Article

The Fit Body Democratised: Fitness Literacy as Biohacking on YouTube

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Abstract

Despite the excellent health care of modern times, lifestyle-related illnesses are increasing at a startling rate. Contemporary society contributes to behaviours such as poor nutrition, inactivity, poor sleep and excessive stress. However, exercise has been proven to reduce the chances of health problems and more information about ways to improve the quality of one's lifestyle is readily available through the Internet. The impact that biohacking YouTube videos have on shaping the knowledge and fitness of the general public is examined. It is argued that this form of literacy enables corporeal control and transformation and that the digital platform contributes to do-it-yourself healthcare. A parallel is drawn between the historical impact of the development of the printing press on public literacy, and the effect of social media on improving fitness literacy. Top-performing fitness channels were analysed to determine the impact of biohacking media on YouTube. While user engagement on popular fitness videos reflected different degrees of understanding of fitness practices, analysis of user engagement clearly revealed aspects of increased fitness literacy in public discourse on YouTube. It is concluded that YouTube stimulates the enhancement of audience fitness literacy, thereby influencing do-it-yourself healthcare of the lay public.

Keywords: biohacking; DIY healthcare; fitness literacy; YouTube; social networking sites; participatory culture

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Introduction

Almost everyone has a desire to "tone up" for the next holiday season or perhaps lose some weight for an upcoming social event. And yet, heart disease, obesity, diabetes and autoimmune disorders are increasing at a startling rate (Stancic 2021). In fact, the worldwide prevalence of lifestyle obesity has almost tripled since 1975 (WHO 2020). Whereas humans historically died from infectious diseases, medical technologies have ensured that we do not become fatally sick from bacteria or infected injuries in the twenty-first century. Instead, a modern lifestyle encourages unhealthy behaviour such as poor nutrition, inactivity, social isolation, poor sleep habits, excessive stress and the consumption of various damaging substances (Stancic 2021). The COVID-19 pandemic has also highlighted the ongoing threat that viral infections pose to health. However, to a significant extent, we are living in an era characterised by self-imposed chronic disease alongside the risk of viral illness.

The good news is that regular exercise has been proven to reduce the chances of health problems such as heart disease, diabetes, high blood pressure, some forms of cancer, mental illness and inflammation (Bean 2010, 6; Newton and Galvao 2008, 136; WHO 2018). The Internet has made more and more information available about ways to improve the quality of one's lifestyle and potentially extend one's life expectancy. Accordingly, this research explored the digitally mediated phenomenon of bio-literacy that promotes a healthy lifestyle or "body-hacking" practices on YouTube. A new perception of the body and the contemporary self-identity has been gaining traction since mass urbanisation started increasing globally. Posthumanist and transhumanist theories have led to an expanded and enhanced view of the body. Fitness culture has thrived because of this as it has initiated a new perception of the body and contemporary self-identity, and has been gaining traction in conjunction with increasing urbanisation. The digital era further boosts the free circulation of body-knowledge through social networking sites (SNSs) because of the social nature of physical culture and a universally shared state of embodiment. This can be compared to the spread of lay literacy through the invention of the printing press.

SNSs, such as YouTube, enable do-it-yourself (DIY) biohacking—a self-help approach to the science behind a trim and healthy body. The objective of this article is to explore how fitness content on YouTube contributes to the enhancement of fitness literacy among audiences. This study draws comparisons between the spread of fitness advice through SNSs, with a particular focus on audience engagement with biohacking practices. The fitness trend emerged with developments in digital technology, when large amounts of data became accessible through smartphones and personal computers. Since embodiment of the posthuman concept can be shared internationally, regardless of language or location, SNSs have democratised fitness culture and specialist body hacks to more consumers. Virtual trainers are enabled to teach fitness as a tool towards self-enhancement and realisation of the ideal body, no matter the location of an individual. Biohacking is generally defined as the improvement of physical and

intellectual performance through self-directed evolution (Yetisen 2018, 744). In this study, biohacking is understood as a body improvement process produced through knowledge of diet and exercise regimens shared by biohackers on various SNS platforms. Through the application of expert health- and fitness-related biohacks, different levels of personal enhancement are achieved. I contend that many active SNS users become fitness literate by consuming fitness content on participatory spaces such as YouTube. Biohacking-related YouTube videos act as pedagogical material to enhance the health of international audiences.

