

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Ehrlén, Veera

Title: Tracking oneself for others : communal and self-motivational value of sharing exercise data online

Year: 2021

Version: Accepted version (Final draft)

Copyright: © 2021 Taylor & Francis

Rights: In Copyright

Rights url: <http://rightsstatements.org/page/InC/1.0/?language=en>

Please cite the original version:

Ehrlén, V. (2021). Tracking oneself for others : communal and self-motivational value of sharing exercise data online. *Leisure Studies*, 40(4), 545-560.

<https://doi.org/10.1080/02614367.2020.1869289>

Tracking oneself for others: Communal and self-motivational value of sharing exercise data online

Self-tracking is increasingly popular in recreational sport. Leisure sports practitioners use wearable devices that are connected to online platforms to record, analyse, and share their exercise data. While doing that they interact with a digital system, with themselves, and with peers. Drawing on van Dijck and Poell's (2013) framework on social media logic and Frandsen's (2020) theorising on mediatisation of sport, this paper examines social-communicative aspects of self-tracking, and the support that these aspects and their associated practices may provide for physical activity behaviour. Data for the study was collected using an online survey and in-depth interviews with Finnish trail runners. The results indicate that sharing exercise data with others on a regular basis can support physical activity behaviour because it is mediated by social peer support. The analysis identified information sharing, comparison, and recognition as the main social-communicative aspects that motivate sharing physical activity data online, and ordinariness and privacy as reasons that limit data sharing. This paper contributes to the discussion on digital leisure by showing that for many users, communal and self-motivational values of self-tracking practices surpass the concern of surveillance and commodification of leisure-time.

Keywords: self-tracking; social support; physical activity; recreational sport

Introduction

Monitoring health and physical activity with the help of technology continues to grow in popularity. In Europe, the market for wearable devices is estimated to grow from 28 million unit shipments in 2018 to 53 million shipments in 2023 (International Data Corporation, 2019). Self-tracking, as this kind of monitoring is often called, is defined by Lupton (2018, p. 1) as 'a form of personal knowledge creation.' People create this knowledge by recording and analysing data about their everyday life events such as exercise routines, bodily functions, eating patterns, or sleeping habits. For individuals, self-tracking serves the purposes of self-care and self-improvement (Lomborg & Frandsen, 2016; Lupton, 2016). These values intertwine with western cultural expectations of the importance of self-awareness, which partly explains the popularity and the hype around the phenomenon (see Lupton, 2016).

Self-tracking as a practice is not new. For example, in the context of goal-oriented sport the use of exercise diaries goes a long way back. What is new, however, is that self-

tracking today is increasingly connected with mobile digital media (Lomborg & Frandsen, 2016; Lupton, 2016). People record, analyse, and share self-tracking data using smartphones, smartwatches, wrist computers, fitness trackers, and their respective software. Moreover, self-tracking data can be moved across software and online platforms and shared on diverse social networking sites such as Facebook¹ and Twitter.²

This paper examines self-tracking in the context of physical activity. In the sport sector, tracking physical performance with the help of technology used to be limited to professional sport. However during recent years, leisure sports practitioners have increasingly become engaged in self-tracking practices. Arguably, this is largely due to the pervasive mobile media that provides communicative affordances for recording, analysing, and sharing exercise data on the go. In Finland, where this study was conducted, 39% of 16 to 54-year-olds use smartphone applications to track their physical activity and 6% share their exercise data online (Official Statistics of Finland, 2018). In comparison with Finnish data from 2016 (Official Statistics of Finland, 2016), recording exercise data with a mobile phone has increased 35% and sharing exercise data 53% in two years.

This paper approaches self-tracking as a *social and communicative phenomenon*. According to Lupton (2014, p. 77), self-tracking is a ‘profoundly social practice’ meaning many individual trackers experience that they are a part of a larger tracking community. Furthermore, Lomborg and Frandsen (2016, p. 1016) conceptualise self-tracking as ‘a social and cultural practice that is fundamentally communicative.’ They propose a three-dimensional framework that sheds light on the different aspects of self-tracking communication: it is about communicating 1. with the digital system (i.e., technological feedback), 2. with the self (i.e., personal reflection), and 3. with the peers (i.e., social network communication). Lomborg and Frandsen (2016) argue that the three dimensions of self-tracking communication help practitioners to construct their sporting identity and agency, which consequently makes self-tracking attractive and meaningful for them.

Previous research on self-tracking is mainly focused on the first two dimensions of self-tracking communication. Aspects that have received special attention from researchers include health care, user experience design, and surveillance (Lomborg & Frandsen, 2016). Recently, self-tracking has also been studied from the perspectives of gamification (e.g., Mauro & Moretti, 2018), e-coaching (e.g., Lentferink et al., 2017), and digital materiality (e.g., Esmonde, 2019). Many studies have taken as their premise the assumption that self-tracking devices and platforms influence individual behaviour (Smith & Treem, 2017). Some scholars (e.g., Lomborg & Frandsen, 2016; Smith & Treem, 2017) have called for more empirical studies that examine how individuals actively engage with diverse platforms and with each other through self-tracking practices that are embedded in their everyday lives. This study seeks to increase the understanding of the choices made around self-tracking as well as the social side of tracking physical activity.

Moreover, this study explores how the social-communicative aspects of self-tracking may support physical activity behaviour. Some of the reviewed studies (e.g., Malinen & Nurkka, 2013; Pinkerton et al., 2017) imply that the social-communicative aspects of self-tracking prompt physical activity. While this may be true, previous literature does not explain where the motivation comes from and to which extent it is

¹ <https://www.facebook.com/>

² <https://twitter.com/>

experienced. This study aims at filling this gap of knowledge by looking at the social motivations and limitations of data sharing, and the associations between background variables, self-tracking practices, and motivations for physical activity.

Understanding contemporary leisure (sport) cultures ‘necessitates understanding digital culture and the ways in which digital forms, structures and platforms have seismically shifted leisure practices, cultures and experiences’ (Silk et al., 2016, p. 721). The key contribution of this paper to leisure studies is to advance the discussion of how digitalisation shapes social, organisational, and communicative leisure-time practices. Instead of focusing on a specific device, platform, or software, the paper approaches sharing physical activity data as a whole. Using a multimodal approach, this study addresses the following research questions:

- (1) What are the social-communicative motivators and limitations of sharing exercise data?
- (2) How can the social-communicative aspects of self-tracking support physical activity behaviour?

