The (In)Accessibility of YouTube Exercise Videos for Disabled Individuals During COVID-19: A Text Analytics Approach

Shevali M Kadakia, Yinfei Wu, Catherine SM Stratton, Josemari T Feliciano, Yetsa A Tuakli-Wosornu

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Shevali M Kadakia[1]; Yinfei Wu[2] BA; Catherine SM Stratton[3] BA, MPH; Josemari T Feliciano[2] BSc, MPH; Yetsa A Tuakli-Wosornu[3] MD, MPH

[1]Department of Computer Science, California Institute of Technology Pasadena US
[2]Department of Biostatistics, Yale School of Public Health New Haven US
[3]Department of Chronic Disease Epidemiology, Yale School of Public Health New Haven CT US

Corresponding Author:
Yetsa A Tuakli-Wosornu MD, MPH
Department of Chronic Disease Epidemiology, Yale School of Public Health
60 College St
New Haven CT
US

Abstract

Background: Disease and mortality attributable to sedentariness disproportionately affects people with disabilities (PWD). It is unclear if this gap also exists online, and if the COVID-19 pandemic has affected it.

Objective: To assess the impact of the COVID-19 pandemic on the amount of fitness content accessible to disabled persons, a cross-sectional text analysis of exercise-related keywords was searched on YouTube.

Methods: Videos published between 01/01/2019 and 06/30/2019 (n=700) were compared to videos published between 01/01/2020 and 06/30/2020 (n=700).

Results: The analysis reveals that terms applicable to PWD (‘Para,’ ‘Paralympic,’ ‘Adaptive,’ ‘Adapted,’ ‘Disabled,’ ‘Disability,’ ‘Differently-abled,’ ’Disability-friendly,’ ‘Wheelchair-accessible,’ and ‘Inclusive’) had minimal appearances in the 2019 and 2020 videos. Additionally, approximately 25% of videos in each year did not contain subtitles. Removing video duplicates that existed in two or more searches resulted in 1038 unique videos (508 in 2019, 530 in 2020). Video viewership significantly increased in 2020 with median view counts of 52,288 (IQR: 2,891-401,879) and 122,837 (IQR: 7,257-728,854) for 2019 and 2020, respectively (P = 0.0012).

Conclusions: While many YouTube exercise videos were published during the COVID-19 pandemic, the proportion of accessible videos remains diminutive. The need for disability-friendly fitness content remains urgent if health disparities associated with sedentariness are to improve.

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Shevali M Kadakia[1]; Yinfei Wu, BA[2]; Catherine SM Stratton, MPH[3]; Josemari T Feliciano, MPH[2]; Yetsa A Tuakli-Wosornu, MD, MPH[3]

[1]Department of Computer Science, California Institute of Technology, Pasadena, California

[2]Department of Biostatistics, Yale School of Public Health, New Haven, Connecticut

[3]Department of Chronic Disease Epidemiology, Yale School of Public Health, New Haven, Connecticut

Corresponding Author:

Yetsa A. Tuakli-Wosornu, MD, MPH

60 College Street

New Haven CT, 06510 USA

Word Count:

2323

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Keywords: Persons With Disabilities (PWD), Exercise, YouTube

Word count: 202

Introduction:

Background

The coronavirus disease 2019 (COVID-19) pandemic has revolutionized how people live and

interact with one another [1–3]. In the United States, for instance, stay-at-home orders have resulted in restaurants, malls, salons, and other businesses centered on in-person interaction shutting down [4,5]. In response to these restrictions, people have sought out alternative ways to connect with their family, friends, and peers, most notably through social media and teleconferencing platforms (e.g., Instagram, Zoom) [6].

One activity that has experienced an increased social media presence due to the pandemic is exercise/fitness [7]. Individuals have created their own YouTube channels, and medical institutions have leveraged online fitness sessions to subside their patients' stress and anxiety [8]. Transitioning to the virtual space has resulted in some benefits, one such being the larger audience that fitness instructors can interact with [9,10]. For example, the University of Milan's '#StayHomeStayFit' movement reached over 21,000 people, a 100-fold increase compared to prior in-person fitness classes [11]. However, it is unknown whether and/or how this shift has impacted the amount of online fitness-related content for minority populations, specifically persons with disabilities (PWD). Pre-COVID-19, disabled persons often struggled to access disability-friendly exercise trainers and equipment due to a lack of support in the fitness and sports sectors [12]. It is unclear whether the disparity in accessibility also exists on social media, and whether COVID-19 widened this gap.

In general, the shortage of digitized fitness resources for disabled web-users is detrimental in that such individuals might depend on virtual resources during the pandemic. It has been documented that disabled people tend to be more willing to participate in physical activity if the instructor has medical knowledge of their particular diagnosis or disability. This was observed in a systematic review that analyzed 30 studies assessing factors which facilitate the adoption of physical activity among disabled people [13]. The reasons for this include, but are not limited to, having greater trust in the source of instruction and greater comfort in the safety of physical activity if it is being led by someone who would understand the manifestation and possible limitations of a particular diagnosis [13]. Simple actions such as having accurate subtitles can drastically increase the inclusivity of

online material [14]. With this information, it is important for institutions and hospitals to make an invested effort to make physical activity and fitness resources available on the internet given that patients are seeking physical activities from these sources.