However, while YouTube provides widespread access to fitness knowledge, this democratisation of fitness advice also warrants further examination. Drawing on Foucault's (2019) concept of biopower, the increase of online fitness content may reinforce self-regulation and surveillance. Fitness culture encourages individuals to monitor their bodies in accordance with societal norms of health and fitness, and the platform's metrics for engagement, such as likes and views, further incentivise adherence to these ideals, transforming self-surveillance into a form of online performance. Disciplinary power does not just operate through coercion but by embedding control within daily life. This suggests that the democratisation of fitness knowledge might perpetuate self-surveillance and normalise specific health ideals (Foucault 2019, 134–170). Thus, the identities shaped within online fitness communities are often reflective of broader societal expectations, which contributes to the growing emphasis on health and fitness in the modern consumer culture.

The advancement of a healthy lifestyle is a fast-increasing trend in urbanised and global consumer societies. Globally, the fitness industry grew from 162 million to 174 million gym memberships in the first 10 months of 2019, and this number is expected to surpass 230 million by 2030 (IHRSA 2019). A massive variety of products and services aimed at enhancing the body and aiding personal health and fitness are flooding markets to meet an ever-increasing demand, particularly in developed countries. Jean Baudrillard (1970, 14) already noted in the 1970s that health-conscious consumers were turning from religion to reliance on treatments, therapies and regimes aimed at optimising health and body. In the postmodern era, health, salvation and the perfectible body are the responsibility of the individual and cannot be ascribed to predestination. This notion justifies the fitness megatrend that has transformed the culture and character of urban life, religion and health. Given the contemporary movement of public health and medicine towards digitising the body, it is now an indispensable part of individual embodiment and postmodern society. However, while the twentieth-century urbanisation and globalisation may have changed bodily perceptions, the body as a site of identity and status existed much earlier. From the emphasis of Greece on the athletic body to the Renaissance ideal of human proportions, the body has long been seen as a reflection of individual and societal values (Sennett 1994, 33).

Increased value is placed on physical activity and fitness in an attempt to escape the ills of the contemporary sedentary urban lifestyle. In the twentieth century, individual

fitness was encouraged, with self-actualisation and self-improvement as the main aim (Smith Maguire 2008, 1–2). Recently, the fit body has become a sign of an individual's self-discipline and good health, even providing increased purchasing power (King 2006, 48). Correspondingly, the role of the fit body as a marker of status and expression of identity is emphasised (Sassateli 2010, 12).

Technological developments increase the possibility of healthy living by visually mediating the road to a fit and active body. These developments provide non-specialists with the means to autonomously manage their physical fitness. The evolution of participatory digital platforms and interactive devices enabled by the Internet facilitates health tracking and increased health awareness. It also provides easy access to nutrition and exercise guidance, all of which contributes to what is called the second fitness boom or fitness megatrend.

The fitness megatrend is characterised by the integration of customisable, mobile and interactive technologies created to be used in customers' fitness endeavours (Hajkowicz et al. 2012, 4; Millington 2016, 185). The first fitness boom took place from the early 1980s and was marked by the expanding market of fitness products and aids, such as treadmills and fitness media that included exercise videos featuring Jane Fonda for home use (Millington 2016, 185). The fit body became a commercialised image, with fitness gyms as the main site where such a body could be produced (Sassatelli 2010, 9–10).

To understand the dynamics of online fitness culture, it is important to explore the theoretical frameworks that underpin perceptions of self-improvement and body regulation. In examining the evolution of self-improvement and body perception, Foucault's concept of disciplinary power provides a crucial theoretical framework. In *Discipline and Punish*, Foucault (2019, 134–170) interprets the influence of societal structures on individual behaviours through mechanisms of surveillance and normalisation. This framework applies to online fitness culture, where a platform such as YouTube becomes a site for self-regulation and discipline. While democratising fitness knowledge can be empowering, it can also drive individuals to monitor and conform their practices to societal norms. This emphasises digital fitness communities' significant role in shaping health and identity, illustrating how contemporary biohacking and DIY biology are rooted in historical self-improvement traditions.

Developments in digital technology support the spread of the fitness revolution to YouTube's two billion users, currently amounting to one-third of Internet users (YouTube 2020a). YouTube provides viewers with access to a myriad perspectives, advice or "biohacks" that could produce a fitter body, akin to the manner in which the development of the printing press in 1450 enabled modern thought through mass literacy (Eisenstein 2005, 335).

