Rock climbers’ management of hand injuries and perceptions on seeking healthcare: A mixed methods analysis

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Rock climbers’ management of hand injuries and perceptions on seeking healthcare: A mixed methods analysis

Keaton F. Piper1*, Jillian R. Gold1, Ryan P. Bodkin2, Erik A. Rueckmann2, Katherine Rizzone3 and Camille A. Martina4

Abstract: This study examined rock climbers’ behaviors and perspectives on utilizing healthcare for climbing-related hand injuries. Twenty-eight climbers were interviewed and completed questionnaires on their management of the 88 climbing-related hand injuries in their lifetimes. The most prevalent reasons for not seeking professional healthcare for hand injuries were: trust in own and/or peers’ treatment knowledge (57%), belief that utilizing healthcare is unnecessary because injuries will self-resolve (35%), and belief that healthcare providers do not have appropriate knowledge to treat climbing-related hand injuries (21%). Ten injuries (11%) were evaluated by primary care physicians, hand specialists, and/or physical therapists. Reasons climbers did seek professional healthcare included an injury required a clearly urgent intervention (57%), repeated or worsening injuries (53%), and knowing a trusted provider (21%). This information can be used to better establish healthcare relationships with climbers to prevent and treat these common injuries and avoid long-term disability from improper management.

Subjects: Sports Medicine; Qualitative Methods in Sport; Health & Medical Anthropology

Keywords: rock climbing; hand injury; qualitative; healthcare utilization; climbing injury

ABOUT THE AUTHORS
Keaton F. Piper and Jillian Gold are 4th year medical students at the University of Rochester School of Medicine, each with a decade of rock climbing experience and several published peer-reviewed abstracts and presentations. The proposal for this study resulted from prior research at the University of Rochester which found that only a small number of rock climbers with hand injuries sought professional healthcare. These patients also reported chronic pain and hand dysfunction. Upon further investigations in scholarly databases, no definitive studies of this phenomenon emerged, prompting the authors to investigate rock climbers’ decisions to seek or not seek healthcare. Our collaborators include Ryan Bodkin, MD; Erik Rueckmann, MD, MPH; Camille Martina, PhD, MS; and Katherine Rizzone, MD, MPH. As emergency medicine physicians, a sports medicine physician, and a public health qualitative and lifestyle researcher, each played a crucial role in the study design, methodology, and data analysis and interpretation.

PUBLIC INTEREST STATEMENT
Studies have shown many climbers choose not to seek healthcare for their injuries, often leading to prolonged recoveries and lasting physical limitations. While the literature has examined the high incidence of soft tissue injuries, climbers’ reasoning for not seeking healthcare has not been studied. The purpose of this study is to better understand how rock climbers make decisions regarding professional healthcare utilization, particularly for hand injuries, which are prone to prolonged recoveries and preventable chronic pain. These data show that climbers choose not to seek healthcare for their climbing-related hand injuries likely due to a lack of understanding of the treatment options available and reservations about the professional healthcare community. This is a significant finding because when left untreated, hand injuries can cause life-long disabilities. Further research on this topic is increasingly important, as hand injuries will become more prevalent with the increasing popularity of the sport.
1. Introduction

While rock climbing began as a skill for mountaineering, it is a growing sport with competitive collegiate teams and will be a sanctioned Olympic sport in 2020 (Hughes, 2012; Lutter, El-Sheikh, Schöffl, & Schöffl, 2017). Although risk for serious injury from high-impact falls exists (Nelson & McKenzie, 2009), these injuries are rare due to advances in climbing safety equipment (Bollen, 1988). In contrast, soft tissue hand injuries from repetitive and strenuous maneuvers are common (Bollen, 1988; Jones, Asghar, & Llewellyn, 2008; V. Schöffl, Morrison, Schwarz, Schöffl, & Küpper, 2010). A2 and A4 pulley tendons are particularly vulnerable and often injured because of the unique hand positions required (Figure 1) (Bollen, 1988; Bollen & Gunson, 1990; Kubiak, Klugman, & Bosco, 2006; Logan, Makwana, Mason, & Dias, 2004; V. Schöffl, Hochholzer, Winkelmann, & Strecker, 2003; V. R. Schöffl & Schoffl, 2007).

