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ORIGINAL ARTICLE

# Mountain biker attitudes and perceptions of eMTBs (electric-mountain bikes)

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## Abstract

**Introduction** While the popularity of pedal-assist electric bikes (eBikes) generally is growing, electric-mountain bikes (eMTB) have not received a warm welcome by many within the mountain biking community. Anecdotally, a variety of concerns have been raised concerning eMTB use, including trail damage, trail conflict, decreased trail access, and the perception that eMTB use is not "real" mountain biking or is "cheating."

**Method** This qualitative study involved extracting and thematically analyzing discussion thread comments about eMTBs among nine mountain biking Facebook pages,

**Results** Three predominant themes emerged: What is an eMTB?, Trails, and How should eMTBs be used? There was general confusion about the features and capabilities of eMTBs except by those who had previously used one. Commenters expressed concern over a variety of trail-related issues, including that eMTBs will damage trails similar to the way motorized vehicles do and that they could cause restricted access to some trail systems. There were inconsistent opinions on the use of eMTBs, where some comments saw riding mountain bikes as a "rite of passage" and that using an eMTB was "cheating". There was some level of acknowledgement that eMTBs may be useful for promoting exercise, but this was mediated by the "rite of passage" belief.

**Discussion** These findings confirm general attitudes around eMTBs including fears, concerns, and prejudices. This study includes insights that will be useful in efforts to promote eMTBs for recreation, a tool to increase levels of physical activity, and in discussing potential conflicts about trail use.

**Keywords** eBike · eMTB · Public health · Physical activity · Attitudes · Perceptions

## Introduction

Mountain biking is an outdoor recreational activity and industry that has experienced rapid growth. As of 2017, there were an estimated 8.6 million soft-surface trail mountain bikers in the US. Revenue from mountain bike sales in the US were up 3% to $577.5 million dollars in 2017, dwarfing slumping road bike sales of $412.8 million. Electric-mountain bike (eMTB) sales climbed to $77.1 million in 2017, a 91% increase in US sales from the previous year and an eightfold increase since 2014 [1, 2].

The emergence of eBikes generally, and eMTBs specifically, presents an opportunity for a larger segment of the population to enjoy the health benefits of mountain biking. A typical eBike has a small electric motor that functions as a pedal-assist, only engaging when the individual pedals. Electric bikes are classified by specific functions and options. Class 1 pedal-assist bicycles only provide battery-powered motor assistance when the rider is pedaling and traveling at speeds under 20–25 mph (32–40 kph) for road/city bikes and under 15 mph (25 kph) for eMTBs. Class 2 pedal-assist bicycles have a throttle which engages the motor assist even when the rider is not pedaling and may also provide a boost of assistance while pedaling. The battery-powered motor's contribution is generally limited to between 250 and 500 W, yet this assistance allows a rider to cycle greater distances and ascend inclines due to the decreased physical work load [3]. Class 3 pedal-assist bicycles are essentially the same as Class 1 pedal-assist bicycles, except the speed limit to receive assistance is higher for Class 3 bicycles (28–30 mph).

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Given the relatively recent introduction of eBikes, the current research literature is limited. To date, most eBike studies have focused on issues concerning safety [4–8]. An emerging body of literature has focused on the potential physical health benefits of eBikes. Heart rate and energy expenditure is typically lower with an eBike compared to what would be observed with a conventional bicycle [9, 10]. A recent study suggests that eBike use results in lower oxygen consumption and exercise intensity, but that moderate physical activity is still achieved [11]. Similarly, a study of ten trained and ten untrained individuals revealed that though power output, exercise intensity, and energy expenditure were lower with assistance from the electric motor, the exercise intensity was sufficiently high to achieve the standards for moderate-intensity health-enhancing physical activity [12]. Of note, recent studies also suggest that eBike commuting may improve metabolic fitness such as glucose tolerance [13] and that riders experience lower levels of perceived exertion and higher levels of enjoyment [14]. Other studies have explored eBikes' potential to reduce personal barriers to conventional cycling, especially commuting. For example, results from an online survey demonstrated that those using an eBike to ride to work report an ability to ride greater distances while perspiring less, suggesting that eBikes may reduce some of the personal barriers of conventional cycling as a form of active transport [15]. Some research suggests that eBikes may have an added benefit of promoting health among individuals otherwise reluctant to engage in physical activity [14]. Previous eBike studies with such populations, including older individuals, obese or overweight individuals, and those who may be impacted by physical injury or impairment, have largely focused only on safety [16, 17].