Social and communicative aspects of sport-related self-tracking

The increasingly growing phenomenon of tracking, analysing, and sharing physical activity data can be understood through van Dijck and Poell’s (2013) framework on social media logic. According to van Dijck and Poell (2013, p. 2), social media ‘have changed the conditions and rules of social interaction’ because they have a unique set of ‘norms, strategies, mechanisms, and economies’ that are ‘gradually invading all areas of public life.’ The four grounding principles of social media logic are programmability, popularity, connectivity, and datafication (van Dijck & Poell, 2013). When approaching self-tracking from the perspective of social network communication (see Lomborg & Frandsen, 2016), the logic of connectivity is of most importance.

Connectivity refers to the affordances of social media platforms to connect humans with each other and with personalised advertising (van Dijck & Poell, 2013). Self-tracking devices, platforms, and software often support this kind of connectivity in both directions; they encourage users to share their physical activity data with others while, simultaneously, they value partnering with other brands.³ On one hand, this supports networked individualism⁴ (see Rainie & Wellman, 2012) and the formation of light sport communities⁵ (see Borgers et al., 2018). On the other hand, it increasingly connects leisure sports practitioners with commercial interests (Frandsen, 2020).

³ For example, Movescount (<http://www.movescount.com/>) encourages users to ‘share your best Moves with your friends in Movescount and beyond’, whereas Strava business (<https://business.strava.com/>) asserts that ‘brands on Strava connect with athletes like nowhere else.’ Retrieved 2020, April 1.

⁴ Rainie and Wellman (2012) describe networked individualism as the ‘new social operating system’ that is rooted in what they call ‘the triple revolution’. By that they mean the sequential revolution of social networks, the internet, and mobile media. In leisure context, networked individualism means that people move from organised recreational groups to shifting networks of recreational friends (Rainie & Wellman, 2012).

⁵ Light sport communities comprise of self-organised informal sport groups. In contrast to heavy sport organisations (such as traditional sport clubs) that value rules and commitment, light sport communities are flexible in their nature (Borgers et al., 2018).

Millington (2016) points out that ‘the second fitness boom’ propels both old and new forms of commodification: first, there is a whole industry of hardware and software suppliers around the self-tracking culture and second, self-tracking data that users produce using hard- and software is often sold to third parties.

Frandsen (2020) links the logic of connectivity to the concept and discussion of mediatisation in the sport context. Mediatisation can be defined as the ‘process whereby society to an increasing degree is submitted to, or becomes dependent on, the media and their logic’⁶ (Hjarvard, 2008, p. 113). According to Frandsen (2020, p. 109), connectivity ‘reflects aspects of mediatization that have extensive implications for sport as an institution.’ Frandsen (2020) argues that the current wave of mediatisation, led by digitalisation, gives impetus to recreational self-organised sport, strengthens commercialisation of sport, and thus challenges formal democratic models of organisation.

Mediatisation is a multi-level and multi-dimensional process that not only affects sporting cultures and structures but, importantly, individual sports practitioners (Frandsen, 2020; Kopecka-Piech, 2019). Sport-related digital media services are multiplying, however, individual practitioners’ responses to new media environment vary. For individuals, mediatisation may manifest itself as increased use of physical activity technologies, as growing sport media consumption or content production, or as conscious decrease or non-use of sport technologies and platforms (Frandsen, 2020; Kopecka-Piech, 2019).

For individual users, self-tracking platforms provide an interactive and customisable environment that enables self-reflexivity (see Millington, 2016). They support practices of selfhood; these are practices directed to self-care and self-awareness that fulfil a western ideal of a good citizen (Foucault, 1988; Lupton, 2016). Furthermore, practitioners who make use of the social features on self-tracking platforms engage in voluntary peer-to-peer surveillance; they allow other user to watch that they fulfil their personal responsibility as citizens (Lupton, 2016; Millington, 2016).

Previous empirical studies on self-tracking have focused on sharing exercise data either on self-tracking platforms or via social networking sites. All the reviewed studies agree that users of self-tracking platforms find the social features less interesting compared to features that support personal data documentation and analysis. Furthermore, the studies suggest that there are many users who do not see any value in sharing their exercise data on self-tracking platforms or social networking sites. Reasons for not sharing include *lack of interest* (Fritz et al., 2014; Pinkerton et al., 2017), *shame or hesitations regarding others’ interest* (Lomborg & Frandsen, 2016; Malinen & Nurkka, 2013; Pinkerton et al., 2017; Smith & Treem, 2017), *privacy concerns* (Ahtinen et al., 2008; Fritz et al., 2014; Ojala & Saarela, 2010; Pinkerton et al., 2017), *lack of social support* (Pinkerton et al., 2017), and *strategy* (i.e., withholding information that could benefit others for one’s disadvantage; Smith & Treem, 2017).

Even though many users experience self-tracking ‘as a relationship between “me”, “my data”, and “my device”’ (Lomborg et al., 2018, p. 4601), the reviewed studies indicate that those practitioners who make use of the social features of the platforms find it beneficial for their practice. According to previous literature, perceived social benefits

⁶ Media logic means that each media has their own set of steering logics that impact and direct the activities of other societal institutions and that are ‘both influenced by the media themselves and by the institutional logics in the area concerned (e.g., politics or sport)’ (Hjarvard, 2018, p. 66).

of using sport-related self-tracking platforms include *finding new routes* (Ahtinen et al., 2008; Malinen & Nurkka, 2013), *seeing content and learning from others* (Malinen & Nurkka, 2013; Ojala & Saarela, 2010), *getting feedback and guidance* (Malinen & Nurkka, 2013; Ojala & Saarela, 2010), *comparing and competing against others* (Ahtinen et al., 2008; Ojala & Saarela, 2010; Smith & Treem, 2017), and *maintaining social networks* (Ahtinen et al., 2008). Additionally, studies show that people share their exercise data on social networking sites to *keep other people informed* (Lomborg & Frandsen, 2016; Pinkerton et al., 2017; Stragier et al., 2015), to *inspire and motivate others* (Lomborg & Frandsen, 2016; Pinkerton et al., 2017; Stragier et al., 2015), to *gain recognition* (Pinkerton et al., 2017), and to *get motivation for the practice* (Lomborg & Frandsen, 2016; Pinkerton et al., 2017).

Drawing from previous literature, this paper aims to provide a comprehensive picture of self-tracking activities within one group of practitioners and seeks to understand in depth their different needs, levels, and motivations for mediated communication of physical activity. The paper concludes with a discussion of the effects of mediatisation and connectivity to leisure-time sport practice.