Full recovery and return to sport for individuals with overuse climbing-related hand injuries is possible (Kubiak et al., 2006; Schneeberger & Schweizer, 2016; V. R. Schöffl, Einwag, Strecker, & Schöffl, 2006). A study of 21 climbers in 2006 showed return of full range of motion and strength within one year for all climbers with hand injuries who complied with professional healthcare recommendations of a specific splinting and rehab protocol (V. R. Schöffl et al., 2006). Yet, it is well-known that many climbers fail to seek medical care for their hand injuries (Furst-Nichols, Jones, Rueckmann, & Mirabelli, 2015; Gerdes, Hafner, & Aldag, 2006), risking future debilitating complications such as muscle contractures, invasive orthopedic surgeries, limited range of motion, chronic pain and loss of ability to participate in sport (Folkl, 2013; Logan, Mason, Dias, & Makwana, 2005). As few as 34% of all climbing related injuries will be evaluated by a healthcare provider (Furst-Nichols et al., 2015; Gerdes et al., 2006), yet there is no study to date examining the beliefs and perspectives of climbers that cause this lack of health care utilization.

This study was designed to answer the following:

(1) What influences rock climbers’ decisions to seek or not seek professional healthcare for climbing-related hand injuries?

(2) What are the sources of information used by climbers who do not seek care from a health care professional?
2. Methods

2.1. Participants and setting
The study was conducted in North America at seven popular climbing sites (Table 2) between May and July 2015, using purposive sampling. Climbers were verbally screened for the following inclusion criteria: (1) age 18 or older, (2) have sustained a climbing-related hand injury that limited their ability to continue climbing, and (3) climb at an intermediate to experienced level. Climbers gave oral consent to the written questionnaire and interview. Institutional Review Board approval was obtained at the University of Rochester Medical Center prior to participant recruitment.

Intermediate to experienced climbing ability was defined as the ability to onsight a sport climbing route at the French level 6b–8b, or onsight a bouldering problem at the Fontainebleau scale of 6A–7C, as set forth by Gronhaug et al. in 2016 (Grønhaug & Norberg, 2016). These grades were converted to the Yosemite Decimal System 5.10c–5.13d for sport climbing and Hueco V3–V9 for bouldering because the study took place in the North America.

2.2. Pre-interview questionnaire
The questionnaire (Appendix 1) collected information on demographics, climbing habits, and health-care utilization for their climbing-related and non-climbing medical needs. The questionnaire was used to guide and expedite the interview, as well as collect quantitative data on the climbers’ health care utilization for the injuries they experienced.

2.3. Semi-structured interview
Two researchers, trained in qualitative interviewing, conducted interviews using a script developed by researchers and climbers (Appendix 2). Respondent verification was used to explore climbers’ thought processes behind their healthcare decisions and to clarify appropriate interpretation of the questionnaire responses. Climbers who had more than three climbing-related hand injuries were asked to elaborate on only three of them due to time restraints: (1) earliest injury, (2) most recent injury, and (3) injury that most affected their life. The data collection tools were piloted on two climbers.

2.4. Qualitative analysis: coding methodology
After transcribing the audio-recorded interviews, a Grounded Theory approach with open coding was utilized (Corbin & Strauss, 2015; Glaser & Strauss, 1999). Two researchers, trained in qualitative analysis, separately coded the transcripts. The researchers discussed codes to generate agreed-upon themes. Themes were stratified by the frequency of responses and condensed into categories. Sample size was determined by theme saturation (minimum of 15 interviews and 3 consecutive interviews that generated no new themes). Theme saturation was reached at 28 participants, after 60 climbers had been screened (Figure 2).
3. Results

3.1. Demographics
Twenty-eight climbers participated in the study: 26 males and 2 females (median age: 28, range: 22–66 years old), who began climbing at mean age of 19. Mean climbing time was 13 h per week for 41 weeks out of the year. Climbers were from 11 of the U.S. states (Figure 3). Climbers reported on-sight1 climbing between 5.10c and 5.13b on YDS, equivalent to French grades 6b to 8a. Boulderers’ skill level ranged from onsight climbing Hueco scale V7 to V14, equivalent to Fontainebleau scale of 7A+ to 8B+. Of the 28 climbers interviewed, 13 had occupations that required rock climbing. Thirty-one percent of climbers reported a “poor” experience with healthcare in general. Climber characteristics and experiences with healthcare are detailed in Table 1.