While the popularity of eBikes generally is growing and their benefits related to active transport and physical activity for a broad segment of the population are being established, the introduction of eMTBs to the mountain biking community has been met with much resistance. Anecdotal concerns have been raised concerning eMTB use and increased trail damage, increased conflict between trail users, a potential for decreased trail access, and the perception that eMTB use is not "real" mountain biking or is "cheating". These concerns have the potential to limit the adoption of eMTBs by individuals who may benefit from them or otherwise enjoy their use. The purpose of this study was to characterize attitudes of mountain bikers about eMTBs in the public forum.

## Method

This qualitative study involved extracting and thematically analyzing discussion thread comments about eMTBs among nine mountain biking Facebook pages.

### Data

Data were collected from various Facebook pages whose theme and focus is to be a regional mountain biking resource and networking forum. A purposeful, convenience variation sample was selected to understand the range of attitudes surrounding eMTBs. Facebook pages were identified via Google searching for mountain biking groups that appeared popular, large, and with frequent activity, and had some regional specificity to them. See Table 1 for the whole list of included data sources. Posts and comments were collected from 15 October through 15 November of 2017, at which time saturation was obtained [18].

### Procedure

Analysis of data was based on familiarization with poster comments. The research team read through entire set of comments to establish a series of coding categories based on the aims of the study. Two researchers applied these codes to the comment posts using QSR International's NVivo 12 qualitative software [19]. NVivo was used to identify themes and relevant supporting quotations, and to compute inter-rater reliability (IRR) for coded themes. The average IRR was $\alpha = 0.84$ (range: $\alpha = 0.81$, $\alpha = 0.90$), indicating strong agreement between coders.

## Results

From among the nine mountain biking Facebook pages selected for this study, 945 comments were gathered resulting in 2537 uniquely coded units. This study aimed to characterize attitudes of mountain bikers about eMTBs in the public forum. Three themes and eight subthemes were observed (See Table 2). The themes emerging from the data

**Table 1** eMTB comment sources

| Facebook group | Location |
|---|---|
| Utah Mt. bike trail condition network | Utah |
| Vancouver Island mountain biking (VIMB) | Vancouver, British Columbia |
| Mountain biking South Africa | South Africa |
| Richmond Virginia Mountain Biking | Richmond, Virginia |
| Colorado Springs Mountain Biking | Colorado Springs, Colorado |
| Tallahassee Mountain Biking | Tallahassee, Florida |
| Mountain Bike Enthusiasts of Utah | Utah |
| Prescott Mountain Biking | Prescott, Arizona |
| Friends of IMBA (International Mountain Biking Association) | International |

**Table 2** eMTB themes from Facebook forums

| Main theme (subtheme) | Description/examples |
|---|---|
| What is an eMTB? | General discussion about what an eMTB is and is not |
| Motor vehicle | Comments about whether or not an eMTB is a motor vehicle (e.g., an eMTB is a motorcycle) |
| eMTB capabilities | Discussion about what an eMTB can and cannot do (e.g., helps with riding up hills) |
| Trails | Impact to trails, including fear of potential access restrictions and fear of trail damage. Also, potential of on-trail conflicts |
| Trail access | Discussion about current regional restrictions and potential future access changes |
| Trail damage | Actuality of trail damage resulting from eMTB use |
| Trail conflicts | Conflicts resulting from eMTB using soft-surface, MTB trails |
| How should an eMTB be used? | Assertions about the use of eMTB, including who and should not use eMTB |
| Who should use an eMTB | Characteristics of eMTB candidates laid out |
| Rite of passage | Riding MTB and riding mountain trails is a "rite of passage", something to be earned |

were What is an eMTB?, Trails, and How should an eMTB be used?