Materials and methods

Data for the study was collected using online surveys and in-depth interviews with Finnish trail runners. Survey data were collected to recognise broader patterns of the use of self-tracking technologies and platforms, whereas interviews were conducted to go deeper into the meanings that trail runners ascribe to self-tracking. A multimodal approach was applied for complementary and developmental purposes. Complementarity means that multiple methods are used to enrich and elaborate the understanding of a phenomenon, whereas development means that results from one method are used to develop or to inform another method (Greene et al., 1989). In the context of this study, the survey results were used to define the interview questions and the research problem that guided the interview data analysis.

Trail running as a sport discipline was selected for this study because trail runners actively track their sport activity and are present on multiple online self-tracking platforms such as Movescount⁷ and Strava⁸. Moreover, in contrast to team sports where practitioners form a well-defined entity and meet face-to-face on a regular basis, trail runners who often practise alone may lack a sense of belonging and connection with other practitioners. Thus, they may be more inclined to look for alternative ways such as online platforms to connect with their peers.

The research was conducted according to the guidelines of the Finnish National Board on Research Integrity (TENK). Participants were briefed about the research in the beginning of the online survey that formed the first part of the study. The survey was open from March to May 2016 and available in Finnish and in English. It was promoted on trail running Facebook groups and online communities and directed toward practitioners living in the Helsinki area in Finland. Permissions for promoting the survey were given by the administrators of the sites and specific groups. At large, the survey investigated recreational lifestyle sports practitioners' communication practices, social tie formation, and social support exchange in online and offline settings (see Ehrlén, 2017). The survey

⁷ <http://www.movescount.com/>

⁸ <https://www.strava.com/>

included questions about the use of self-tracking devices and platforms and about practitioners' motivations to be physically active. As the survey was only promoted online, the collected data were limited to people who used digital media platforms as a part of their sport practice.

Altogether, 125 trail runners took part in the survey. More than half of the participants were male, and the majority were between ages 30 and 49. The respondents were most often highly educated and full-time employed. Most participants had been practicing trail running for two to five years and perceived themselves as intermediate practitioners. Only 10% of the respondents reported that they are members of a sport club that organises trail running practice.

To test the motivations for practicing trail running, a five-point Likert-scale⁹ with 10 pre-named variables was used. These variables were 1) *Physical effects of training* (endurance, strength, motoric skills, flexibility), 2) *Mental effects of training* (stress reduce, cognitive skills, relaxation), 3) *Physical and mental challenges*, 4) *Risk-taking*, 5) *Spirituality of trail running*, 6) *Nature experiences*, 7) *Social contacts*, 8) *Trail running community*, 9) *The popularity of trail running*, and 10) *Possibility to record and/or share trail running exercise data with the help of technology* (e.g., mobile application, sport watch, activity tracker). Mean values and standard deviations were counted for each of the scale variables.

Chi-square analysis, correlation analysis, and independent sample t-tests were used to investigate relationships among background variables, variables that tested patterns of the use of self-tracking devices and platforms, and variables that tested what motivates trail runners to be physically active. To further study the extent to which social contacts motivate physical activity, a new derived variable *social contacts as motivators* was introduced. The new variable was calculated as the mean value of two questions that measured the extent to which one experiences social contacts being motivational for the sport practice,¹⁰ and thus it revealed more subtle variations between the answers regarding the importance of social contacts in motivating physical activity behaviour. The Spearman–Brown coefficient that is considered the best indicator of the reliability of a two-item construct (Eisinga et al., 2013) was found to be .65.

At the end of the survey, participants were asked about their willingness to take part in interviews regarding physical activity related digital media use. The selection of interviewees was made among the 25 trail runners who were willing to take part. The aim was to collect a varied sample with regards to age, perceived trail running competence, and frequency of recording and sharing self-tracking data. Gender, nationality, level of education, or employment status were not given priority in the selection of interviewees because the focus of the current study was not on these identity characteristics. A separate consent form concerning interview guidelines was sent to all participants after an initial email exchange, and prior to data collection.

Semi-structured interviews with seven participants were conducted in February–April 2017. The participants' age range was between 31 to 52 years, and they included five male and two female runners. Three of the interviews were conducted face-to-face

⁹ Question format: to what extent does variable x motivate you to practice trail running? Scale: not at all, to a little extent, to a moderate extent, to a great extent, to a very great extent.

¹⁰ Question 1: to what extent do your social contacts motivate you to practice trail running? Scale: not at all, to a little extent, to a moderate extent, to a great extent, to a very great extent. Question 2: my sport-related social contacts motivate me to practice trail running. Scale: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.

in semi-public or private spaces and four over online video calls. The interviews lasted between 55 and 100 minutes. All interviews were recorded and later transcribed using intelligent verbatim form. The purpose of the interviews was to identify meanings that the practitioners ascribe to social interaction, different digital media platforms, and diverse sport-related content. One theme in the interviews was recording and sharing physical activity data. The focus was especially on the social motivators and limitations that trail runners ascribe to sharing exercise data online. All predetermined questions were asked in each interview, but the order varied and they were supplemented with other questions depending on the course of discussion (see Kvale, 2007).

Interview data were analysed inductively using qualitative content analysis according to Schreier's (2014) model. The aim of the content analysis was to identify meanings and mindsets embedded in the interviews. Following Schreier's (2014) steps, the author *first* decided on a research question (what are the social-communicative motivators and limitations of sharing exercise data?); *second*, selected all interview material that was related to recording and sharing physical activity data; *third*, read through all relevant material twice and built a preliminary coding frame with definitions of each main and subcategory; *fourth*, segmented all material into coding units; *fifth*, coded all material twice; *sixth* evaluated and modified the coding frame; and *seventh*, coded all material according to the modified coding frame.

An inductive content analysis of the interview data identified three social-communicative aspects that motivated the use of self-tracking platforms. These were information sharing, comparison, and recognition. Additionally, the analysis identified ordinariness and privacy as reasons that limited data sharing. Table 1 shows the coding schema with descriptions and examples of each main and subcategory. In the first round of coding, there were two additional subcategories, *1.3 Need for help* and *3.3 Empathy*, that were merged with *1.2 Guidance* and *3.2 Identification* before the final coding because the categories overlapped considerably. The interview extracts that are presented in the results section were translated from Finnish to English by the author.

Table 1. Social-communicative motivators and limitations of sharing exercise data.

