

## *A Case for the Bicycle: How Cycling Can Promote Equality*

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### **Abstract**

The purpose of this paper is to explore how cycling enhances health and quality among minority groups. We see examples from empirical literature of how cycling supports female health and empowerment, how cycling improves quality of life for people with cognitive and physical disabilities, how cycling increases health equality among people of color, and how cycling can combat ageism. Overall, a cycle of health, body autonomy, quality of life, and education work together to support equality in minority groups. . A prime example of this is seen in the history of the bicycle. Not only is this tool for exercise used for promoting positive physical and mental health outcomes, but also in increasing the quality of life. This quality of life does not only refer to the improvement of physiological and psychological outcomes but also changes in the ability of the individual to participate equally in society as their counterparts (i.e., men, people without disabilities). This is seen with the suffragettes riding bicycles to promote the right for women to vote or individuals with Autism Spectrum Disorders utilizing cycling as a life-long leisure skill. This paper argues that through utilizing means of accessible physical activity (i.e., the bicycle) minority populations are able to find more equality within society through transportation, physical and mental health, and education.

Keywords: Human Equality, Exercise Science, Adaptive and Inclusive Training

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## **The Beginning of the Bike**

While it may be common to see a female riding a bicycle today, it was a radical sight in the 1890s. The bike had gained immense popularity, and women and men alike were partaking in the new invention. As strange as it may seem, this form of physical activity gave women not only a means of travel but also fostered a new level of independence.

It is not irrelevant that women began to wear pants (riding in a dress wasn't as efficient) and use the bicycle to symbolize the suffragettes. Alice Hawkins, a suffragette, promoted the women's rights movement by riding her bike around Leicester (in the United Kingdom) in pants. She was one of the first females to wear pants publicly in the city while promoting women's right to vote.

## **Cycling and Women Today**

### **Increasing Access to Education**

Cycling promotes female empowerment through access to education. A program called "Wheels of Change" seeks to supply bicycles to females in 5th to 7th grade. A year after the program distributed the bikes, female absences from school decreased by 28%, increased their punctuality by 66% (due to reducing their travel time). It increased their safety in commuting to school by 22% (measured by cat-calling and teasing from male counterparts during their commutes), and females had more positive self-image and felt more in control of their lives than females who were not in the program.

### **Individuals with Cognitive Disabilities**

It is clear that the bicycle was influential in female empowerment and still is today. But can this independence and freedom be applied to other minority groups? A key group that has already been anecdotally and empirically shown to benefit from cycling is individuals with cognitive disabilities, specifically Autism Spectrum Disorder (ASD) and Down syndrome (DS).

For instance, those with ASD often have deficits in balance due to poor proprioception, connected to elevated anxiety and decreased motor skills (Stins, & Emck, 2018). So not only do populations with ASD struggle with balance, but this deficit also produces other comorbidities that may limit functioning and quality of life. Therefore, interventions that address balance in this population could also benefit other aspects of quality of life.

What if there could be an intervention easily applied at home? Recent research has demonstrated that pedal-less bikes might be the solution (Shim, et al., 2021). This research found that in a 4-week trial, in 20 participants of ages 3-5 years old, balance and overall quality of life could be significantly improved. This is vastly important, as those with ASD and other disabilities may struggle to learn to ride a bike given their deficits in balance. While the research in discussion does not focus specifically on ASD and other disabilities, there is a plethora of research.

HOPE for Autism is a program that provides opportunities for children in the community to learn how to ride a bike, including those children who have been diagnosed with an autism spectrum

disorder (Page, 2019). This is an important aspect to address as youths with ASD are less social compared to their typically developing peers (Garcia, Hahs-Vaughn, 2021; Head, McGillivray, & Stokes, 2014). Significantly, research has demonstrated that males with ASD are more likely than females to be less sociable (Head, McGillivray, & Stokes, 2014). Meaning, cycling may be an especially important intervention for males with ASD to improve not only physical health but also sociability.

### **Individuals with Physical Disabilities**

Another group that benefits from the bicycle is individuals with physical disabilities. This group is often significantly less physically active than those without physical disabilities (Hollander, & Proper, 2018; Jung et al., 2018). Importantly, physical activity is important not only for physical health but also for mental health (Landers, & Arent, 2007; Tyson et al., 2010). Research has shown that the mental health of individuals with physical disabilities is significantly poorer than those without disabilities (Jones, & Loller, 2008; Schreurs, Ridder, & Bensing, 2002). What's more, individuals with physical disabilities are more likely to report lower quality of life (Brown et al., 2014). Importantly, this same research from Brown and colleagues (2014) demonstrated that physical activity increased reported quality of life in individuals with and without physical disabilities. Therefore, bicycling is capable of improving the quality of life for individuals with physical disabilities.