A historical contextualisation of the first instances of public literacy in the western world, as a result of the development of the printing press, serves as a springboard for this study to establish a comprehensive definition of literacy. This study explores the impact of new technologies, specifically YouTube, on the global public's fitness literacy. In this study, literacy is understood by drawing parallels with the increase in traditional literacy (the ability to read and write) that was caused by the development of the printing press. Mass public literacy was precipitated by ready access to the printed word afforded by the printing press. The spread of literacy in the fifteenth century can be interpreted as one of the most transformative events in the world (Easton 2008, 47). I propose that a similar transformative revolution is currently playing out in the fitness industry due to the widespread impact of literacy about the human body, as created by SNSs. Just as traditional literacy empowers individuals to access and interpret information, fitness literacy enables individuals to interpret fitness-related content in ways that facilitate their journey towards improved fitness. Fitness literacy is therefore further defined as the ability of individuals to engage with, interpret and apply fitness-related information to enhance their physical health. However, engagement on YouTube occurs through public comments and user discussions, which can raise questions about the depth of this literacy. Thus, this analysis seeks to determine whether viewers can articulate the principles of balanced nutrition and effective exercise habits, which could indicate a level of fitness literacy.

Howard Rheingold (2013, 217) describes literacy as the intersection of the human brain, sociality and communication technologies. He views the alphabet as a social practice—where sociality meets "the augmenting power of technological networks". Literacy is therefore an essential skill for humans to build social structures, as it is used to "introduce systems and tools to other humans, to train each other to partake of and contribute to culture" (Rheingold 2013, 217). In short, this means that literacy intersects with technology and sociality and when individuals learn the particular skill set of decoding and encoding knowledge, they are introduced to a community or culture.

Rheingold explores literacy in relation to social media and views the printing press as enabling literacy and collective knowledge production, in the same way that digital social participation allows for collective information sharing and interaction. Social media augments human behaviour and sociality and contributes to literacy by bridging sociality and technology. This confirms the notion that literacy is essential to the human ability to enable participation by sharing systems and technologies (Rheingold 2013, 215–217). Consequently, social media platforms such as YouTube develop new forms of digital literacy that give individuals access to a particular participatory digital culture, as is the case with fitness.

Jodi Pilgrim and Elda Martinez (2013, 60) define literacy as generally referring to reading and writing effectively in a variety of contexts. Carl Kaestle similarly explores traditional literacy in *The History of Literacy and the History of Readers* (1985) as "the ability to decode and comprehend written language at a rudimentary level, that is, the

ability to look at written words corresponding to ordinary oral discourse, to say them, and to understand them" (Kaestle 1985, 13). Thus, for most, literacy refers to reading and writing, and schooling is perceived as the tool for accomplishing it (Gates et al. 2009, 24). Moreover, literacy offers an account of the transformations in western culture as brought about by the development of printing in Europe. The shift to print culture and the impact of Gutenberg's movable type printing press is contextualised first through American historian Elizabeth Eisenstein's work *The Printing Revolution in Early Modern Europe* (2005). The book is a seminal historical account of the advent of printing as an agent of change in the communications revolution. Eisenstein is aware of network effects, and explains how books and printed matter provided the basis for new extensive networks of interaction. This approach is thus also suited to consider the impact of digital technologies. Eisenstein (2005, 102) credits Marshall McLuhan's *The Gutenberg Galaxy: The Making of Typographical Man* (1962) with first spreading awareness of the possibility that printing had social and psychological consequences. McLuhan (1962, 31) predicted the networked "global village" of electronic interdependence and explored the effects of the movable type of press as well as the "trauma" of literacy caused by the introduction of the phonetic alphabet (McLuhan 1962, 22). The Gutenberg Galaxy aids the examination of the impact of enhanced literacy in the fifteenth century and how it compares to the digitally mediated fitness literacy or contemporary biohacking by introducing the concept of the human extension of abilities through technologies. However, this enhancement of bio-functionality is only one aspect of what any new technology does. It also changes our environment, and when we change our environment, we change ourselves. The introduction of new digital technologies has supplied possibilities for interpretative comparisons to old technologies, thereby increasing awareness of the contemporary media environment and bringing popular media theorist Marshall McLuhan's research back into focus.

McLuhan (1994, 90) writes: "All technologies are extensions of our physical and nervous systems to increase power and speed." For example, electronic technology has externalised the nervous system and brain functions (McLuhan 1994, 247). Since the advent of electricity, and more so with the Internet, as humans we have extended our nervous system globally by translating our lives into information, thereby connecting every human experience into a networked whole or single universal consciousness (McLuhan 1994, 61, 358). Therefore, technologies are extensions of the physical, social and intellectual functionalities of humanity and affect "the whole psychological and social environment" (McLuhan 1994, 4), which again implies the networked structure of the technologised humanity. It is clear that the human nervous system and the "wired planet" are fundamental to McLuhan's belief that the media could produce a level of unity across the world (Marchessault 2005, 205). Similarly, literacy is a technology and therefore a form of self-extension. As an extension of the "visual faculty, intensified perspective and the fixed point of view" (McLuhan 1994, 172), print technology shaped a new kind of person (McLuhan 1962, 174). McLuhan (1994, 300) sees literacy as permeating every phase of communal life while functioning according to the principles derived from print technology, namely "continuity, uniformity, and repeatability". It is

argued here that fitness literacy as technological self-extension creates a standardised digital fitness culture and produces a new type of health-conscious and increasingly self-reflexive individual.