Prior Work

Although many studies have been conducted on YouTube videos, few have analyzed the accessibility of YouTube videos for PWD. A quick Google search of 'studies on the accessibility of fitness content for persons with disabilities' reveals that most analyses have been on the accessibility of physical fitness centers for disabled persons, not the accessibility of online fitness content [15–17]. Another reason for the literature gap related to online fitness content available for people with disabilities is the fact that the last national lockdown was during the Influenza outbreak of 1918, which was before the internet existed [8]. Since YouTube is the second largest and most used search engine for much of the global populations, it is important to understand the accessibility and related characteristics of YouTube exercise/fitness videos [18]. To the authors' best knowledge, no current studies analyze this matter.

Objectives

The aim of this study is to assess the availability of physical activity resources on YouTube for PWD during the global pandemic. A secondary aim is to increase awareness about fitness opportunities for persons with disabilities in the general public and YouTube fitness content creators.

Methods:

Data Collection Parameters:

A cross-sectional text analysis of exercise- and fitness-related YouTube videos was conducted. Data from videos published between 1 January and 30 June 2019, and between 1 January and 30 June 2020 were collected using the following search terms: 'at home exercise,' 'exercise at

home,' 'exercise no equipment,' 'home exercise,' 'home-based exercise,' 'no equipment workout,' and 'workout no equipment.' The two time periods were compared.

Based on YouTube practices, the sample size was determined to be 100 videos. Using Python (version 3.0) and the YouTube Data Application Programming Interface (API), data about the top 100 videos from each time period that populated YouTube based on relevance to the search terms was gathered [19].

Data Analysis:

Video titles are often not comprehensive descriptors of video content. Therefore, video tags (words/phrases that creators associate with their video), subtitles, and written descriptions were gathered and analyzed. Frequencies of each video tag in the top 100 videos for each search term were recorded. Frequencies of each word in video descriptions was also recorded. Additionally, a record of the number of videos with subtitles was kept.

The terms 'Para,' 'Paralympic,' 'Adaptive,' 'Adapted,' 'Disabled,' 'Disability,' 'Differently abled,' 'Disability-friendly,' 'Wheelchair-accessible,' or 'Inclusive' were searched in the video titles and descriptions data. The terms 'Para,' 'Paralympic,' 'Adaptive,' 'Adapted,' 'Disabled,' 'Disability,' 'Differently abled,' 'Disability-friendly,' 'Wheelchair-accessible,' and 'Inclusive' were searched in the transcriptions.

An additional keyword, 'rehab exercise,' was searched as part of a separate analysis. The program gathered data about 500 videos from January 2019 to June 2019 and January 2020 to June 2020. The top word counts for the titles and descriptions were analyzed. A term frequency-inverse document frequency (tf-idf) weighing was performed to statistically classify significant topic differences in video content descriptors between 2019 and 2020. To assess potential differences in how content generators are describing and tailoring their videos, we tallied the top 16 terms for each year. For validation, frequent word pairs (bigrams) were created to offer additional insight and

context compared to analyzing solely words (unigrams). Gephi (version 0.9.2) was utilized to create a network plot to map notable word pairings (e.g., shoulder and injury) for their context.

Results:

The title, description, and transcription were collected for a total of 1400 videos (excluding the 'rehab exercise' term search). For the 700 videos created in 2019, titles, descriptions, and transcriptions included the terms 'Para,' 'Paralympic,' 'Adaptive,' 'Adapted,' 'Disabled,' 'Disability,' 'Differently abled,' 'Disability-friendly,' 'Wheelchair-accessible,' or 'Inclusive' 28 times. Additionally, 163 of the 700 (23%) videos from 2019 did not have subtitles. For videos published in 2020, the terms appeared 37 times in the video transcriptions while 198 out of 700 (28%) videos did not have subtitles.

A sharp increase in Google searches for exercise and/or fitness videos was observed in March 2020, consistent with the beginning of COVID-19-related global lockdown orders. Search frequency gradually returned to pre-pandemic levels by June 2020 (Figure 1). Overall, compared to 2019, exercise video content generation increased in 2020. Considering three domains of interest, hospitals/ institutions, individuals (e.g., private citizens), and others (e.g., neither hospitals/institutions nor private citizens), hospitals and institutions generated more exercise-related videos during the pandemic as compared to before (Figure 2).

Figure 1: Google Trend Data on Searches for 'Exercise Videos' between January 2020 and June 2020

