed on how to train and adjust the intensity during their first training session and then followed the program according to their own climbing schedule for five weeks. Climbing performance was assessed on five boulder problems before and after the intervention. Rate of perceived exertion (RPE), rate of perceived discomfort (RPD), and exercise enjoyment (EE) were assessed right after the first and last training session and after a session mid-way through the study. In addition, intrinsic training motivation (ITM) was assessed after the last training session.

Results

Out of 21 participants, 17 were included into the analysis. There were no significant differences between the groups regarding age, weight, height, climbing level, climbing experience, climbing sessions per week, or climbing performance at pre-test ($p=0.122-1.000$). A two-way repeated measures ANOVA was used to examine the effects of time and group on RPE, RPD, EE, and performance. There were significant main effects of time for RPE ($F(2,14) = 6.238, p = 0.005, \omega^2 = 0.174$), RPD ($F(2,14) = 4.339, p = 0.022, \omega^2 = 0.119$), and climbing performance ($F(1,15) = 9.076-12.082, p = 0.003-0.009, \omega^2 = 0.008-0.040$), but not EE ($p = 0.095-0.536$). While the TT group scored generally higher in EE, RPE, and performance, and lower in RPD, no statistically significant interaction effects for time and group were found for any of the affective- and performance measurements ($F < 1.2, p > 0.3$). Additionally, significantly higher intrinsic motivation ratings for the TT group regarding interest/enjoyment ($U = 14.5, p = 0.043$), effort/importance ($U = 15, p = 0.046$), and value/usefulness ($U = 20.5, p = 0.020$) were found. No significant differences between the groups were found for pressure/tension ($U = 11.5, p = 0.145$).

Discussion

Our results suggest that while both technique and off-the-wall resistance training have positive effects on bouldering performance in lower level to advanced female climbers, the former elicits higher intrinsic training motivation, possibly related to less discomfort and greater exercise enjoyment. A way to break down the barriers towards RT for females and to motivate more women to train in addition to climbing on a regular basis, could thus be to introduce them to more complex and technical ways of training that are perceived as highly sport-specific. Importantly, both bouldering and fingerboard training have been reported as effective for improving as climbing-specific fitness [7, 8]. Since both methods were generally positively rated, trainers and practitioners can consider incorporating either one in training routines. The selection should be based on desired outcomes as well as personal preferences. However, more research is needed to identify the specific outcomes of the two training routines in recreational females. Furthermore, it is important to note that this study included advanced female climbers only and the findings may, therefore, not be applicable to males or climbers on other performance levels.

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Short Biography

Kaja Langer entered the research world to follow her passion for climbing research after graduating from university with a state examination in sports and biology. As a PhD student at the Technical University of Darmstadt in Germany, her personal and professional goals are to explore the effects of training on climbing performance and to establish more standardized procedures in performance diagnostics. She strongly supports the cooperation between researchers and practitioners and can be credited with the publication of two reviews in these areas. When she's not busy, you can find her in the climbing gym either training others or enjoying some time on the wall herself.

Nicolay Stien has a background in exercise science from the Western Norway University of Applied Sciences. His research has been focused mainly on resistance training and muscle activity, which in combination with his passion for climbing has led his research increasingly in the direction of training and testing for climbing. He completed his PhD in climbing in the fall of 2021, and since then he has been working mainly with movement learning and skill acquisition in both traditional resistance training and in climbing.