Another major contention of McLuhan is that the media can depict an image that influences the recipient's self-image and expectations. He believes that "we become what we behold" and that "we shape our tools", after which "our tools shape us", similar to the printing press shaping societies after its introduction (McLuhan 1994, xi). For this research, McLuhan's argument can be interpreted further: "we shape the Internet, the Internet shapes us." This study focused on the way the Internet influences the shaping of users' bodies and fitness experiences through increased fitness literacy and biohacking.

According to McLuhan (1994, 15), both the French and American Revolutions took place under pressure created by printed media. The current fitness megatrend similarly owes its increasing reach to development in digital technologies and cultures, and is comparable to the invention of the printing press as a catalyst for the Reformation. Electronic media, as the precursor of digital media, introduced the simultaneity and instantaneity of information (McLuhan 1994, 351). It converted humans from nomadic food gatherers into virtual nomads and gatherers of knowledge. The press similarly created the modern individual after the fall of information gatekeepers and the rise of the first instances of social networks. The impact of new technologies on literacy in different areas, in this case on fitness literacy, can be understood by drawing parallels with the increase in traditional literacy as initiated by the development of the printing press.

Method

The fitness megatrend has accumulated great momentum via the online availability of information and motivational resources, especially on SNSs. While different forms of biohacking can be found on various online platforms, YouTube retains an active fitness community consisting of more than 8 000 fitness channels (YouTube 2020b). Fitness-themed channels typically focus on biohacking methods such as exercise routines, muscle mechanics, nutritional information and sleeping habits. Online social environments such as the comment sections on YouTube videos act as a platform for discussions and interaction with YouTube hosts as well as other users. This specific zone has been selected as an appropriate site to focus investigations to determine fitness literacy and participation in biohacking.

The analysis focused on users' comments on the respective YouTube channels to find and interpret visual and textual elements and strategies that are reflective of biohacking and augmented bio-literacy. Qualitative discourse analysis (Fairclough, 1989) was used to examine YouTube fitness comments. Comments from selected videos were gathered to capture more diverse perspectives. Themes were identified by coding the comments,

focusing on fitness literacy, biohacking and how users report applying fitness advice. The analysis emphasised the influence of YouTube content on users' fitness behaviours and self-monitoring.

The case study channels act as examples of popular biohacking practices on YouTube, where fitness participants come together to enhance their fitness literacy and gain knowledge to be applied toward producing a fit body. To optimally explore selected areas and contextualise natural biohacking as fitness literacy on YouTube to answer the research questions, relevant discourse on top fitness videos was collected and used as the basis for analysis.

The objective of this study was to capture a snapshot of popular YouTube fitness video engagements to analyse the spread of fitness literacy through YouTube. Discourse analysis is a qualitative method centred on the examination of language. It allows for virtually any social text to be used as a basis for analysis, including public group discussions such as those found on YouTube. Discourse analysis is based on the understanding that language has a vital role in social functions and that the study thereof grants a better understanding of social functioning. The methodology focuses on the relationship between structures of text, language use and verbal communications, while at the same time considering cultural structures and social representation (Yin 2016, 69). In addition, visual elements in the selected material were analysed through employing a semiotic approach.

Material Selection Process

The aim was to assess the possible increase in users' fitness literacy following their engagement with fitness videos on YouTube. Two of the most-viewed biohacking videos from each channel were selected for analysis (a total of four videos). Particular emphasis was placed on the analysis of video comments as a potential arena for reflection of knowledge. Two or more comments from each video were assessed using Fairclough's critical discourse analysis model (1989, 26). In total, six texts were analysed.