Category	Description	Example
1 Information	Interviewees share exercise data to give information about their practice and to gain information that supports their practice.	
1.1 Utilisation	Interviewees share information so that it can be utilised, or they utilise peer provided information in their own practice.	<i>Also the majority of top-level athletes share. It's not a secret what they do. It's not the workout routine itself but how someone executes the routine individually that is a reason for success. (male, 31)</i>
1.2 Guidance	Interviewees ask for practice-related assistance and guidance from others, or they guide other runners.	<i>Sometimes I get some training advice. I can set goals like 'okay, why not try that too?' (female, 36)</i>
2 Comparison	Interviewees share exercise data to compare their data to other runners' data.	
2.1 Positioning	Interviewees compare their exercise data to peer data in order to define their own level and to position themselves within the subculture.	<i>I like to compare if someone who is on the same level has been training harder than me. It helps me to define my level and where I stand right now. (female, 36)</i>
2.2 Admiration	Interviewees compare their exercise data to top-level athletes' data in order to understand the level difference between them and the athletes.	<i>Those runners who are completely outside of my capacity, it's interesting to know how what they do differs from what I do. Sometimes I want to know how they end up running on a snowfield on the side of some mountain somewhere. (male, 32)</i>
3 Recognition	Interviewees share exercise data to give and gain recognition.	
3.1 Acceptance	By sharing exercise data interviewees seek for recognition and acceptance from others.	<i>Sometimes people are like 'oh this was such a bad result', but actually they just want others to tell them 'no it wasn't.' (female, 36)</i>
3.2 Identification	By reacting to other runners' posts interviewees express recognition and empathy.	<i>When I see that a friend of mine hits her record on 10k I feel sincerely glad for her. (male, 32)</i>
4 Limitations to data sharing	Interviewees prefer not to share their exercise data.	
4.1 Ordinarity	Interviewees prefer not to share their exercise data because they regard their performances too ordinary.	<i>I just don't think that anyone would be interested in my data. Really who would? (female, 46)</i>
4.2 Privacy	Interviewees prefer not to share their exercise data because they regard the data as private information. Some interviewees express specific privacy concerns.	<i>I wouldn't like it if I had to think every time I share if there is something that I don't want the whole world to see. (male, 52)</i>

Quantitative results

Table 2 shows the distribution of the survey data by gender, age, self-perceived competence, and patterns of exercise. Nearly all trail runners who took part in the survey recorded their exercise data with the help of technology and almost 70% of runners did it at least once a week. Men recorded exercise data more often compared to women. Persons under the age of 50 recorded data more often compared to older practitioners. There were no statistically significant associations between recording exercise data and level of education, employment status, frequency of trail running practice, perceived competence, or patterns of exercise.

More than half of the trail runners who participated in the survey also shared¹¹ their exercise data with others, and over 20% did it at least once a week. Men shared data more often than women. In terms of age, 30 to 39-year-olds shared data most often compared to other age groups. Regarding competence, those who perceived themselves as intermediate or advanced practitioners shared data more often compared to those who perceived themselves as novice practitioners. Additionally, those who exercised together with others were more likely to share their data than those who practised only alone (see Lomborg & Frandsen, 2016). There were no statistically significant associations between sharing exercise data and level of education, employment status, or frequency of trail running practice (cf. Pinkerton et al., 2017). The three most popular self-tracking platforms that the respondents used for analysing and sharing their self-tracking data were Movescount, Sports Tracker,¹² and Garmin Connect.¹³

¹¹ In the survey, sharing was not limited to any specific self-tracking device or platform or any other communication channel. Also with whom one shares exercise data was not defined meaning both public and private sharing were included.

¹² <https://www.sports-tracker.com/>

¹³ <https://connect.garmin.com/>

Table 2. Distribution of data.

		<i>N</i> %	Record exercise data %	Share exercise data %	Are motivated by data recording and sharing %	Are motivated by social contacts %
All (<i>N</i> = 125)		100	90	56	58	88
Gender	Male	54	96	66	58	87
	Female	46	85	46	59	90
	χ^2 *		$\chi^2 (1, N=125)$ =4.4, $p=.037$	$\chi^2 (1, N=124)$ =5.0, $p=.025$		
Age	20-29	12	93	36	67	73
	30-39	34	95	74	64	91
	40-49	41	94	55	56	88
	50-69	13	63	31	40	94
	χ^2 *		$\chi^2 (3, N=125)$ =16.5, $p=.001$	$\chi^2 (3, N=124)$ =12.3, $p=.006$		
Perceived competence	Novice	36	93	40	62	84
	Intermediate	44	91	63	62	94
	Advanced	21	85	69	46	80
	χ^2 *			$\chi^2 (2, N=123)$ =7.6, $p=.022$		
Patterns of exercise	Only alone	11	93	31	71	57
	Alone and with others	67	91	55	52	92
	Only with others	22	89	74	69	93
	χ^2 *			$\chi^2 (2, N=124)$ =7.0, $p=.030$	$\chi^2 (2, N=125)$ =14.2, $p=.001$	

A comparative analysis of the mean values of the motivations for practicing trail running showed that nature experiences and physical and mental effects of training motivated trail runners most in their practice. The majority of participants also experienced social contacts and data recording and sharing as motivational for their practice. Almost 90% of trail runners were at least to some extent motivated by their social contacts, and almost 60% of runners were at least to some extent motivated by data recording and sharing.

Being motivated by social contacts or data recording and sharing showed no statistically significant associations with any of the demographic background variables. However, the two motivational variables correlated ($r_s = .36, p < .001$). In other words, those trail runners who were more motivated by their social contacts tended to be more

motivated by data recording and sharing, and vice versa. This indicates that motivation for physical activity comes not only from personal tracking but, importantly, also from communicating about self-tracking with other practitioners.

Figure 1 shows a visualisation of the data distribution in relation to social contacts as motivators and the frequency of sharing exercise data. The visualisation indicates that the frequency of sharing exercise data is connected to the extent one experiences social contacts as being motivational for the sport practice. A correlation analysis confirmed that there is a moderate correlation between the two variables ($r_s = .32, p < .001$). Additionally, an independent samples t-test showed that those trail runners who shared their exercise data perceived their social contacts as being more motivational ($M = 3.49, SD = 0.82$) compared to those runners who did not share their data ($M = 2.98, SD = 0.95, t(122) = -3.18, p = .002$).