## Theme 1—what Is An eMTB?

Nearly one-third of all comments (30%) were about the nature of the eMTB itself, particularly, what exactly is an eMTB? Posters seemed to be divided into two groups when commenting on eMTBs; those who had personal experience with an eMTB and those who did not. This division appeared to be central to whether or not an individual was accepting of an eMTB and cropped up in context of other themes. eMTB riding history was occasionally self-divulged, but more often someone with prior eMTB experience "called out" someone who did not.

> "[I] Haven't ridden one nor have I been around one. But I know that they're a hot topic as of late." (Commenter on the Tallahassee Mountain Biking Facebook Group)

> "I can tell you never rode a pedal-assist bike before. It doesn't have accelerator… you have to pedal the whole time. There is no free ride, it just lets you take the same energy and go further and ride more often. It is still a workout just the same. Don't talk if you never rode one." (Commenter on the Colorado Springs Mountain Biking Facebook Group)

> "All the haters haven't ridden one" (Commenter on the Colorado Springs Mountain Biking Facebook Group)

Overall, there was general confusion about the capabilities and features. The majority of comments within this theme came from posters who presumably had little familiarity or experience with eMTBs. There was lengthy discussion as to whether or not an eMTB was in fact a motor vehicle (i.e., a motorcycle or bicycle with an electric motor) because it is not entirely human powered.

> "Many of the e mtb's are basically stripped down dirt bikes" (Commenter on the Richmond Virginia Mountain Biking Facebook Group)

> "A motorized vehicle is a motorized vehicle" (Commenter on Friends of IMBA Facebook Group)

> "I'm not against E-bikes, but doesn't it just make more sense for anything motorized to be categorized as a motor vehicle? It shouldn't really matter if it's a gas or electric motor…If it has a motor, it's motorized. And I think it will be safer for everyone if there are trails for motorized vehicles, and trails where there aren't motorized vehicles." (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

Some posters pushed back against the assertion that an eMTB is a motorized vehicle. Most seemed to rely on their own experience to provide this counter-argument.

> "I assume you have never ridden an e assist bike. FARRRRR from a stripped down dirt bike." (Commenter on the Richmond Virginia Mountain Biking Facebook Group)

> "If you think that's a motorized vehicle, go to one of the bike shops selling 'em (power assisted not motorized) and tell 'em you want to try one out without the peddles attached." (Commenter on the Friends of IMBA Facebook Group)

Similarly, many posters seemed confused or misinformed about the actual capabilities of eMTB despite having opinions about them. For example, how fast they are able to travel, the effort required to use them, and if they have the capacity to "roost" up a trail.

> "Guy … [was] going over 20mph uphill heart rate 120. Wish I could climb like that." (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"Some of the new "eBikes" are dang near motocross bikes (with mountain frames) and can cruise uphill at 20+ mph" (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"They sure can do burnouts!" (Commenter on Mountain Bike Enthusiasts of Utah on Facebook)

And there were posters with eMTB experience attempting to clarify and educate the forum on the actual capabilities of eMTBs.