The selection of case studies aimed to capture a typical representation of popular YouTube video engagement and indicators of fitness literacy. For that reason, channels that achieved the greatest reach were identified. In establishing the corpus for analysis, YouTube's search engine (www.youtube.com) was used to search for the keyword "fitness." Results were then filtered to show the channels with the highest view count first. On February 4, 2021, Athlean-X (Figure 1) and Blogilates (Figure 2) were identified as the most-subscribed-to male and female fitness channels. These channels are focused on different aspects of physical culture since they are targeted to gendered audiences. I selected Athlean-X and Blogilates as case studies due to their popularity and diverse audiences. However, this choice may introduce selection bias, as both channels represent extremes of gender-targeted content. Athlean-X appeals primarily to

men and Blogilates targets women. This focus means that the data may not be representative of the full spectrum of fitness perspectives. Further research into less popular or niche channels could provide a more nuanced understanding of fitness literacy across different gender identities and backgrounds.

Figure 1: Athlean-X YouTube creator Jeff Cavaliere with a client, ATHLEAN-X website, 2018

Figure 2: Cassey Ho leading a POP Pilates Workout, Blogilates website, 2009

The set of gender-inclusive case studies offers superior insights rather than research using a single case study, which would not have reflected the full diversity of sources.

According to statistics by Bärtl (2018, 16), 85% of views on YouTube are concentrated on just three per cent of all channels. This would mean that Blogilates and Athlean-X are particularly dominant fitness channels and therefore well-positioned to reflect literacy in online engagement, such as comments on extremely popular YouTube fitness videos. Furthermore, García-Rapp (2017, 234) suggests that a channel's "legitimacy within the community" is verified by its number of subscriptions, which further substantiates the use of most-subscribed-to fitness channels for this analysis.

To produce evidence of biohacking literacy spread through SNSs, one popular exercise video and one top nutrition video were selected from each channel to diversify the content of the analysis. Videos were required to contain fitness content or biohacking practices such as nutrition and exercise and had to have been posted within the last 12 months. Images were obtained by taking screenshots of scenes in the video that were illustrative of biohacking practices.

Results and Discussion

This research explored the enhancement of fitness literacy through the consumption of fitness content on SNSs. YouTube is considered a pedagogical tool, whereby a transformed perception of embodiment was found to be produced. Due to the development of SNS technologies, such as YouTube, access to advanced knowledge behind managing a fit body is democratised. The fitness megatrend is diffused through media such as YouTube videos that shape the development and perception of the human body into a fitness instrument. Since the realisation of the ideal body is universally defined, virtual professionals are able to teach fitness as a self-actualising tool that is globally accepted. The contemporary movement of public health towards digitising the body is now a crucial part of individual embodiment and postmodern culture.

By analysing user engagement on top-performing fitness channels as case studies, aspects of fitness literacy were determined by analysis of public discourse following engagement of users on popular YouTube fitness channels. Comments analysed in this study were regarded as part of the public domain, accessible to anyone visiting the YouTube platform. Care was also taken to anonymise specific usernames and ensure that no personal information was disclosed.

Indicators of literacy were determined in the comments of YouTube users, and biohacking knowledge was found to be distributed through health-related YouTube videos. The pursuit of fitness literacy and a certain type of body (lean and toned) was reflected in YouTube comments, and the implementation of YouTuber health practices was often described. Biohacking content on YouTube promotes health and fitness practices that focus on changing physical appearance. This content offers users DIY methods to achieve a certain level of leanness, setting a benchmark for the ideal percentage of body fat and muscle mass. A thin and toned body is presented as the current sociocultural ideal (Ratwatte and Mattacola 2019, 10; Tiggemann and Zaccardo

2016, 1008) and, in line with this set norm, many of the most-viewed videos specifically discuss the reduction of abdominal fat, which indicates the most popular body part participants in fitness culture are interested in changing.

The research demonstrated, through the case studies and discourse analysis conducted on two of the most popular fitness YouTube channels, how SNSs contribute to enhancing the fitness literacy of audience members. Findings of this study revealed that the informal environment of YouTube fitness videos, as reflected in users' comments, suggests enhanced but different levels of understanding of fitness practices. Some users went beyond information sharing by giving advice to others on the same journey towards an actualised body, proving that a higher level of knowledge creation is taking place on YouTube, further inspiring and enhancing the current fitness megatrend.

Comments on Blogilates

Cassey Ho is the founder of Blogilates as well as a certified group fitness instructor and Pilates teacher with over 4.78 million subscribers by 2020 (YouTube 2020b). Blogilates was analysed as a case study to determine the impact of digital technologies on the fitness megatrend in terms of enhanced lay literacy. Central themes of literacy, posthumanism and biohacking are reflected in the visual and textual approaches taken by Blogilates. Overall, comments on Blogilates videos are reflective of different degrees of fitness literacy concerning biohacks, including nutrition and exercise regimes. Blogilates viewers perceive Ho as an informal mentor, and their comments frequently reflect appreciation of her for sharing fitness-related information. It is clear that Ho is accepted as an authority figure on YouTube, as she assumes the dominant role in influencing the social attitudes and mental processes of the audience.