### **Adaptive Equipment in Cycling**

In order for those with physical disabilities to be successful in cycling, there are a variety of adaptive bicycles available. Examples of these bicycles include handcycles, tandem bikes, and recumbent cycles. Descriptions can be found in the appendix (Table 1). Additionally, resources for purchasing these bikes and accessories are available in the appendix.

### **Programs for Individuals with Disabilities**

There are programs available to educate individuals with cognitive and physical disabilities on how to ride a bike, as well as services to make bikes adaptable for different disabilities. Many of these programs are free to participants and function as non-profits. Examples and descriptions of these programs can be found in the appendix (Table 2).

Importantly, research has also demonstrated that education coupled with an active cycling intervention promoted greater sport participation (Vanroy et al., 2017). This study analyzed patients with severe motor deficits. Both groups (test and control) showed significant improvements in physical activity measures regardless of coaching or no coaching (meaning cycling of any duration seems to improve physical performance in this population). With this in mind, it further supports the claim that programs that promote inclusiveness in cycling are vastly crucial for improving the quality of life for these populations. More work is needed to assess what types of intervention strategies are most successful.

## **Fighting Ageism through Cycling and other Physical Activity**

Ageism, stereotyped, prejudiced, discriminatory attitudes based on age, has replaced the practice of honoring old age with a focus on the negative aspects of aging (Ye, Gao, Fu, Chen, Dong, & Gu, 2020). Studies show older adults' perceptions and attitudes toward aging has a significant influence on physical and mental health (Massie & Meisner, 2019; Dionigi, Horton, & Bellamy, 2011; Vertinsky, 1995). According to Levy, Slade, Kunkel, and Kasl (2002) a positive self-perception on aging increased the lifespan of subjects 7.5 years. A variety of factors contributes to this self-perception influencing older adults' behaviors and health, and indirectly to the social and economic costs of a frail older generation. Physical activity continued into older age can provide significant relief to the health and social care services, through the positive impact on quality of life as well as social and mental wellbeing (Black & Street, 2014).

## **Older Cyclist and Holistic Health**

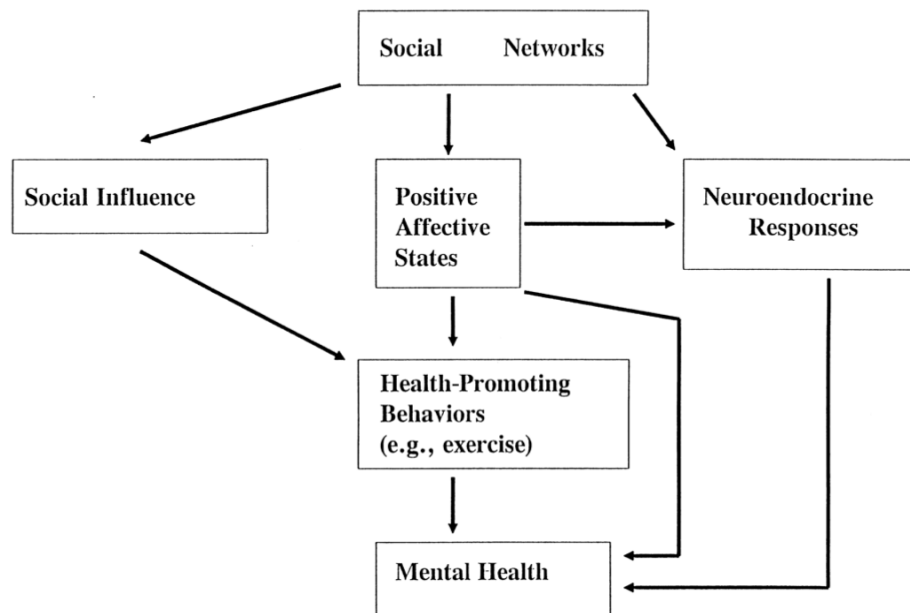
The Cycling without Age group supports the organization of local groups of volunteers who act as 'pilots', biking with a trishaw carriage to give rides to older nursing home residents, an outdoor excursion and social activity (Cycling without Age, 2021; Jørgensen, Petersen, Eghøj, & Toftager, 2021). This leisure-time physical activity has been identified as a positive experience in active aging, but not all older adults are able to experience the health benefits, as they fight the perceptions of ageism (Massie & Meisner, 2019).

## **Breaking Stereotypes**

Older adults who view aging positively can be role models for society. An active older person challenges the traditional stereotypes related to aging. According to Clément-Guillotin, Radel, & Chalabaev (2015) physically active older adults were viewed as an admired group and more socially accepted. The potential for personal empowerment and purpose through physical and sports activity supports women in particular, who lose the ability to socialize and freedom of movement (Dionigi, Horton, & Bellamy, 2011).