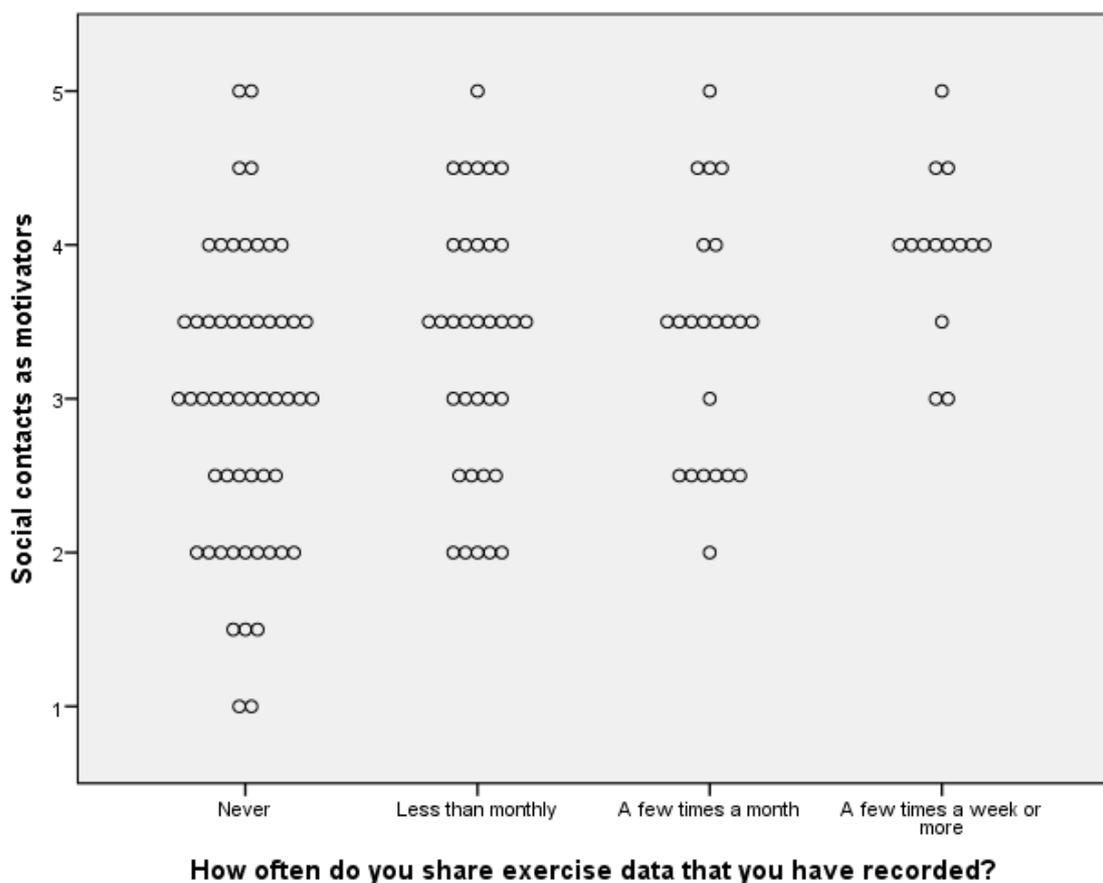


Figure 1. Visualization of data distribution in relation to social contacts and sharing exercise data.

Previous studies show that social peer support positively impacts physical activity levels (Anderson et al., 2006; Samson & Solmon, 2011). Recent research has also found that the use of self-tracking technologies has the potential to promote behavioural changes in the direction of increased physical activity (Sullivan & Lachman, 2017). In light of these results, the current study suggests that sharing exercise data with other practitioners on a regular basis can have a positive effect on being physically active because it is mediated by social peer support.

When considering the more widespread impact that data sharing may have for physical activity levels, it must be stated that as such the effect may be low. As this study shows, those who perceive themselves as novice practitioners share less often compared to more advanced practitioners. Consequently, the positive effect of data sharing may not reach those practitioners who would need more support for their practice.

The following qualitative section takes a closer look at the social-communicative meanings that trail runners ascribe to sharing exercise data. The section sheds light on how the interviewed practitioners understand social peer support in the context of mediated communication of physical activity.

Qualitative results

The qualitative analysis identified information sharing, comparison, and recognition as the main social-communicative aspects that motivate sharing physical activity data online, and ordinariness and privacy as reasons that limit data sharing. In the following, each category is discussed in more detail using an exploratory typology of three modes of sharing. These are no sharing, selective sharing, and open sharing. What sets the three types apart is the representatives' attitude towards and their practice of sharing self-tracking data. The exploratory typology of the three modes of sharing can be applied to all seven interviewees: one interviewee was a non-sharer, three interviewees were selective sharers, and three interviewees were open sharers.

No sharing

As the survey results showed, more than a third of those participants who record their physical activity data refrain from sharing it with others. Tina¹⁴ is a 46-year-old trail runner who records exercise data regularly but who never shares her data with other practitioners. For Tina, the most important reason for not sharing is ordinariness: 'I just don't think that anyone would be interested. Really who would? Because I'm not interested in anyone's data, I really don't see the point of sharing my data.'

Tina regards her practice as too ordinary for anybody to have interest in her exercise data. She is also not following other practitioners' performances online unless they appear on her Facebook newsfeed. Therefore, she experiences both lack of interest towards the sharing culture (see Fritz et al., 2014; Pinkerton et al., 2017) and hesitations regarding others' interest towards her training (see Malinen & Nurkka, 2013; Smith & Treem, 2017). Moreover, because Tina is not sharing her exercise data, she also does not experience following others' performances online as motivational for her practice. Thus, she lacks the feeling of reciprocity, which would allow an online sport network to provide her with support in physical practice (see Ehrlén & Villi, 2020; Xie et al., 2020).

Tina explained how her relation to data collection has changed through the years of practice:

In the beginning I recorded data nearly every time I went running. But after a while I felt I was tied up to my wrist computer. I experienced a feeling of freedom when I started running without [the device]. I was too attached to it. Half of the enjoyment

¹⁴ To protect participants' privacy, pseudonyms are used.

of running went to staring at my watch. For a long period of time I didn't save any data. Now that I use [the device] more again I notice I can run better with it.

Communication with the digital system took over Tina's trail running experience and she needed to regain control of communication with the self. Her data collection device did not support self-reflexion. Rather, it gave her unnecessary pressure during physical practice, which she could only avoid by not recording her exercise data at all. In like manner, she may use no sharing as a means to avoid the social pressure that performing under the gaze of peer practitioners may cause. Hence, for non-sharers, peer-to-peer-surveillance is likely to appear as more of a discouragement than a benefit for physical practice.

Selective sharing

Selective sharers share their physical activity data within their individually defined boundaries. For a 36-year-old Anni, selectiveness happens on two levels. First, she selects which exercise fulfils the definition of being interesting:

If there is something bad or especially good about [the practice], I can share. Or if someone asks me something, I let them know. I also think that probably no one is interested if I run 10k on asphalt. I'm hardly interested in that.