"Ebikes aren't any faster than a regular bike. I have friends that can go downhill a lot faster on their Trail bike than on an eBike." (Commenter on Mountain Bike Enthusiasts of Utah on Facebook)

"Too many "cyclists" think those are motor powered. They are not. Those are power assists, similar assisting action as power steering" (Commenter on Friends of IMBA Facebook Group)

"As far as speed goes' can go faster on a regular bike the limiter cuts in at 20 mph and it feels like you are dragging a anvil behind you. My overall speeds are about the same. 10–12 mph" (Commenter on the Richmond Virginia Mountain Biking Facebook Group)

## Theme 2—trails

Almost half of comments (49%) were about trails and the impact eMTBs may have on them, access to them, or conflicts that may arise while using them. Some commenters expressed concern about trails being damaged by the eMTBs. The majority of trail damage-related comments defended eMTBs as not being any more damaging than a mountain bike.

"I strongly disagree they do any more measurable damage" (Commenter on Colorado Springs Mountain Biking Facebook Group)

"they don't damage the trail like a motorbike" (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"They cause no more wear on the trails than any other mtn bike." (Commenter on Mountain Bike Enthusiasts of Utah Facebook Group)

Some feared this damage may lead to restricted access to trails on public lands. However, most feared reduced access for mountain bikers due to an association with eMTBs. They associated eMTBs with motorcycles and feared others, including land managers, would consider an eMTB to be a motorcycle, leading to limited trail access for both mountain bikes and eMTB users.

"More E bikes = decreased trail access. Let's face it. Why do we want to give people a good excuse to ban all bikes from trails. There are already plenty of people who want bikes banned, e bikes will make it worse" (Commenter on Colorado Springs Mountain Biking on Facebook)

"I'm concerned about all mtbs being categorized with motos, since it's very difficult to differentiate the two due to the e bikes. Motos are unfairly hated, and face severely restricted access. I would hate for the mtbers to be placed in the same category due to blurred lines" (Commenter on Colorado Springs Mountain Biking Facebook Group)

"A throttle assisted electric motored dirt bike should not be allowed on a bike trail." (Commenter on Richmond Virginia Mountain Biking on Facebook)

Some commenters qualified their consideration for restricted eMTB trail access by describing potential on-trail conflicts. Since mountain biking often requires negotiating narrow trails, riding etiquette is important for rider safety (e.g., passing other riders, appropriate speed around blind corners, or yielding) and trail maintenance (e.g., riding off marked trails).

"I would worry about radical speed" (Commenter on Colorado Springs Mountain Biking Facebook Group)

"I have a rule. I don't yield to eBikes." (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"Saw some on trails in St G last week as well. Came flying by my kids and me without a word—I wasn't thrilled." (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"My only concern is for the speeds they might be able to attain and their relative experience levels." (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

"added to my personal experience where I get almost hit because they can't maneuver the bike to let me pass while i am going uphill…" (Commenter on Mountain Bike Enthusiasts of Utah Facebook Group)

Yet, a minority expressed that the soft-surface trails can be shared safely for all to enjoy.

"We can all share the space and enjoy" (Commenter on Colorado Springs Mountain Biking Facebook Group).

### Theme 3—How should eMTB be used?

The remaining comments (21%) were about how eMTBs ought to be used. This included who should use eMTBs, where opinions ranged from anyone to persons with physical disabilities, and the assertion that eMTBs are not for "regular people" because riding trails is a "rite of passage" preserved for those fit enough to gain access.

> "They should only be used by those with a disability. Not by the fat and lazy." (Commenter on Friends of IMBA Facebook Group)

> "Also I think if there is a medical reason you need one then it's fine, it gets you out and enjoying the outside." (Commenter on Colorado Springs Mountain Biking Facebook Group)

> "What kind of loser would ride an e-bike?" (Commenter on Prescott Mountain Biking Facebook Group)

A minority attempted to share their experience using an eMTB and how it helped them exercise.

> "i don't go any faster, it just allows me to finish a ride with my friends and still be able to walk the next day." (Commenter on Richmond Virginia Mountain Biking Facebook Group)

Many were supportive of anyone riding an eMTB without any qualifications, pointing out that an eMTB could be a good way to encourage exercise and grow trail riding activities.