## **Social Aspects of Cycling**

When looking at the human experience as a whole, a major component of holistic well-being is the social bonds humans form between one another. The Main Effect Model can be used to support this concept, as seen below in figure 1 (Kawachi and Berkman, 2001). Kawachi and Berkman describe the Main Effect Model as a way of portraying how social interaction can influence mental health. Social influence is defined as how our peers influence our actions (i.e if a child sees their parents working out, they are more likely to work out when they get older). Neuroendocrine responses pertain to how an individual responds to stress (i.e how their CNS reacts to a stressful stimulus with hormones and neurotransmitters). Overall, the researchers found that individuals who were active in their community had an increase in positive psychological states (such as an increased state of purpose and belonging) which could contribute to a higher sense of motivation for self-care, such as exercise or other beneficial habits.



**Figure 1:** Main Effect Model on social interactions and mental health  
(Kawachi & Berkman, 2001)

Furthermore, while research shows that social interactions improve mental health through engagement in activities that increase positive psychological states, the inverse is also true. Exercise can be seen to allow individuals to form social interactions. For example, a study performed by Duncan and colleagues (2017) reached out to members of the CrossFit community (i.e. Members of gyms certified as CrossFit affiliates) to evaluate their experience with exercise and the CrossFit environment. The following quote can be seen in the study:

Moreover, for some participants ([n=]5), the social aspect of CrossFit was just as or even more important than the health and fitness benefits as expressed by participant 16, “I enjoy the workouts, but at the end of the day it is the people who are there and how supportive everybody is for each other.

This study shows how exercise is in itself a way to form social connections.

### **Older people and Sociability**

Similarly, Zander, Passmore, and Rissel (2013) found that cycling in older individuals could increase the quality of life. The researchers argue that cycling is an affordable resource that is easily incorporated into a daily routine and is a habit that provides various beneficial factors. For example, the study concluded that through enhancing social networks and allowing the individuals to build confidence in their abilities, the participants essentially had a higher sense of self-efficacy. Interestingly, the study found differences between the male and female participant outcomes, as seen in the following quote:

[...]the sense of empowerment and pride was felt very strongly by female participants but not even mentioned by men. It is possible that men may be inherently more physically confident and assume that they will be able to ride without problems while for women this is a realisation rather than an assumption.

This quote is an important finding. It shows that women are often the members of society who need exercise the most- not for the physical benefits, but for the positive psychological developments. This evidence supports that exercise is critical for all people, but especially women. Cycling is an accessible form of exercise to achieve this goal.

## **The Covid Era**

Moreover, not only is exercise an essential part of an individual's overall well-being through physiological and psychological factors, but also a healthy outlet for stress. Amongst the diverse stressors many people face in today's society, the Covid-19 pandemic can be found to be a mutual stressor for many. A review by Hu and colleagues (2020) discusses the mental health changes seen during the Covid-19 lockdown in April 2020. The review evaluates how stress during the lockdown altered neurotrophic factors and endocrine pathways in the CNS. That is to say, how the stress and fear of the Covid-19 lockdown stimulated depression and anxiety in individuals. Through this review of studies, the authors state that "Although outdoor physical exercise is unavailable during the outbreak of Covid-19, indoor exercise is recommended in view of the positive effect of exercise on boosting [the] immune system...and alleviating anxiety and depression..." (Hu et al., 2020). Therefore, not only did exercise increase mental health during the Covid-19 lockdown, but also increased overall immune function- an essential factor during a global pandemic.

Furthermore, while the Covid Era further substantiated the importance of exercise on mental health, it also revealed the inequality found between social groups. The Centers for Disease and Control Prevention (CDC) states that "The COVID-19 pandemic has brought social and racial injustice and inequity to the forefront of public health" (Centers for Disease Control and Prevention, 2021). The CDC found that minority groups were more at risk for contracting Covid-19 and becoming ill or dying. According to the CDC, social determinants that contribute to minority groups being more at risk range from their work environment, home environment, learning environment, etc. The CDC goes on to discuss discrimination that minority groups may face once in a healthcare facility as well, such as language barriers and biased care (Centers for Disease Control and Prevention, 2021). However, despite these obstacles minorities already face when it comes to health, Janet Fulton, Chief of the CDC's Physical Activity and Health Branch in the Division of Nutrition, Physical Activity, and Obesity, states that minority groups are physically less active than others in the United States (Fulton, 2020). This is in part due to the communities that minority groups live in. Many of these communities are deprived of resources, and do not provide areas where individuals can safely exercise. Fulton states that "...Hispanics had the highest prevalence of physical inactivity (31.7%), followed by non-Hispanic blacks (30.3%) and non-Hispanic whites (23.4%)." Overall, it can be concluded that limited access to opportunities to exercise within a minority community contributes to the lack of activity level. Likewise, this could be a negative factor when it comes to minority mental health and staying healthy during the Covid era.