The visual and textual strategies employed by the Blogilates channel indicate that Ho acts as a spearhead of the postmodern body project on YouTube by mediating the body as a prestige possession to keep beautiful and competitive. Further conclusions include that Ho promotes the body as a site for both financial and psychical personal investment (Baudrillard 1998, 129), creating a sense of self that is independent of religious and political structures. However, the perfect body may perhaps be interpreted as a new "religion." Furthermore, Ho acts as a virtual mediator of fitness culture values and practices by sharing fitness information directed at transforming the body into an ideal, or fitter, shape. The repeated emphasis on transformation through diet and exercise programmes supports the postmodern self-perception of the body as pliable and identity as flexible (Figure 3). Blogilates has also been found to encourage disciplined eating and behaviour to align with fitness culture ideals. Through discourse analysis, it has been determined that the Blogilates channel generates and actively supports the fitness literacy of its audience.

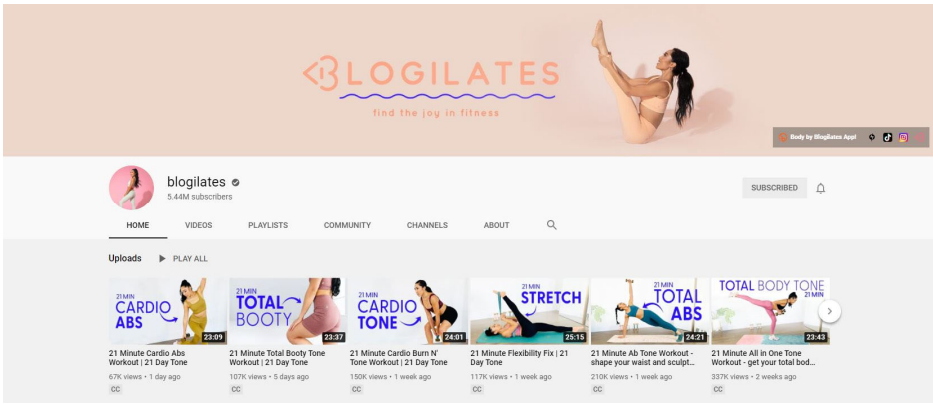

Figure 3: The Blogilates YouTube channel homepage, Blogilates YouTube channel, January 2021 (screenshot by author)

In summary, Blogilates advances a controlled and socially mobile physical appearance through the implementation of biohacking regimes that are shared and motivated by participatory culture values. Participation is enhanced, according to Chau (2010, 68–72), through accessibility (a fundamental element of YouTube as a digital platform), active community contribution and social connection (demonstrated by user comments), informal mentorship (as facilitated by Ho), and encouraged project sharing (mostly in the form of shared transformation photographs). This channel is therefore established as a prime example of popular biohacking practices on YouTube, where the fitness culture encourages participants to increase their fitness literacy and to transform their bodies as instruments towards greater self-actualisation.

Comments on Athlean-X

Jeff Cavaliere is the owner of the most-watched male fitness channel on YouTube, Athlean-X. By 2020, the channel had surpassed 9.6 million subscribers (YouTube 2020b). Cavaliere is a physical therapist who uses his channel to educate audiences on subject matter ranging from common workout mistakes to nutrition advice. An analysis of Athlean-X demonstrates its contribution to and promotion of the fitness megatrend by sharing specialised biohacking knowledge or fitness literacy through created and shared educational YouTube videos. An investigation of the educational impact of Athlean-X's YouTube channel was conducted according to key themes of bio-literacy, biohacking and posthumanism. The analysis provided evidence of enhanced audience literacy levels and established the channel as a notable distributor of biohacking practices following enhanced fitness literacy.

The ideal male body shape, as promoted by Cavaliere and as the outcome at which his biohacks are aimed, is lean but also enlarged with regard to muscle size (hypertrophy). Cavaliere views the body as a flexible tool to be sculpted and transformed in an

instrumental manner. The repeated removal of the head in imagery, with the head as the symbolic seat of identity and thought, suggests that the body is separate from thought and is, therefore, an instrument that is controlled and made fitness literate (Figure 4).