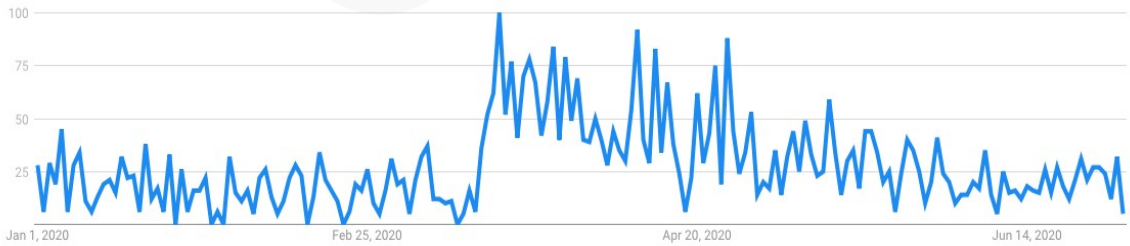
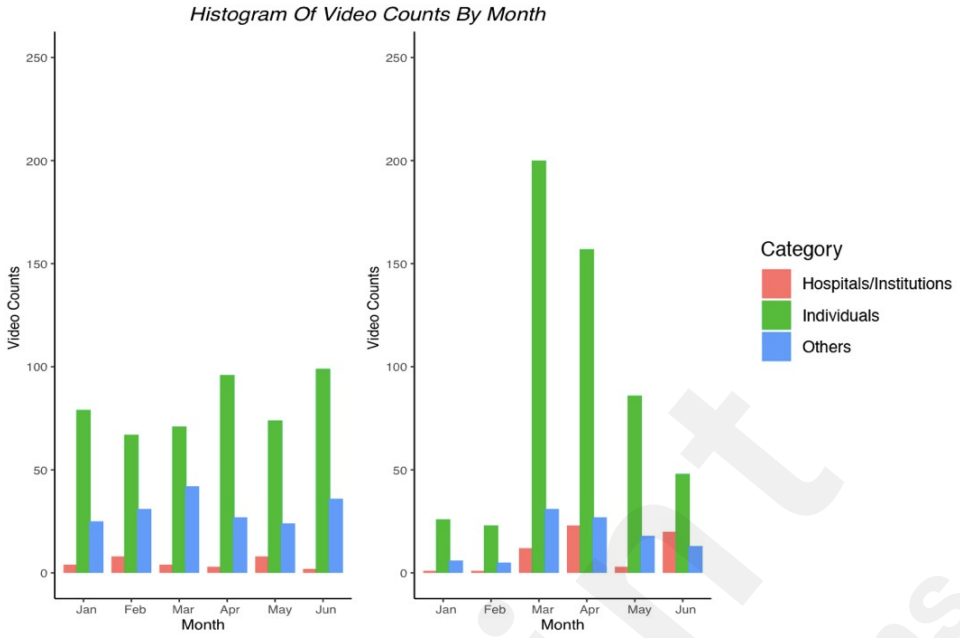


Figure 2: Histogram of Total Videos Published from January to June in 2019 and 2020



The top 10 exercise content generators in 2019 were individuals and others. In 2020, one hospital/institution (Shepherd Center) was featured in the top 10 content generators (Table 1). Hospitals/institutions were thus more likely to generate exercise-related videos in 2020 (29/508 vs 60/530, chi-square = 8.1476, $P = 0.004$).

Table 1: Top Content Generators of 2019 and 2020

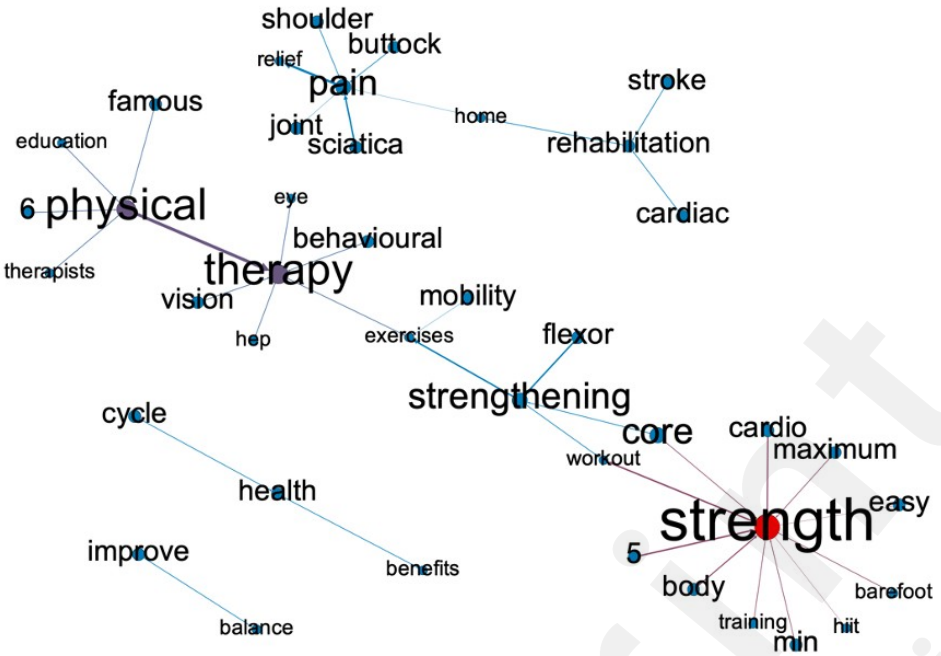
Channel Titles (2019)	***Video counts (2019)***	***Category (2019)***	***Channel Titles (2020)***	***Video counts (2020)***	***Category (2020)***
MadFit	29	Individuals	MadFit	34	Individuals
POPSUGAR Fitness	28	Others	BullyJuice	28	Individuals
Heather Robertson	25	Individuals	Roberta's Gym	22	Individuals
Roberta's Gym	17	Individuals	Shepherd Center	21	Hospitals/Institutions
THENX	14	Individuals	Natacha Océane	18	Individuals
Body Project	13	Others	ATHLEAN-X™	15	Individuals
BullyJuice	13	Individuals	Heather Robertson	13	Individuals
CHRIS HERIA	13	Others	Little Sports	12	Others
Fraser Wilson	13	Individuals	Pamela Reif	12	Individuals
Gareth Myles	13	Individuals	Body Project	10	Others

Removing video duplicates that existed in two or more searches resulted in 1038 unique

videos (508 in 2019, 530 in 2020). Video viewership significantly increased in 2020 with median view counts of 52,288 (IQR: 2,891-401,879) and 122,837 (IQR: 7,257-728,854) for 2019 and 2020, respectively (P = 0.0012). Videos from 2020 were more likely to reference ‘diabetes,’ ‘lockdown,’ and ‘Zoom’ whereas videos from 2019 often referenced ‘gym workouts,’ ‘paralysis,’ and ‘gym workouts for women.’