| Table 1. Climber characteristics* |
|-----------------------------------|
| Climbing habits                   | Mean (range) |
| Most difficult climb in the past year | 5.12 (5.10c–5.13b) & V12 (V7–V14) |
| Hours climbing/week               | 13 (2–30)    |
| Weeks climbing/year               | 40 (4–52)    |
| Years climbing at this frequency and grade | 11 (1–50)    |
| Climbers with primary care physician | 15          |
| Climbers with health insurance    | 19           |
| Rank experience with healthcare in general | N (%) |
| Excellent                         | 3 (11)       |
| Good                              | 8 (29)       |
| Fair                              | 7 (25)       |
| Poor                              | 8 (29)       |
| Injury prevention methods practiced |               |
| Warm up on easier holds           | 23 (82)      |
| Avoid crimp holds                 | 12 (42)      |
| Taping over pulleys               | 10 (36)      |
| Hand exercises                    | 5 (18)       |
| Planned rest                      | 5 (18)       |
| Other methods                     | 5 (18)       |
| Number of climbing hand injuries in lifetime | Mean (range) |
|                                   | 3 (1–10)     |

*Not all surveys were completed in entirety.

3.2. Hand injuries
The 28 climbers reported 88 total hand injuries caused by climbing. Hand injuries indicated by the climbers varied widely in both location and description, but 53% were of the 3rd and 4th fingers (Table 4). Sixty percent of the participants had repeated injuries and twenty-eight percent reported lasting pain or deformity. The most common causes of injuries were “general overuse” and “crimping” (Table 4).

3.3. Healthcare utilization
Despite 52% of climbers reporting that they had health insurance at the time of their injury, only 11% utilized healthcare services. Of the climbers who sought professional healthcare for their injuries, three saw a primary care physician (PCP) only, three saw a PCP and were referred to a hand specialist, one saw a hand specialist only, one saw a hand specialist and acupuncturist, one saw a physical therapist, and one went to the emergency department. Eighty-eight percent (78/88) of the injuries were self-treated. Climbers who saw a healthcare provider had a 50% rate of expressing satisfaction with their healing process. Climbers who self-treated had a 35% rate of satisfaction with their healing process.
3.4. Decision-making around healthcare utilization

Reasons climbers reported not seeking healthcare included trusting personal and climbing community knowledge over the knowledge of healthcare providers, a belief that the injuries would self-resolve, and belief that providers do not have the appropriate knowledge to manage these specific injuries. One climber commented, “You would think that [sports medicine] specialists in Boulder would be world class. But they did not provide anything that a five minute Google™ search would not find.” Another climber reported a similar concern, stating, “Primary health care providers, most of them, from what I’ve heard just don’t know their hand stuff. You walk in feeling like you know more than them because you’ve looked it up on the Internet. I mean, it is pretty easy, you have your pulley, tendons and a couple other things going on, and you can feel around and see what you are feeling [in regards to diagnosing].”

Although only 10 participants sought healthcare, 16 climbers stated they would seek healthcare if they required a “serious medical intervention”, which climbers categorized/defined as including sutures, joint relocation, or if self-treatment did not yield desired results. Most climbers sought advice from trusted peers, and/or media sources. One climber stated, “it just helps to talk to others who have had similar injuries, they might know more than the doctor.” Many climbers reported changes in treatment approaches with subsequent injuries. Themes derived are listed with associated number of respondents in Table 3.