Like a non-sharer Tina, Anni chooses not to share the practice she perceives ordinary, such as running on asphalt instead of trails. However, unlike Tina, she does not perceive all her practice ordinary to the extent that it would not be interesting for other practitioners. When Anni started trail running she 'gathered information from all kinds of sources' and found 'every single grain of information interesting.' Gradually, she realised that 'what other people share is nothing special' compared to her and started sharing more. The increase in her sharing behaviour was thus caused by a realisation of the value of her data in comparison to other runners' data.

Secondly, Anni selects the audience with whom she shares her data. Anni regards her exercise data primarily as private information and chooses to share it only with a select few. For similar reasons, a 52-year-old Frans has limited who gets to see his data:

First and foremost, I use [a self-tracking platform] to make notes to myself. That others see my notes is a secondary matter. ... I wouldn't like it if I had to think every time I share if there is something that I don't want the whole world to see. Starting from where I'm located, which the GPS-trace would reveal.

Frans shares data with 'friends with whom I'm in contact with also outside the practice.' Thus, for him sharing exercise data and interacting around it is also a way to keep contact and to communicate about everyday life activities with his closer social ties (see Pinkerton et al., 2017; Stragier et al., 2015).

Whereas Frans sees exercise data as information that could potentially violate one's privacy, a 45-year-old Samuel emphasises the value of sharing GPS-files:

Finding good trails is a special characteristic in trail running. ... When someone plans a route and shares the GPS-file people can run it in their own time. ... Sharing this kind of information improves others' conditions for practice. It creates

more reasons to be involved in that community and a will to contribute in some way to the opportunities of others.

Samuel shares self-tracking data selectively when he feels that sharing could benefit others. Apart from utilising data and information that is available online, he also asks for direct guidance and gives advice to others if asked. Samuel explained further the value of peer-to-peer guidance:

In this kind of community, where there are no coaches or anyone who would be available to instruct, voluntarily or compensated, we have to turn to our peers. ... People may post their heart rate graphs and ask, 'what should I do? I exercise a lot but my pace doesn't improve'. Then the audience gives feedback and tips. I think this works really well.

For selective sharers, data sharing is likely to fulfil the feeling of reciprocity: sharing pieces of information that can be valuable for (a selected few) others is done because practitioners see value in gaining information. At the same time, selective sharing means that practitioners are withholding information and, consequently, they can manage what is communicated about their practice to others (see Smith & Treem, 2017).

Open sharing

For open sharers, data sharing a habitual practice that immediately follows and is thus an integral part of the physical activity. Some open sharers allow self-tracking technologies automatically transfer their exercise data to self-tracking or social networking platforms. A 32-year-old Jonas highlighted the intrinsic value of openness:

I always save my running data so that it's publicly visible online. It's about being open. You can set your data private but only few people do that. That [the data] is public lowers the threshold to co-operate with others.

For Jonas, sharing exercise data openly with everyone 'brings positive pressure' that motivates his practice (see Ojala & Saarela, 2010). Apart from peer motivation, open sharing increases chances of being seen. In other words, by sharing data leisure practitioners look for attention and reassert their place as a part of the trail running subculture. On many self-tracking platforms other practitioners may comment and like the posts, and thus express recognition and empathy. Jonas told how 'it feels good when a friend is like [raises a thumb and laughs].' A 31-year-old Tom explained how expressing recognition is, in turn, based on identification with peer practitioners: 'Yesterday there were many who did a long run. For some it went better and for some worse. We spurred each other regardless.'

Similar to Jonas, Tom sees 'no reasons for not sharing.' He relies on a larger network of practitioners that organise themselves on digital media and self-tracking platforms to find diverse resources that support his practice (see Ehrlén, 2017; Smith & Treem, 2017). Tom is especially interested in workout routines, motivations, and goals of top-level trail runners:

I look for motivation from them. Calling it being a fan or having an idol might be the wrong way of putting it, but with some [athletes], I'm so inspired by what they do and amazed by how they make the impossible possible.

Upward comparison helps Tom to realise what is required of him to reach a higher level of running practice. Through peer comparison practitioners can model what they are supposed to be doing in order to reach practice-related goals (see Smith & Treem, 2017). Some self-tracking platforms strongly encourage users for comparison. A 44-year-old Henrik explained:

There are segments from where I can see how it went for others. For example, here [shows a segment on Stava] I can see that on the route I did today I ranked 17th on it and all-time 247.

Peer comparison helps practitioners to define their level as a runner and to position themselves within the trail running subculture. Comparison can either have positive or negative effects on the practice. Henrik elaborated: 'It's like it is with Facebook. I get to see that others have been training again and I ask myself "don't they ever rest?" [laughs]'. Accordingly, practitioners' choice of a reference framework affects how they evaluate their exercise data and what meanings they ascribe to it (see Kneidinger-Müller, 2018).

Where open sharers differ from selective and non-sharers is how they approach their data. Open sharers share their ordinary practice with their peers not necessarily because it would always be interesting for others, but because they think that sharing everyday life routines brings people closer. Moreover, they are not trying to manage what they communicate about their practice because they enjoy the social pressure that comes with communication with a larger, unknown audience. In conclusion, this suggests that perceiving exercise data as communally valuable and sharing it for self-motivational reasons may separate a non-sharer from a sharer. What may furthermore distinguish an open sharer from a selective sharer is the value that a practitioner sees in sharing ordinal exercise data in a ritual manner.

Discussion

This paper has investigated the social-communicative aspects of self-tracking, and the support that these aspects and their associated practices may provide for physical activity behaviour. The results show that sharing exercise data with others on a regular basis can support physical activity behaviour because it is mediated by social peer support. Moreover, the results indicate that for those trail runners who regularly share their physical activity data, sharing has both a communal and a self-motivational value.

The communal value of data sharing manifests itself when practitioners share information about their workout routines and routes. Information sharing has surfaced also in many previous studies (e.g., Malinen & Nurkka, 2013; Ojala & Saarela, 2010) as a motivating factor for the use of self-tracking platforms. Depending on the sport culture, situational impacts, and personal choices (see Ehrlén, 2017), practitioners share information openly or selectively using a range of self-tracking platforms, social networking sites, and instant messaging applications.

The self-motivational value in data sharing emerges in activities that support social comparison or recognition. Previous literature has identified that comparison (e.g., Ojala & Saarela, 2010; Smith & Treem, 2017) and recognition (e.g., Pinkerton et al., 2017) motivate the use of self-tracking platforms, and as a possible outcome, the sport practice. As Lomborg and Frandsen (2016) point out, the dynamics of recognition are of importance both in social media and in sport. In agreement with previous research (Ahtinen et al., 2008; Fritz et al., 2014; Lomborg & Frandsen, 2016), this study shows

that leisure sports practitioners are comparing their data with and searching for social recognition from a knowledgeable audience, their peer practitioners.