A bigram network plot for the ‘rehab exercise’ term identified several keywords. As indicated by the word adjacencies within the plot, discussions about rehabilitation were likely to reference ‘stroke,’ ‘cardiac,’ and ‘home’ (Figure 3). In contrast, discussions about pain were likely to reference ‘shoulder,’ ‘sciatica,’ and ‘buttock.’

Figure 3 Bigram Network Plot



Dis

cussion:

Principal Results

Comparing 2019 to 2020, the publication of fitness-related video on YouTube increased. Google trend data on searches of ‘Exercise Video’ reveal a peak in March 2020, the beginning of global lockdown orders due to the pandemic [5]. After March 2020, the number of searches decreased, potentially due to a decrease in COVID-19-related restrictions, increased engagement in fitness-related activities outside of the home, or general fatigue/apathy related to the pandemic (Figure 1) [20]. Still, between January and June 2020, as compared to between January and June 2019, people were driven to online fitness tutorials, matching an increased quantity of online fitness content published on YouTube (Figure 2). These results suggest people generally had the ability (e.g., internet connectivity) to adapt to life lived online.

Disabled individuals often struggled to find adequate fitness programs before the pandemic due to inaccessible buildings, classes, equipment or price-points [16]. During the pandemic, the

transition to online fitness content did not resolve this issue: the increase in the amount of content for PWD was minimal, and disproportionately low compared to the overall increase in online fitness material catalyzed by COVID-19. When keywords associated with home exercise were searched, the terms that correlated with disabled persons was minimal (Appendix A: Table 1, Table 2). Further, an analysis of the most frequently used words and word-pairs in video descriptions showed no words applicable to PWD (Appendix A: Table 1, Table 2). The data suggests most of the content created for at-home exercises did not include disabled persons.

Appendix A:For terms related to home exercise, word counts from the titles and descriptions (excluding filler words such as 'the', 'and', etc) are shown. Also reported are the top 20 bigrams from the video descriptions in 2019 and 2020.

Appendix A. Table 1: Aggregate Word Count of 1400 Video Descriptions (Excludes Filler Words)

	Year	***Word***	***N Value***		***Year***	***Word***	***N Value***		***Year***	***Word***	***N Value***	***#***	***Year***	***Word***	***N Value***
1	2019	workout	139	11	2019	exercises	24	21	2020	workout	150	31	2020	free	26
2	2019	home	88	12	2019	abs	23	22	2020	home	109	32	2020	abs	25
3	2019	https[1]	46	13	2019	10	20	23	2020	https	56	33	2020	ready	23
4	2019	body	42	14	2019	free	20	24	2020	body	41	34	2020	hiit	22
5	2019	exercise	42	15	2019	http	20	25	2020	video	35	35	2020	min	22
6	2019	video	38	16	2019	hiit	18	26	2020	minute	34	36	2020	exercises	21
7	2019	minute	30	17	2019	min	18	27	202	5	32	37	2020	10	20

[1] Before tokenization (text parsing), symbols are converted into white space. Accordingly, 'http' was kept in the word tally after symbol removal from any embedded link in the video description.

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8	2019	5	27	18	2019	cardio	15	28	2020	exercise	32	38	2020	burn	19
9	2019	fat	26	19	2019	download	15	29	2020	equipment	27	39	2020	visit	19
10	2019	equipment	25	20	2019	visit	15	30	2020	fat	26	40	2020	join	18

Appendix A. Table 2: Bigram Counts of 1400 Video Descriptions

	Year	***Word 1***	***Word 2***	***N Value***		***Year***	***Word 1***	***Word 2***	***N Value***
1	2019	home	workout	19	12	2020	visit	https	19
2	2019	visit	https	15	13	2020	https	www.heatherrobertson.com	18
3	2019	https	www.heatherrobertson.com	13	14	2020	abs	workout	17
4	2019	body	workout	12	15	2020	chris	heria	14
5	2019	home	exercise	12	16	2020	5	minute	13
6	2019	abs	workout	11	17	2020	join	chris	13
7	2019	5	minute	9	18	2020	body	workout	12
8	2019	10	minute	8	19	2020	home	exercise	10
9	2019	cardio	workout	8	20	2020	10	minute	8
10	2019	chris	heria	8	21	2020	body	home	8
11	2020	home	workout	21					

Persons with disabilities have previously identified ‘safety’ as an important variable in their decision to engage in physical activity [21,22]. That said, most of the content creators examined in the current analysis were individuals rather than institutions. In 2019, for example, no institutions were included in the list of top 10 content creators. Additionally, of all top-viewed fitness videos during the COVID-era, none emerge from hospitals/institutions (Table 2.). This suggests that content may not be certified by relevant experts or assessed against any specific standard-of-care or safety,

giving potential participants the impression that safe, expert-approved exercises are not included. If safety is a key determinant of engagement, PWD may be dissuaded from participating.