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**Table 2. Number of participants at each data collection site**

| State        | Name of climbing location         | N (%) |
|--------------|-----------------------------------|-------|
| New York     | Local Climbing Gym                | 2 (7) |
|              | Boulder Canyon                    | 6 (21)|
|              | Clear Creek Canyon                | 2 (7) |
| Colorado     | Estes Valley                      | 2 (7) |
|              | Independence Pass                 | 3 (11)|
|              | Local Climbing Gym                | 3 (11)|
|              | Rifle State Park                  | 1 (4) |
| California   | Yosemite National Park            | 9 (32)|
4. Discussion

4.1. Reasons climbers do not seek care

The primary aim of this study was to gain insight into why intermediate to experienced outdoor rock climbers elect to not seek formal healthcare for their climbing-related hand injuries. Previous studies have shown that many climbers fail to seek medical care for their injuries, yet often sustain long-lasting discomfort and disfigurement from the injury (Furst-Nichols et al., 2015; Gerdes et al., 2006). This study found that climbers trusted information from other climbers and climbing media over healthcare professionals. Additionally, climbers believed most their injuries were not serious enough to merit medical treatment, often leading to insufficient self-treatment. These results lay a foundation for further research on disseminating information regarding prevention and treatment of climbing-specific hand injuries.

4.2. Belief that healthcare professionals cannot help

Climbers who decided to self-treat preferred to seek information from peer climbers and the climbing media; sixteen participants believed climbers are a better source of information than doctors and ten participants believed healthcare professionals are ill-equipped to help with their injuries. One climber explained, “a climber would rather talk to a doctor who is also a climber, or at least understood climbing. From my experience they don’t. They understand sports injuries, but the hand ones specifically are pretty weird for them.” Despite many climbers sharing similar beliefs, the ten climbers in our study treated by a healthcare provider had a 50% rate of reporting full remission of symptoms in a timely manner as compared to 35% satisfaction rate in climbers who self-treated. This shows that there may be benefit in seeking healthcare for climbing-related hand injuries but climbers are unaware of the benefits. Reported satisfaction of the healing process was linked closely to providers who “were more familiar with climbing” and “who took the time to really understand my injury.”

Historically, lack of physician knowledge on climbing-related injuries has delayed diagnosis and treatment (Bannister & Foster, 1986; Wyatt, McNaughton, & Grant, 1996). While primary literature has been published on numerous climbing-related injuries and recommended treatments (Schneeberger & Schweizer, 2016; V. Schöffl et al., 2003), commonly used medical databases such as UpToDate and Medscape contain little on climbing-related hand injuries. Further research can examine the accessibility of climbing-related hand injury management knowledge, as well as appropriate referral by primary care providers.
4.3. Use of media for information

Sixty-one percent (17/28) of climbers sought information from the Internet and climbing magazines. One climber explained his use of internet knowledge, “A lot of it is general information, but there is actually some information that is really good. It won’t necessarily be climbing specific. But information is information, and you can make it work for you.” The quality of information available on the Internet is widely variable, from personal experiences in forums to articles written by healthcare providers in *Rock and Ice Magazine*, which do provide explanations of injuries but do not provide tools for self-diagnosis and treatment. Given the complexity and large variety of climbing-related hand injuries that can have similar symptomatic presentation (V. Schöffl et al., 2003), it is unlikely that a patient could self-diagnose based on information found online. This data highlights the importance of encouraging climbers to seek care from those who understand the nuances of different injuries. Climbing gyms or climbing forums would be an ideal location to distribute information on how to find such providers.

4.4. Cohort studied and injuries experienced

While the questionnaire was primarily used to direct the interview, the results yielded important data about the cohort studied, reported here as ancillary results. The cohort studied had an overall low perception of healthcare in general with 58% of participants reporting either “fair” or “poor” experience with healthcare providers while only three had an “excellent” experience. While only 58% had a primary care physician, all climbers reported some type of self-treatment with 96% of climbers reporting they used rest as a primary means of treatment. Of note, 16 climbers further mentioned they felt they should have taken more rest and seven climbers mentioned they should