Figure 4: Jeff Cavaliere in "How to lose stubborn belly fat", Athlean-X YouTube channel, 2020 (screenshot by author)

The Athlean-X channel meets all the requirements of creating a participatory culture, such as easy accessibility, community contribution and connection, informal mentorship and emphasised project sharing (Chau 2010, 68–72). This user participation makes YouTube a unique platform for research as there is an emphasis on sharing of specialist knowledge, as demonstrated by visuals such as the Athlean-X channel cover image and thumbnails (Figure 5).

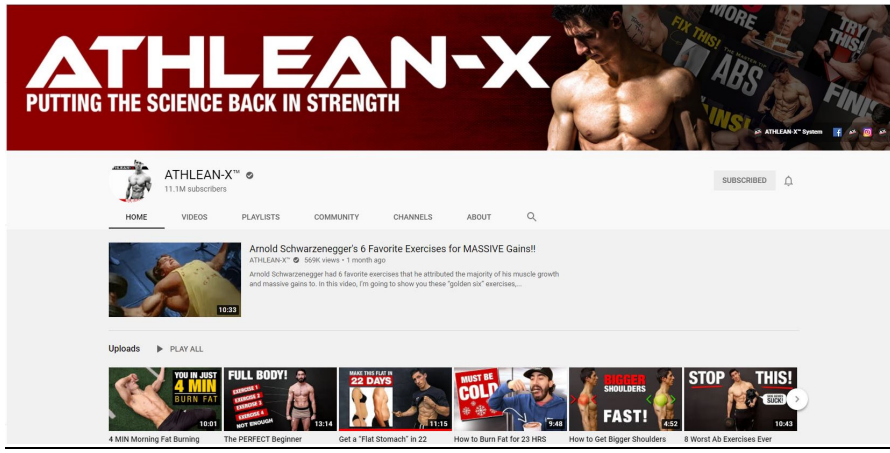

Figure 5: The Athlean-X YouTube channel home page, Athlean-X YouTube channel, 19 January 2021 (screenshot by author)

The emphasis on participatory culture is evident in audience members conferring among themselves to better understand Cavaliere's biohacking recommendations. Analysis of the comments further showed community contribution and social connection. The comments demonstrated a perception of educational value in Athlean-X's video content. Similar to Ho, Cavaliere is perceived as a mentor figure with the purpose of guiding viewers to an enhanced physique through DIY methods as he assumes the dominant role in influencing mental processes and social attitudes of the audience towards the fit body.

In summary, the Athlean-X videos have pedagogical value in terms of biohacking knowledge being disseminated. The videos encourage an instrumentalist view of the self, while promoting biohacking towards the perfect body and upholding the body project as providing a form of self-actualisation. This channel is therefore established as another example of popular biohacking practices on YouTube, where fitness culture encourages participants to increase their fitness literacy and transform their bodies as an instrument towards greater self-actualisation.

Comparative Interpretation of Athlean-X and Blogilates

This section seeks to compare the selected case studies and further establish the impact of SNSs on fitness trends to enhance fitness literacy. As is evident in the Athlean-X and Blogilates YouTube channels, online fitness culture communicates information about food intake, motivation, exercise, functioning of the body and representations of ideal fit bodies (Andreasson and Johansson 2014, 106; Jong and Drummond 2016, 760). A fit or athletic-looking body is a powerful icon for fitness participants, and online fitness communities gather on places such as YouTube to "consume" information on this fit body. Viewers are directed by the YouTubers in question to achieve this ideal through messages and values that are then consumed by participants (Jong and Drummond 2016, 762). Featherstone (2007, 88) states that the lower-middle-class possesses little economic or cultural capital and consequently must procure this by adopting a "learning mode of life" where they are consciously and continuously educating themselves in terms of taste, style and lifestyle. Because the growing global middle-class is the driving force behind the fitness megatrend, this learning-oriented mind set is crucial to the bio-literacy argument as advanced in this study.

Both Cavaliere and Ho treat the body as a site worthy of investment (Baudrillard 1998, 129) and as a site for the construction of the identity of the self (Negrin 2008, 5). The type of body reproduced is the healthy-looking ideal, which is regarded as physically attractive (Jong and Drummond 2016, 763).

It is crucial to keep in mind the consumerist root of the individualistic rhetoric of contemporary self-conception (Negrin 2008, 9). Both Ho and Cavaliere encourage the aestheticisation of the self or influencing the body project through bodily regimes, and both use their bodies as commodities to display consumer objects (Negrin 2008, 13–14). The channels display advertiser-friendly personas that legitimise them as

knowledgeable specialists, while also advertising products through their channels to support their efforts to share expert bio-knowledge with an audience that does not pay for access to content. These objects include fitness programmes, active wear and fitness accessories in the case of Blogilates, and performance-enhancing supplements in the case of Athlean-X. Their bodies are thus used as a type of living marketing tool for their respective range of products.