Of note, while the number of hospitals/institutions making fitness videos is relatively low, their contributions are steadily increasing. Hospitals/institutions (such as Shepherd's hospital) increased their content creation in 2020 compared to 2019, most apparently during March and April (e.g., while there were lockdown orders) (Figure 2). In addition, the video titles of four out of the top five videos created in 2020 by hospitals/institutions implied the videos were low impact exercise, required minimal to no equipment, or were for persons with diabetes.

By contrast, four out of the top five videos created in 2019 by hospitals/institutions required equipment and/or were designed for viewers of a higher fitness level (Table 3).

Table 3: Top 5 Videos by Hospitals/Institutions, Individuals and Others in 2019 and 2020

Category	***Video Titles***	***Channel Titles***	***View Count***
Hospitals/ Institutions 2019	6 easy strength training exercises	MD Anderson Cancer Center	857,433
	3 Best Exercise for Sciatica Pain Relief in Hindi	Sunit PhysioTherapist	400,604
	The Squat - An exercise to build leg muscles	Renown Health	325,860
	Mayo Clinic HIIT Workout for Mind & Body – Week 1	Mayo Clinic	320,632
	The Push-up - An exercise to build upper body muscles	Renown Health	308,392
Individuals 2019	FAST Walking in 30 minutes | Fitness Videos	Walk at Home by Leslie Sansone	31,972,886
	The Best Home Chest Workout (No Equipment Needed)	THENX	23,421,718
	How To Get 6 Pack Abs Series Part 1 | Floor	THENX	23,421,342
	Home Tricep Workout (You Can Do Anywhere)	THENX	23,418,009
	How To Get 6 Pack Abs Series Part 3 | HIIT (No Equipment)	THENX	23,292,783
	8 Simple Exercise to Lose Love Handles Without	BRIGHT SIDE	29,604,801

	Gym		
Others 2019	10-Minute Full Body Workout Without the Gym	BRIGHT SIDE	29,600,357
	5-Minute Home Workout to Build a Bigger Chest	BRIGHT SIDE	29,414,241
	30 minute fat burning home workout for beginners. Achievable, low impact results.	Body Project	12,927,417
	Fun, low impact workout for Total beginners	Body Project	12,924,144
Hospitals/ Institutions 2020	Low Impact Full Body HIIT Workout (No Equipment + No Jumping)	Shepherd Center	4,170,175
	20 Min Home HIIT Workout // No equipment, no noise, no impact	Little Sports	3,108,295
	How To Build Muscle At Home: Science-Based Workouts (No Equipment Needed!)	UW Medicine	1,708,937
	Full Body Fat Burn: One Hour Exercise At Home	Shepherd Center	299,530
	10 Best Diabetes Exercises to Lower Blood Sugar Exercise - Diabetes Workout	Shepherd Center	236,578
Individuals 2020	No Gym Full Chest Workout At Home	Yash Anand	24,521,523
	Intense 5 Minute Home Back Workout | No Gym	Yash Anand	22,420,881
	10 Min Beginner Ab Workout / No Equipment I Pamela Reif	Pamela Reif	19,890,094
	20 Min Full Body Workout - Intense Version / No Equipment I Pamela Reif	Pamela Reif	19,484,086
	Hips Dips Workout | 10 Min Side Booty Exercises 🍈 At Home Hourglass Challenge	Chloe Ting	15,835,194
Others 2020	No Gym Full Body Workout (feat. 5 min Tabata)	Allblanc TV	18,331,311
	Lose Arm Fat in 1 Week - Get Slim Arms | Arms Workout Exercise for Flabby Arms & Tone Sagging Arms	Little Sports	3,589,580
	11 Kids Exercises To Lose Belly Fat At Home	ASquare Crew	2,900,454
	21 Days Epic Body Transformation | Home Workout Challenge | No Equipment | Aayush & Abhay	Body Project	2,251,818

Low impact, high intensity intermediate home cardio workout	POPSUGAR Fitness	2,174,462

Non-clinical disability-friendly YouTube channels by sports- and fitness-related organizations are emerging, as well. MoveUnited, Disability Sport Northern Ireland, and Chapter 126 Paul Weiland target PWD specifically. However, low view counts, minimal subscribers, and a lack of mainstream media attention make these channels and their content difficult to find unless explicitly searched for (Appendix B: Table 1, Table 2, Table 3).

Appendix B: For the term 'rehab exercise' tables about the top word counts from the titles and descriptions (excluding filler words such as 'the', 'and', etc) are shown. Also reported are the top 20 bigrams from the video descriptions in 2019 and 2020.