| Table 4. Hand injury characteristics* |
|-------------------------------------|
| **Location of hand injury**           | **N (%)** |
| 1st digit                           | 3 (5)     |
| 2nd digit                           | 3 (5)     |
| 3rd digit                           | 22 (37)   |
| 4th digit                           | 25 (42)   |
| 5th digit                           | 3 (5)     |
| Palm                               | 4 (6)     |
| **Hand injury pain severity**        |           |
| 1–2                                 | 4 (10)    |
| 3–4                                 | 10 (25)   |
| 5–6                                 | 10 (25)   |
| 7–8                                 | 11 (28)   |
| 9–10                                | 5 (12)    |
| **Cause of injury**                 |           |
| General overuse                     | 21 (38)   |
| Crimping                            | 17 (31)   |
| Feet slipping while hand in a precarious position | 7 (13) |
| Fall                                | 2 (4)     |
| Not warming up                      | 3 (5)     |
| Other difficult climbing move/hold  | 5 (9)     |
| **Lessons Learned after 1st hand injury** |           |
| Take more rest after injury         | 16 (57)   |
| Rest immediately following injury   | 7 (25)    |
| Avoid certain holds and moves       | 7 (25)    |

*Not all surveys were completed in entirety.
have rested immediately following the injury, while those who followed a specific treatment regimen either self-designed or prescribed by a clinician expressed satisfaction with their outcomes. These data suggest that simple rest may not be sufficient but instead strict adherence to a treatment plan may lead to improved healing, as supported by several studies on specific conservative treatment modalities for rock climbing related hand injuries (Kubiak et al., 2006; Schneeberger & Schweizer, 2016; V. R. Schöffl et al., 2006). The questionnaire also showed that 78% of the reported injuries were due to general overuse or strain on one’s hand from difficult rock handholds. These data support previous studies showing trauma and large falls are not the cause of most hand injuries (Bollen, 1988; Jones et al., 2008; V. Schöffl et al., 2010).

5. Limitations
Due to recall bias and the fact that most injuries were self-diagnosed, it was difficult to ascertain the mechanism and severity of injury. Hence, this study is limited in the ability to assess how the nature of the injury would influence a climber’s decision to seek care. Climbing grades are subjective, making it difficult to definitively categorize our study population as intermediate to experienced (Grenhaug & Norberg, 2016). Our research included only climbers who were found actively climbing outside; therefore, our results do not reflect perspectives of climbers with injuries that prevented them from returning to the sport.

6. Conclusions
Eighty-eight percent of climbers in this study chose not to seek professional healthcare for their climbing-related hand injuries. While lack of health insurance prevented some from having the option, the overwhelming majority with health insurance still decided not to seek healthcare due to preference for advice from within the climbing community, citing lack of trust for medical providers to understand their injuries, and belief injuries will heal on their own. Future efforts should be directed toward better establishing trust with healthcare professionals as well as increasing climbers’ knowledge about the risks associated with improper or insufficient treatment of their hand injuries. Climbing gyms and media are ideal avenues to educate climbers about their injuries and connect climbers with healthcare practitioners who treat climbing specific hand injuries.

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Competing interests
The authors declare no competing interest.

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Note
1. Onsight = to complete a route without prior attempts or prior knowledge about the route.

Cover image
Permission: Drawing permission from Dr Julian Saunders, expert clinician in rock climbing injuries.

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Appendix 1. Questionnaire for semi-structured interview
Thank you for participating! Please skip any questions that you are uncomfortable answering or unable to answer.

Current Location: ___________________ Age: ________ Gender: ________

Home state: ___________________ State you most often climb in: ___________________

What is your occupation? ___________________

How many hours per week do you climb? ________

How many weeks per year do you climb? ________

How long have you been climbing at that frequency? ________

At what age did you begin climbing? ________

In the past year, what is the most difficult route you redpointed? (YDS or V scale) ________

In the past year, what is the most difficult route you onsighted? (YDS or V scale) ________

How many climbing injuries have you had in your lifetime? ________

How many of these were hand injuries? ________

How do you prevent hand injuries? Select all that apply.
(a) taping over my pulleys
(b) warm up on easier holds
(c) try to avoid using crimps whenever possible
(d) Other _________________________________

Do you treat climbing related hand injuries differently than climbing related injuries of other body parts?

(a) yes
(b) no

Rank your experiences, in general, with health care providers.

(a) poor
(b) fair
(c) good
(d) excellent

Do you have a primary care provider?

(a) yes
(b) no

Climber ___ Date:__________

On average, how many times per year do you see a doctor (for any reason)?

(a) 0
(b) 1
(c) 2
(d) 3 or more

What type of things do you see a doctor for? Select all that apply.