> "I'm all about getting folks into our sport." (Commenter on Richmond Virginia Mountain Biking Facebook Group)

> "It makes people who would not be able to ride actually ride. I don't own one but am just fine with anyone who does the more riders we have out there the more trails we can get…" (Commenter on Mountain Bike Enthusiasts of Utah Facebook Group)

> "I think if an ebike helps someone who otherwise couldn't ride I'm all for it." (Commenter on Richmond Virginia Mountain Biking Facebook Group)

Many strongly rejected the idea that anyone should be riding eMTBs. The commenters supported the notion that there is a "rite of passage" to mountain biking and, in their view, eMTBs sidestep this.

> "I see it more as a right of passage to be in good enough shape to get to remote places. It's like being good enough shape to run a 5 k, but calling upon the assistance of a Segway to help you finish a marathon." (Commenter on Colorado Springs Mountain Biking Facebook Group)

> "If you can only do 15 miles with pedal-assist, you aren't a rider…that's the blunt thing…" (Commenter on Colorado Springs Mountain Biking Facebook Group)

> "I know it's un-american, but why don't you just take the time and put in the hard work to get in shape and learn the skills?" (Commenter on Colorado Springs Mountain Biking Facebook Group)

> "lazy and worthless they can't build up enough fitness to actually pedal a bike?!?!?!" (Commenter on Utah Mt. Bike Trail Condition Network Facebook Group)

## Discussion

While eMTB use has been popular in Europe for many years, it is still emerging in the US. Though research has been done with eBikes, little has been done with eMTBs. This study sought to capture mountain biker's attitudes and perceptions of eMTBs. Three major themes were identified within the comments that span the identity of an eMTB, trails, and the potential individual impact of using an eMTB. Understanding and working to improve attitudes toward eMTBs could help some accept it as a viable physical activity option. Likewise, understanding misconceptions and fears of eMTBs can aid in working with land managers to keep trails open for all mountain bikers.

There was general confusion about what an eMTB was, particularly by those who seem to have not ridden one. Many commenters seemed to think an eMTB was a type of motorcycle, despite the technology and capabilities of motorcycles and eMTBs being very different. An off-road motorcycle generally has a combustion engine (although there is a growing interest in electric motorcycles) and is capable of traveling at speeds greater than 50 miles per hour for adult sizes. An eMTB is a bicycle with a lower wattage, battery-powered motor aimed to assist the rider. The amount of assist given is designated by three classes: Class 1, Class 2, and Class 3 eMTBs (See Table 3). To still be classified as

**Table 3** eMTB classifications and capabilities

| EMTB classification | Throttle | Speed limit to receive assistance (mph) | Pedaling required to receive assistance |
|---|---|---|---|
| Class 1 | No | 15–20 | Yes |
| Class 2 | Yes | 15–20 | No |
| Class 3 | No | 28–30 | Yes |

an eBike, the pedals must be fully operable and the electric-assist motor must produce less than 750 W [20]. Class 1 eMTBs are those bikes that only provide assist when a rider is pedaling and the assist usually has a limit of 15–20 miles per hour (i.e., above that speed, the electric motor no longer provides any assistance and the rider then supplies all the power via pedaling). A Class 2 eMTB is similar to a Class 1 eMTB, but with the addition of a throttle. It still "cuts out" above the 15–20 miles per hour range, but even prior to that, pedaling is not required to propel the rider forward. Class 3 eMTBs are similar to Class 1 eMTBs, except the upper limit at which assistance stops being given is usually around 28 miles per hour [20]. Unfamiliarity with these classifications could be the source of some commenters' confusion. Most references in support of eMTBs for exercise purposes are referring to Class 1 eMTBs. In 2017, the International Mounting Bicycling Association (IMBA), a world-wide leader in mountain biking advocacy, including protecting riding trails, issued a statement of support for using Class 1 eMTBs on mountain bike trails [20].