Appendix B. Table 1: Top Word Counts From Video Titles

	Year	Word	N Value		Year	Word	N Value
1	2019	pain	81	12	2020	pain	65
2	2019	shoulder	53	13	2020	home	49
3	2019	knee	50	14	2020	workout	49
4	2019	workout	35	15	2020	knee	39
5	2019	ankle	31	16	2020	physio	39
6	2019	5	30	17	2020	cardiac	35
7	2019	leg	28	18	2020	acl	34
8	2019	physio	28	19	2020	ankle	28

	9				0		
9	2019	acl	27	20	2020	mark	28
10	2019	home	26	21	2020	surgery	28
11	2020	shoulder	82				

Appendix B. Table 2: Top 20 Words From Video Descriptions

	Year	Word	N Value		Year	Word	N Value
1	2019	pain	93	11	2020	pain	97
2	2019	knee	53	12	2020	shoulder	74
3	2019	shoulder	53	13	2020	video	70
4	2019	video	52	14	2020	injury	46
5	2019	https	49	15	2020	Rehabilitation	43
6	2019	acl	30	16	2020	knee	42
7	2019	injury	29	17	2020	home	40
8	2019	home	28	18	2020	workout	35
9	2019	physical	27	19	2020	ankle	33
1	201	1	25	20	2020	dr	31

0 9	

Appendix B. Table 3: Top 20 Bigrams of Parsed Video Descriptions

	Year	Word 1	Word 2	n		Year	Word 1	Word 2	n		Year	Word 1	Word 2	n
1	2019	rotator	cuff	14	16	2019	brad	demonstrate	6	31	2020	chiropractic	llc	9
2	2019	knee	pain	10	17	2019	muscle	fibre	6	32	2020	chiropractor	dr	9
3	2019	common	recommended	9	18	2019	shoulder	pain	6	33	2020	dr	william	9
4	2019	knee	flexion	9	19	2019	single	leg	6	34	2020	holdsworth	dc	9
5	2019	physical	therapists	9	20	2019	airrosti's	dr	5	35	2020	knee	pain	9
6	2019	pain	relief	8	21	2019	dr	travis	5	36	2020	newton	andover	9
7	2019	therapists	bob	8	22	2019	shoulder	range	5	37	2020	nj	chiropractor	9
8	2019	bob	schrupp	7	23	2020	found	helpful	23	38	2020	relief	chiropractic	9
9	2019	brad	heineck	7	24	2020	join	mark	23	39	2020	william	holdsworth	9
10	2019	famous	physical	7	25	2020	mark	bowra	23	40	2020	care's	dr	8
11	2019	https	bit.ly	7	26	2020	rotator	cuff	20	41	2020	spinal	care's	8
12	2019	physical	therapy	7	27	2020	rehabilitation	www.posturefit.com.au	16	42	2020	pelvic	floor	7
13	2019	specifically	designed	7	28	2020	posturefit	braces	14	43	2020	shoulder	mobility	7
14	2019	youtube	channel	7	29	2020	pain	relief	10	44	2020	shoulder	pain	7
15	2019	basically	treating	6	30	2020	andover	nj	9					

The concept of ‘disability’ encompasses visible impairments such as amputations, and invisible disabilities like chronic pain and disease [23–25]. Considering the disablement associated with chronic pain and disease, this analysis included a search of the term ‘rehab exercise.’ The term ‘pain’ was the topmost word to be found in ‘rehab exercise’ video descriptions and titles. Further, the term ‘rehabilitation’ appeared 43 times in the 2020 videos, and one of YouTube’s 2020 exclusive words was ‘diabetes,’ meaning that PWD—including those with invisible disabilities—are no longer a minority user group on YouTube. As full participants in this active social media platform [18], persons with diverse disabilities and ailments may find the relative invisibility of YouTube channels that specifically serve them problematic.

The current analysis makes it clear that the standards for giving everyone equal access opportunities are not being met. In this sense, the COVID crisis has further exposed and exacerbated pre-existing social inequities such as disability stigma and ableist attitudes [26–28]. A particularly damaging form of ableism is the reality that disabled persons are often invisible to mainstream citizens, programs and policies. Despite the global burden of disability for instance, even sweeping international policies have been called out for omitting and failing to consider the experiences of disabled people [29]. In addition to this, achieving 11 of the 17 Sustainable Development Goals (SDGs) requires totally equal access to health-related resources in disabled and non-disabled populations, but the world is on the whole far from achieving those 11 SDGs.

Beyond YouTube, however, it is encouragingly clear that the COVID pandemic has accelerated action in grassroots and international advocacy groups, as they increasingly recognize the imperative for digital inclusiveness -- including with exercise, health and fitness content. Mooven, an online resource center, was created in response to the stay-at-home orders. With the help of the International Federation of Adapted Physical Activity, Mooven offers guidance and feedback on exercises [30]. Additionally, the non-profit Inter Campus uses sports to develop resilience in children during the pandemic. On the European front, many programs are taking action to adequately prepare trainers to work with PWD [31]. For digital media access, the Universal Fitness Innovation & Transformation organization created a repository of fitness content specifically for disabled persons and persons with chronic pain [32]. And finally in regards to overall connectivity, a UNICEF program increases internet connection for children in 11 different countries [33]. These programs' work to increase outreach provides a positive outlook on the increased accessibility of sports.

Limitations

Limitations of this study include a selection bias for the search terms. Additionally, cross-sectional methodology introduces inherent limitations related to generalizability.

Conclusions

In conclusion, while current YouTube fitness content address non-disabled populations with greater frequency than groups with disabilities, there is a general increase in online fitness content and a global move towards increasing digital social inclusion for PWD. A large gap in exercise content still needs to be filled, and content creators are invited to join the positive momentum being generated globally in the digital space and take on this challenge.