## **Conclusion**

Bicycles have played a part in the empowerment of women as well as other underserved groups. It has been shown that cycling is capable of improving the quality of life in minority populations. The general increase of physical activity lends itself to transportation, leisure physical activity for life (as seen from pediatric to geriatric populations), improved mental health, and an increase in education. When we increase the ability for a human to utilize their body with full autonomy, we are able to increase the quality of life in realms that reach outside of physical activity.

## Appendix

### *Adaptive Bicycles*

<b>Bike Name</b>	<b>Description</b>
Handcycle	Allows cyclists to propel a three-wheeled cycle using their arms.
Tandem Bike	<ol style="list-style-type: none"><li>1. two-wheeled bike with a guide in the front. (other set-ups are possible)<ol style="list-style-type: none"><li>a. side-by-side tricycle: allows two people to work together synchronously or asynchronously</li></ol></li></ol>
Recumbent Cycle	<ol style="list-style-type: none"><li>1. tadpole-style: one wheel in the back and two in front.</li><li>2. Delta-style: two wheels in the back and one in the front</li><li>3. Four-wheeled: similar to the Delta-style recumbent, but with two wheels in the front.</li></ol>

**Table 1.** Examples of adaptive bicycles

### *Where to Buy Adaptive Bikes*

<https://www.adaptivemall.com/specneedtric.html>

<https://www.freedomconcepts.com/product-lines/adaptive-bikes/>

[https://www.thealinker.com/?gclid=Cj0KCQjwnoqLBhD4ARIsAL5JedLu9BQPijzR6oyqjhR7wD9MTHJ5\\_vVeMKfXlb8FP2SK4fl1S4Xi03kaAqsrEALw\\_wcB](https://www.thealinker.com/?gclid=Cj0KCQjwnoqLBhD4ARIsAL5JedLu9BQPijzR6oyqjhR7wD9MTHJ5_vVeMKfXlb8FP2SK4fl1S4Xi03kaAqsrEALw_wcB)



*Programs for Adapted Cycling*

<b>Program Name</b>	<b>Summary</b>	<b>Website</b>
<i>Move United</i>	This program provides an adaptive cycling recreational manual. This manual covers off-road, tandem, handcycling, and others.	<a href="http://www.moveunitedsport.org">www.moveunitedsport.org</a>
<i>Adaptive Cycling Foundation</i>	This program manufactures and supplies adapted bikes for first responders and service members. These bikes serve to address limitations in mobility and balance, limb loss, and other sustained injuries.	<a href="http://www.adaptivecycling.org">www.adaptivecycling.org</a>
<i>Programs to Educate All Cyclists (PEAC)</i>	This program is based in Ypsilanti, Michigan, PEAC teaches individuals with disabilities how to ride a bike and to maneuver public transit safely.	<a href="http://www.bikeprogram.org">www.bikeprogram.org</a>
AdaptAbility	This program is based in Brooklyn, New York; this program makes custom adaptive bikes for kids and adults with disabilities. This program also offers applications to receive a free custom bike. AdaptAbility also has subprograms such as 4Ride, which is a program that allows youth with disabilities to rent adapted bikes for free.	<a href="http://www.adaptabilitybike.org">www.adaptabilitybike.org</a>
Adaptive Sports Connection	The Adaptive Sports Connection offers four programs: Discover Cycling (ages 24+), Discover Mountain Biking (any ages), Group rides (any ages), and Bikes To Go (ages 23 and under). Therapists are present at programs to aid in the learning and riding of adaptive bikes.	<a href="http://www.adaptivesportsconnection.org">www.adaptivesportsconnection.org</a>
iCan Shine	iCan Shine provides learning through the iCan Bike program. This program teaches individuals with disabilities how to ride bikes (ages 8 and up).	<a href="http://www.icanshine.org">www.icanshine.org</a>

**Table 2.** Examples of available adaptive programs for cycling

*Sources of Older People Being Active*

<b>Instagram Handle</b>	<b>Description</b>
Squat_University	This instagram account is run by Dr. Aaron Horschig. On this account movement analysis and recommendations can be found, and athletes who are 50+ can be seen lifting weights.
OldLadyGains	This account is run by a Master's women empowHERment company. The account posts apparel to support the company and female empowerment, and female athletes of all ages.
TrainWithJoan	This account is run by public figure, Joan MacDonald. She is 80-years-old and documents her fitness journey. She has over 1.5 million followers and has drastically transformed her life through fitness.

**Table 3.** Examples of social media accounts where role models can be found for older people wanting to begin lifting weights and exercising.

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