Much of the discussion surrounding eMTBs has revolved around trail access and impact. Many users worry an increase in the use of eMTBs may lead to a loss of trail access for all MTB users, particularly in areas designated for non-motorized use only. Currently, "IMBA is supportive of Class 1 eMTB access to non-motorized trails when the responsible land management agency, in consultation with local mountain bikers, deem such eMTB access is appropriate and will not cause any loss of access to non-motorized bikes" [20]. As IMBA points out, there is inconsistency with how eMTBs are defined and managed by various land agencies. Federal agencies have categorized eMTBs as motorized and only allow them in areas where motorized vehicles are permitted. In contrast, various state and local agencies have sometimes defined eMTBs as non-motorized and allowed them on trails prohibiting motorized vehicle use [21]. These inconsistent views of eMTBs across governmental agencies further confuse many in the public as to how the use of eMTBs may impact long term access to trails on government lands.

A number of comments expressed concern about the potential for eMTBs to cause damage to trails beyond what a normal MTB might cause. Research has found that regular MTBs have similar trail impacts to hiking and far less impact than equestrian and motorized users. In 2015, IMBA commissioned a study to consider whether or not eMTBs increases soil erosion and trail damage. The study found no statistical differences in trail impacts between traditional MTBs and eMTBs, but found that motorcycles created statistically greater erosion and soil displacement [22].

The issues surrounding the use and appropriate use of eMTBs represents a wide spectrum and characterizes a divide which exists in the US as it relates to exercise and recreation. For example, US approaches to addressing physical activity are largely individualistic [23]. This is reflected in comments that suggest riders should train harder and get in shape. This disregards the larger systems that contribute to unhealthy outcomes, many of which limit an individual's ability to adhere to rigorous training regimens, and thus prevent many people from even attempting a recreation pursuit such as mountain biking. The overemphasis on the individual may compromise our larger public health efforts and pose a threat to their success as there is almost no reason to expect that people will spontaneously overcome the deleterious barriers that currently govern their health behaviors [24]. Perceptions that eMTB riders are losers, lazy, or uncommitted to fitness only reinforce the notion that health and fitness can be competitive and that the individual, alone, defines, and determines health. This ignores the potential for eMTBs to minimize physical and fitness barriers during a critical period of establishing new health behaviors. Some commenters may feel that eMTBs dilute the experience by limiting the required level of fitness, or enhancing another rider's ability artificially. It is unclear if these comments stem from a lack of understanding or if conventional riders feel threatened by other riders, in particular eMTB riders that might use the technology to neutralize their dominance, without paying a price in terms of training. Additional research into this topic may inform future efforts to educate riders and to create a greater sense of collegiality so that all might enjoy the sport and achieve healthy levels of physical activity.

## Conclusion

There were many misconceptions about what constitutes an eMTB. These misconceptions seem to foster fears and concerns about trail conflict, access, and the morality of individuals using eMTBs. Understanding these attitudes provides insights that can be used in promoting eMTBs as a viable exercise alternative. Likewise, they can be useful in promoting or maintaining trail access. From a public health perspective, it will be important to advocate for an empirical approach when assessing both user-group challenges and the health benefits of this technology. This qualitative analysis helps delineate an emerging debate related to eMTB use and provides context for those who view eBike technology as a catalyst for promoting physical activity. In other words, if future research determines that eMTBs help to increase levels of physical activity without serious negative impacts to the individual or environment, it may be important to promote their role as a potential tool to mitigate traditional barriers. As demonstrated here, there are also significant social barriers to overcome. In all these insights will be useful when promoting the use of eMTBs.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with ethical standards of the institutional research committee (BYU IRB) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. In consultation with BYU IRB, this study did not undergo formal review because data were collected from the public domain involving de-identified, anonymous comments.

**Informed consent** Informed consent was not obtained because the researchers were not intervening, interacting, or questioning participants in anyway. Their comments were entirely anonymous and in the public domain.

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