(a) annual wellness visits
(b) preventative care (i.e. flu shots, vaccines, etc.)
(c) chronic disease management
(d) anytime I am feeling sick
(e) other _________________________________

When you see a doctor, do you tell him/her that you are a rock climber?

(a) Yes, every time
(b) Yes, most of the time
(c) Sometimes
(d) Only if the visit is for an issue that is directly related to climbing
(e) Only if it seems like the doctor understands how climbing affects my health
(f) No
If you have had any recent injuries, aches, or pains related to climbing, would you share that with your doctor at an appointment?

(a) yes
(b) no

If you are having a non-urgent health issue related to climbing, who are you most likely to seek care from first? (you may write your own or choose from examples below) Select all that apply.

(a) primary care physician
(b) emergency department
(c) orthopedist
(d) osteopathic physician
(e) physical therapist
(f) chiropractor
(g) Reiki practitioner

If that provider was not able to help you in a suitable way, who would you most likely seek care from next? (you may write your own or choose from examples below) Select all that apply.

(a) primary care physician
(b) emergency department
(c) orthopedist
(d) osteopathic physician
(e) physical therapist
(f) chiropractor
(g) Reiki practitioner
(h) I would not seek further care from a health professional.

Climber ___ Date:__________

For each hand injury, please complete the following set of questions.

Injury #:   Year:

Did you have health insurance at the time? (a) yes   (b) no

Describe your hand injury. Please indicate your symptoms on the attached hand pictures.
Climber ___ Date:__________

Was your injury’s diagnosis given by a health care provider?

(a) yes

(b) no

What caused this injury?

(a) General overuse
(b) Crimping
(c) Crack climbing
(d) Feet slipping while hands in a precarious position
(e) A fall
(f) Other __________________________
Please rate the severity of pain you experienced with this injury: __________ (0 = no pain, 10 = excruciating, unable to use your hand for any activities)

Did you immediately stop climbing after your injury?

(a) yes, and I resumed climbing after __________ (days or weeks)
(b) no

Please select all of the ways you physically treated your injury:

(a) rest
(b) ice
(c) heat pads
(d) tape
(e) pain meds (type______________)
(f) range of motion exercises
(g) steroid injection
(h) surgery
(i) other ______________________________

What type of doctor did you see for this injury? Select all that apply.

(a) primary care doctor
(b) emergency room doctor
(c) hand specialist
(d) other _____________________________
(e) I did not see a doctor for this injury

If you did not see a doctor for this injury, you may skip to the last question of the survey.

How many days after the initial injury did you see a doctor? __________________

Did you feel your needs were met by your doctor?

(a) yes
(b) no

Climber ___ Date:__________

Did you feel listened to?

(a) yes
(b) no

Did you feel understood?

(a) yes
(b) no
Did your doctor recommend that you stop climbing?

(a) yes, temporarily
(b) yes, for good
(c) no

If you saw a medical provider that you would recommend to other climbers with hand injuries, please indicate the name of the healthcare professional(s)

________________________________________________________________________

THANK YOU for filling out this questionnaire. Please let Keaton and/or Jillian know that you have finished the survey, and we will begin the interview.

Climber ___ Date:__________

Appendix 2. Interview questions for semi-structured interview

1. Describe your training regimen in the off-season and during the climbing season.
2. What kinds of things do you do to prevent hand injuries? Please describe.
3. When do you feel you need to see a doctor for hand issues, including injuries, aches, pains, etc.?
4. Do you have any hesitations towards seeking medical care in general? Please describe.
5. Tell me about the specific injuries that you wrote about in the survey. (Will prompt for each one at a time)

For each injury:

If you saw a doctor

Why did you decide to medical care/advice?

Did you follow your doctor’s instructions? (yes/no)

Why or why not?

Describe your healing experience.

If you did not see a doctor

Why did you decide not to see a doctor?

Describe your healing experience.

6. Was your chosen path for recovery, in retrospect, the best choice?
7. Would you do anything differently next time you have a climbing related hand injury?
8. Is there anything else you feel that is important in relation to your experience with healthcare as a climber?
9. Or anything not related to climbing that has shaped your medical decisions?
10. Respondent Verification