Social-communicative motivators for data sharing that did not surface in this study were informing and maintaining larger social networks (see Ahtinen et al., 2008; Lomborg & Frandsen, 2016; Pinkerton et al., 2017; Stragier et al., 2015) and inspiring others by example (see Lomborg & Frandsen, 2016; Pinkerton et al., 2017; Stragier et al., 2015). Presumably, this is because unlike in the above-mentioned studies, the participants of this study identified themselves as members of a specific sport subculture. Again, this indicates that they are not using data sharing to reach a larger network of people but as a means to communicate with those peers who belong to the same subcultural sporting network.

This study suggests that sharing exercise data generates peer support that motivates trail runners to carry on their sport practice. The prerequisites for peer support are, however, that the sharer has a knowledgeable audience that includes at least some known social ties, and the sharing is at least partly a reciprocal activity. This study shows that social-communicative practices around self-tracking and exercise form a positive circle where more is more: those who practise with others are more motivated by their sport-related social contacts and often, as a consequence, share more data because they are surrounded by a knowledgeable peer network that is expecting reciprocity in terms of sharing. Additionally, being social around peers, face-to-face and online, makes practitioners feel more competent and a greater sense of belonging to the subculture. This further strengthens the social interaction and support around the practice.

It is, however, not straightforward or even plausible to argue that sharing physical activity data with peer practitioners has only positive effects. As van Dijck (2009, p. 47) states, 'it is crucial to understand the new role of users as both *content providers* and *data providers*.' As noted earlier, self-tracking devices, platforms, and software follow the logic of connectivity and function as a connecting interface between users and advertisers. Furthermore, many critical self-tracking scholars subscribe to Hutchins' (2019, p. 477) notion of that 'the quantified self is indivisible from the commodified self' (see also Lupton, 2016; Millington, 2016). Even though privacy surfaced in the interviews as a limiting factor for data sharing, the participants of this study did not reflect on the issue of sharing exercise data with third parties alongside their peers. A recommendation for future studies is to investigate in detail the consequences of sharing exercise data with third parties for individual users and for networks of practitioners.

On a theoretical note, this paper supports the argument that mediatisation affects sport not only on institutional but also on interpersonal and individual levels (see Frandsen, 2020; Kopecka-Piech, 2019). At the individual level, prolonging the experience of physical performance through data analysis and visualisation gives added meaning to the practice (see Lomborg & Frandsen, 2016). Moreover, the added meaning is not created in a void but through social-communicative exchanges within a reference framework that consists of peer practitioners and top-level athletes (see Kneidinger-Müller, 2018). For some trail runners, sharing exercise data is a form of ritual communication: it is done for the sake of connectivity to peers and to a larger community of practitioners. Other practitioners are more focused on the content they share and find meaning in the selective process of communicating their identity as sports practitioners. Yet others experience that this causes unnecessary social pressure for their practice and avoid sharing exercise data entirely. Thus, a key effect of mediatisation to individual sport practice seems to lie in the ability of practitioners to choose their level and style of involvement with digital media platforms.

Looking at this from a broader perspective, it can be noted that individual practitioners' digital media use indeed 'reflects broader cultural and social changes brought about by networked media in general' (Frandsen, 2020, p. 102). Recreational sport is to a growing extent organised around digital media and self-tracking platforms. These platforms function as connecting hubs for sports practitioners to get together, to communicate, to create social ties, and to exchange social support. At the same time they operate as sites for identity construction and communication. On the platforms users form momentary experiences of belonging to the subculture and to networks of practitioners, which keeps bringing them back to the platforms. This both increases individual practitioners' connection to commercial interests and strengthens commercialisation of sport at large.

This paper contributes to the discussion on digital leisure by showing that for many users of self-tracking platforms, the communal and self-motivational values surpass the concern of surveillance and commodification of leisure-time. Mediatisation creates novel social environments where networked individuals can gather and interact around a common interest without binding attachments and, at the same time, actively manage 'the social fabrics of their everyday lives' (Wang et al., 2018, p. 683). In conclusion, this study suggests that many leisure sports practitioners rely on digitally mediated commercial platforms because they meet their individuated needs for selfhood and social interaction, even when that comes at the cost of privacy.

Limitations

The most notable limitation of this paper is that it examines self-tracking from the perspective of only one sport discipline and from the perspective of practitioners who, at least on some level, identify belonging to the subculture of trail runners. In some other sport disciplines where the practice is organised in more formal settings, the importance of social support provided by peer practitioners might be less evident. Also for those leisure sports practitioners who do not identify belonging to any specific sport subculture, the concept peer practitioners might be more vague, and thus it might affect how social they are around their sport practice, and what meanings they ascribe to sharing exercise data with other people.

The second limitation is that the participants of this study were recruited online meaning that they use digital media as a part of their sport practice. Thus, it is unclear how well they represent the overall population of trail runners in Finland. Those trail runners who are outside the scope of this study might experience technology use in general as non-motivational and ascribe more limitations to data recording and sharing. Therefore, in order to make more general conclusions about self-tracking and social support in relation to physical activity, more comparative research is needed in diverse settings.

The third limitation of this paper is the small sample size, especially regarding the interviews. The sample did not allow drawing any general conclusions for example about the role of age or gender in self-tracking activities. For future studies, it would be interesting to investigate the role that these two variables have in sports practitioners' data-sharing practices.