Conflicts of Interest: None reported

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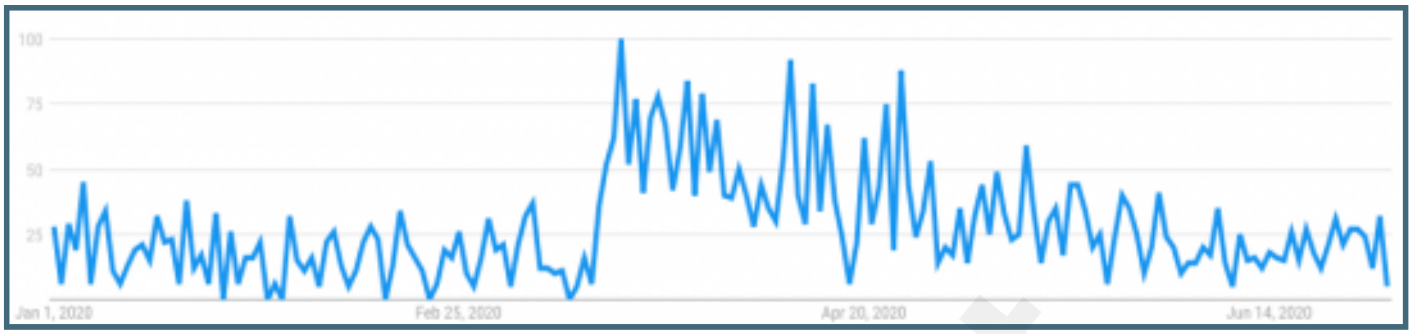
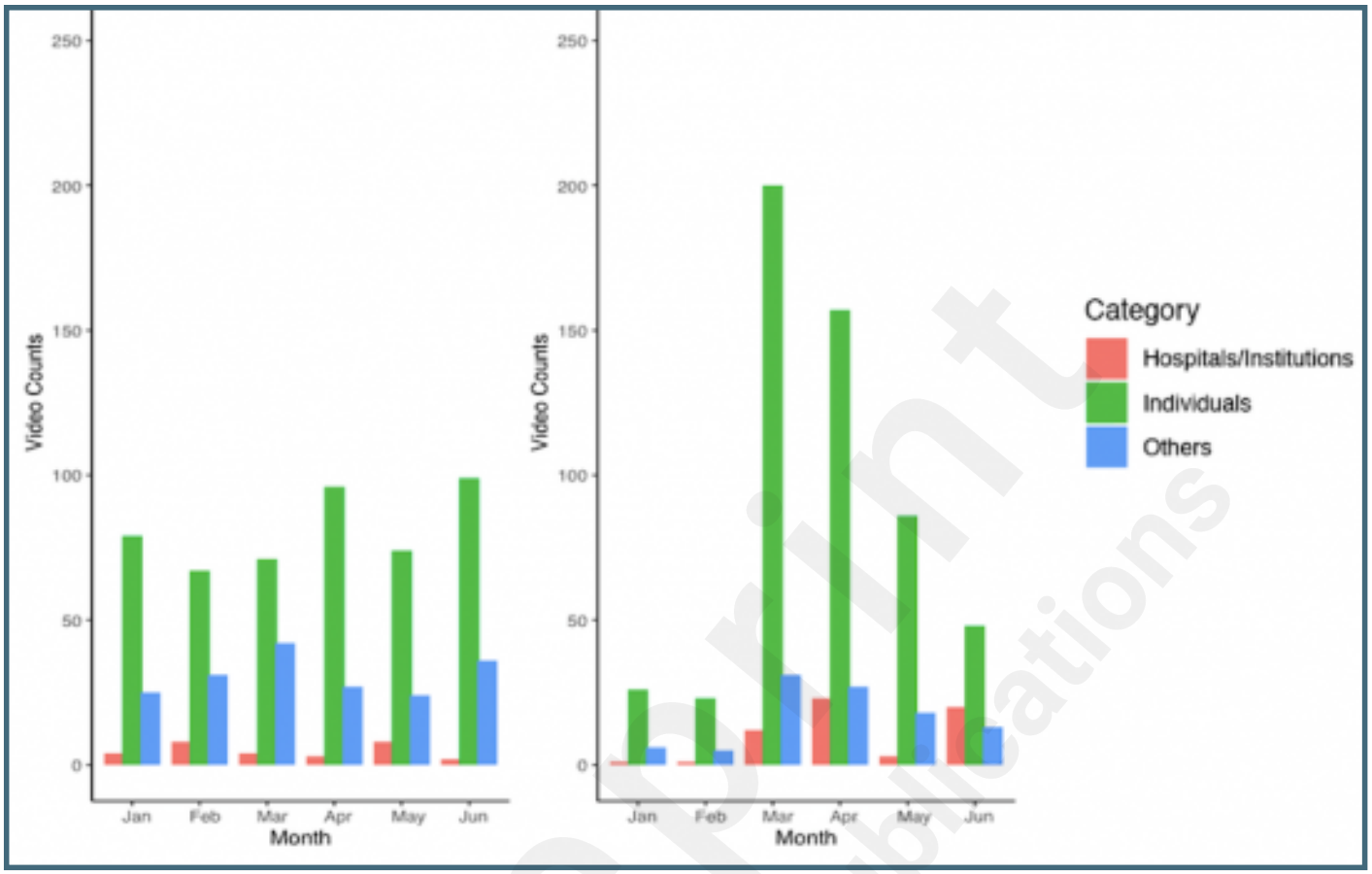
Supplementary Files