Other recurring similarities between the channels, including fitness challenges, transformations and the appearance of headless bodies, are interpreted hereafter. There is a repeated emphasis on health challenges and 21 days are repeatedly put forward as the number of days it takes to learn a habit or transform the body (Clear 2014, 2–3). These health challenges promise transformation in the minimum amount of time, to entice viewers to participate, and promote constant yearning for further improvement as evident in biohacking techniques to "fashion the body" or influence appearance through controlled food intake and exercise (Negrin 2008, 13).

Heavy emphasis is placed on bodily transformation by both channels, and overweight bodies are shamed in before-and-after or transformation pictures, creating a constricted view of what it means to be healthy (Jong and Drummond 2016, 763). The appearance of the headless body is important, as it occurs in both channels, especially in transformation images and video thumbnails (Figure 2 and 5). This element can be interpreted as the body being split into opposites, where the body is degraded by a fragmented view of embodiment as an instrument to be disciplined and educated or made literate in its mechanical functioning so that it can be transformed and improved. Both channels have been established as examples of massively popular biohacking practices on YouTube, where fitness culture participants gain fitness literacy and make their bodies literate as instruments.

Finally, discourse analysis of comments on both channels indicates that the channels are participatory hubs for enhancing fitness literacy, and comments on the most popular biohacking videos are reflective of this contention. Viewers often position the advice they receive as useful and transformative, inspiring further self-monitoring and self-improvement, which reinforces the disciplining of bodies and influences the audience to continuously work on their body project.

Conclusion

This research explored enhanced fitness literacy as stimulated by the consumption of fitness-related social media content, such as can be found on YouTube. SNSs are considered pedagogical tools that motivate the physical, and mental, transformation of consumers. It is argued here that these novel technologies produce a new type of public literacy, which was compared to traditional lay literacy in the fifteenth century, as instigated by the historical advance of the printing press in early modern Europe.

A revolution is currently taking place in the fitness industry due to interactive SNSs, comparable to the revolution created by development of the printing press, which allowed the layperson to access knowledge in ways that had not been possible earlier. Due to the development of SNS technologies such as YouTube, access to advanced knowledge behind managing a fit body is democratised. The fitness megatrend is diffused through media such as YouTube videos that shape the development and perception of the human body into a fitness instrument. Since the realisation of the ideal body is universally defined, virtual professionals are able to teach fitness as a self-actualising tool that is globally accepted. The contemporary movement of public health towards digitising the body is now a crucial part of individual embodiment and postmodern culture.

This study contributes to research by examining how SNSs, in this case YouTube, become spaces where health topics are promoted and discussed by cosmopolitan audiences across the world, from laypeople to professional health and fitness experts. This research demonstrates how SNSs contribute to enhancing the fitness literacy of viewers through case studies and discourse analyses of popular fitness YouTube channels. Evidence has been provided that YouTube has pedagogical value in terms of increased fitness knowledge, motivation to maintain and improve personal fitness and better DIY healthcare of SNS users. Additional insights have been gained into how individuals cognise popular fitness practices and issues.

This study's findings are of significance as they determine the diffusion of fitness literacy to establish the pedagogical value of YouTube as a digital platform. This research seeks to fill a gap in the literature regarding the informal educational significance of digital platforms. It also aims to define the gap between professional health sciences and DIY biohacking practices. This investigation explored critical areas in the informal and digitally mediated educational process, which was not possible until very recently and has therefore not been explored yet. Determining the effect of technologies on culture is essential as we are continually exposed to these novel technologies and therefore need to be aware of the impact media content has on our everyday experiences. Since the digital humanities are a uniquely current discipline, there are ample opportunities for research. At an individual level, this exploration has provided the researcher with insight into the value of a healthy lifestyle as promoted and supported by contemporary open-source knowledge systems.

Suggestions for Further Research

Based on these conclusions, other practitioners could address the unique impact of different digital platforms or software on mass fitness literacy. YouTube provides an abundance of data for future research. Further research could also engage in measuring indicators of fitness literacy in discourse through in-depth interviews with audience members of informal pedagogical platforms such as YouTube. Alternatively, interviews could be analysed by means of reliable coding frameworks to indicate quantitative

measurements of fitness literacy as enhanced by fitness media, assigning value to the improved literacy derived from pedagogical input on SNSs.

Declaration of Competing Interest

None.

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