Figures

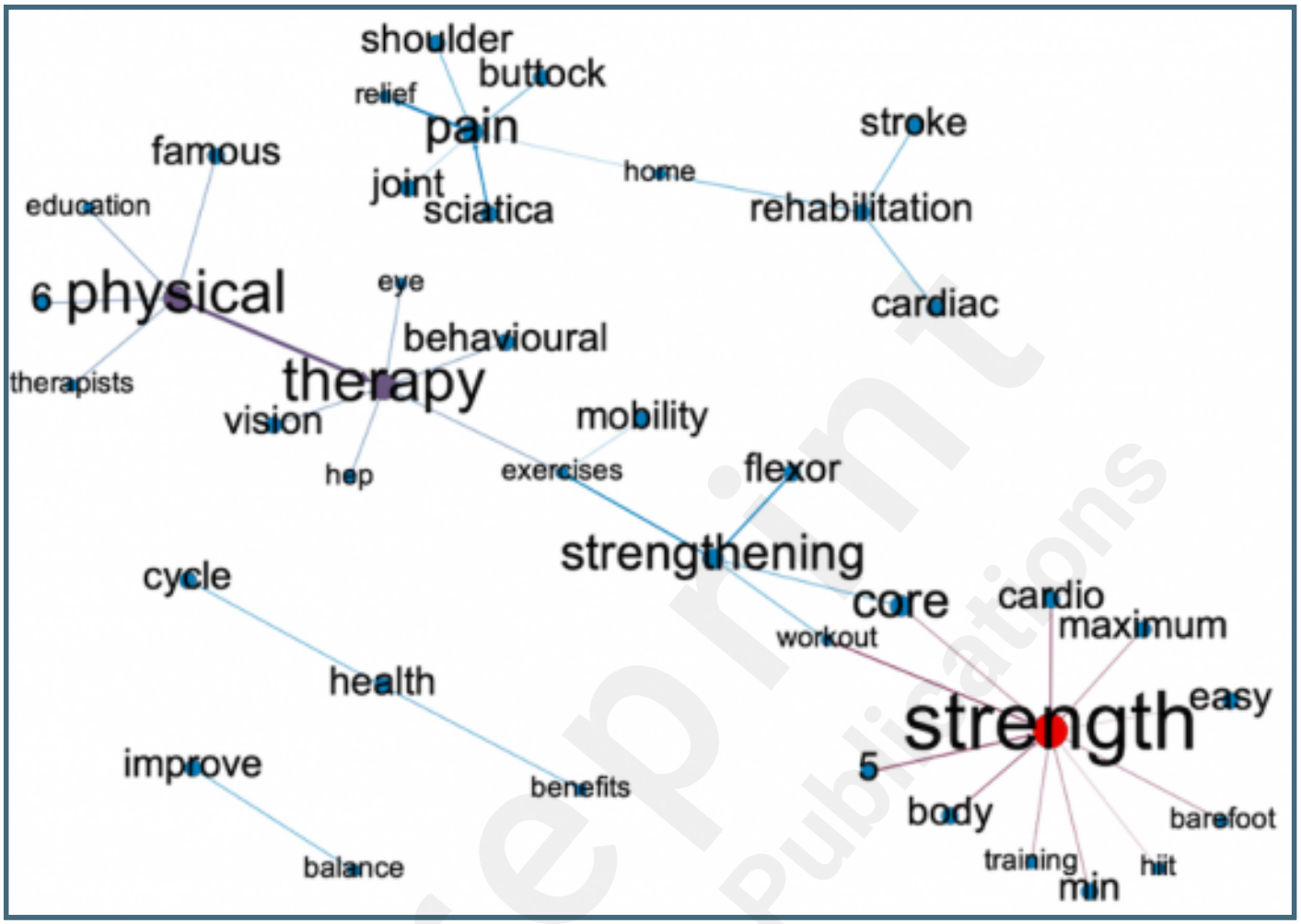
Google Trend Data on Searches for ‘Exercise Videos’ between January 2020 and June 2020.



Histogram of Total Videos Published from January to June in 2019 and 2020.



Bigram Network Plot.



Multimedia Appendixes

Aggregate Word Count of 1400 Video Descriptions (Excludes Filler Words).
URL: http://asset.jmir.pub/assets/4dd76d2e79f07a3998e852da17253089.docx

Bigram Counts of 1400 Video Descriptions.
URL: http://asset.jmir.pub/assets/57355eab26328c0ae4a049bfd5bb8d0d.docx

Top Word Counts From Video Titles.
URL: http://asset.jmir.pub/assets/ce17446feebce127e65e63b0ec51adf5.docx

Top 20 Words From Video Descriptions.
URL: http://asset.jmir.pub/assets/3977fc36ed0c713279f03e35905fb0f4.docx

Top 20 Bigrams of Parsed Video Descriptions.
URL: http://asset.jmir.pub/assets/85f39cfc79037550a3abb6a2d7a42730.docx