References

- Ahtinen, A., Isomursu, M., Huhtala, Y., Kaasinen, J., Salminen, J., & Häkkinen, J. (2008). Tracking outdoor sports – User experience perspective. In E. Aarts, J. Crowley, B. de Ruyter, H. Gerhäuser, A. Pflaum, J. Schmidt, & R. Wichert (Eds.), *European conference on ambient intelligence* (pp. 192–209). Springer.
- Anderson, E., Wojcik, J., Winett, R., & Williams, D. (2006). Social-cognitive determinants of physical activity: The influence of social support, self-efficacy, outcome expectations, and self-regulation among participants in a church-based health promotion study. *Health Psychology, 25*(4), 510–520. <https://doi.org/10.1037/0278-6133.25.4.510>
- Borgers, J., Pilgaard, M., Vanreusel, B., & Scheerder, J. (2018). Can we consider changes in sports participation as institutional change? A conceptual framework. *International Review for the Sociology of Sport, 53*(1), 84–100. <https://doi.org/10.1177/1012690216639598>
- Ehrlén, V. (2017). Communication practices and social tie formation: A case study of recreational lifestyle sports cultures. *International Journal of Sport Communication, 10*(3), 393–413. <https://doi.org/10.1123/ijsc.2017-0032>
- Ehrlén, V., & Villi, M. (2020). ‘I shared the joy’: Sport-related social support and communality on Instagram. *Visual Studies, 35*(2–3), 260–272. <https://doi.org/10.1080/1472586X.2020.1790304>
- Eisinga, R., Te Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health, 58*(4), 637–642. <https://doi.org/10.1007/s00038-012-0416-3>
- Esmonde, K. (2019). Training, tracking, and traversing: Digital materiality and the production of bodies and/in space in runners’ fitness tracking practices. *Leisure Studies, 38*(6), 804–817. <https://doi.org/10.1080/02614367.2019.1661506>
- Foucault, M. (1988). Technologies of the self: A seminar with Michel Foucault. In L. Martin, H. Gutman, & P. Hutton (Eds.), *Technologies of the self* (pp. 16–49). Tavistock Publications.
- Frandsen, K. (2020). *Sport and mediatization*. Routledge.
- Fritz, T., Huang, E., Murphy, G., & Zimmermann, T. (2014). Persuasive technology in the real world: A study of long-term use of activity sensing devices for fitness. *Proceedings of the SIGCHI conference on human factors in computing systems, Toronto, Canada*, 487–496. <https://doi.org/10.1145/2556288.2557383>
- Greene, J., Caracelli, V., & Graham, W. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255–274. <https://doi.org/10.3102/01623737011003255>
- Hjarvard, S. (2008). The mediatization of society: A theory of the media as agents of social and cultural change. *Nordicom Review, 29*(2), 102–131. <https://doi.org/10.1515/nor-2017-0181>
- Hjarvard, S. (2018). The logics of the media and the mediatized conditions of social interaction. In C. Thimm, M. Anastasiadis, & J. Einspänner-Pflock (Eds.), *Media logic (s) revisited: Modelling the interplay between media institutions, media technology and societal change* (pp. 63–84). Palgrave Macmillan.
- Hutchins, B. (2019). Mobile media sport: The case for building a mobile media and communications research agenda. *Communication & Sport, 7*(4), 466–487. <https://doi.org/10.1177/2167479518788833>
- International Data Corporation. (2019, April 30). *European wearables market hits record values in 2018, with over 28 million units shipped, says IDC*.

- International Data Corporation. <https://www.idc.com/getdoc.jsp?containerId=prEUR145041019>
- Kneidinger-Müller, B. (2018). Digital traces in context| self-tracking data as digital traces of identity: A theoretical analysis of contextual factors of self-observation practices. *International Journal of Communication*, 12, 629–646. <https://ijoc.org/index.php/ijoc/article/view/5869/2257>
- Kopecka-Piech, K. (2019). *Mediatization of physical activity: Media saturation and technologies*. Rowman & Littlefield.
- Kvale, S. (2007). Conducting an interview. In S. Kvale (Ed.), *Qualitative research kit: Doing interviews* (pp. 52–66). SAGE.
- Lentferink, A., Oldenhuis, H., de Groot, M., Polstra, L., Velthuisen, H., & van Gemert-pijnen, J. (2017). Key components in eHealth interventions combining self-tracking and persuasive eCoaching to promote a healthier lifestyle: A scoping review. *Journal of Medical Internet Research*, 19(8), e277. <https://doi.org/10.2196/jmir.7288>
- Lomborg, S., & Frandsen, K. (2016). Self-tracking as communication. *Information, Communication & Society*, 19(7), 1015–1027. <https://doi.org/10.1080/1369118X.2015.1067710>
- Lomborg, S., Thylstrup, N. B., & Schwartz, J. (2018). The temporal flows of self-tracking: Checking in, moving on, staying hooked. *New Media & Society*, 20(12), 4590–4607. <https://doi.org/10.1177/1461444818778542>
- Lupton, D. (2014). Self-tracking cultures: Towards a sociology of personal informatics. *Proceedings of the 26th Australian computer-human interaction conference on designing futures: The future of design, Sydney, Australia*, 77–86. <https://doi.org/10.1145/2686612.2686623>
- Lupton, D. (2016). *The quantified self*. Polity Press.
- Lupton, D. (2018). *Self-tracking*. ResearchGate. https://www.researchgate.net/publication/323402296_Self-Tracking
- Malinen, S., & Nurkka, P. (2013). The role of community in exercise: Cross-cultural study of online exercise diary users. *Proceedings of the 6th international conference on communities and technologies, Munich, Germany*, 55–63. <https://doi.org/10.1145/2482991.2483006>
- Maturo, A., & Moretti, V. (2018). *Digital health and the gamification of life: How apps can promote a positive medicalization*. Emerald Publishing Limited.
- Millington, B. (2016). Fit for prosumption: Interactivity and the second fitness boom. *Media, Culture & Society*, 38(8), 1184–1200. <https://doi.org/10.1177/0163443716643150>
- Official Statistics of Finland. (2016). *Use of information and communications technology by individuals: Annex table 15*. Statistics Finland. http://www.stat.fi/til/sutivi/2016/sutivi_2016_2016-12-09_tau_015_fi.html
- Official Statistics of Finland. (2018). *Use of information and communications technology by individuals: Annex table 15*. Statistics Finland. https://tilastokeskus.fi/til/sutivi/2018/sutivi_2018_2018-12-04_tau_013_fi.html
- Ojala, J., & Saarela, J. (2010). Understanding social needs and motivations to share data in online sports communities. *Proceedings of the 14th international academic MindTrek conference: Envisioning future media environments, Tampere, Finland*, 95–102. <https://doi.org/10.1145/1930488.1930508>

- Pinkerton, S., Tobin, J., Querfurth, S., Pena, I., & Wilson, K. (2017). 'Those sweet, sweet likes': Sharing physical activity over social network sites. *Computers in Human Behavior*, *69*, 128–135. <https://doi.org/10.1016/j.chb.2016.12.028>
- Rainie, L., & Wellman, B. (2012). *Networked: The new social operating system*. MIT Press.
- Samson, A., & Solmon, M. (2011). Examining the sources of self-efficacy for physical activity within the sport and exercise domains. *International Review of Sport and Exercise Psychology*, *4*(1), 70–89. <https://doi.org/10.1080/1750984X.2011.564643>
- Schreier, M. (2014). Qualitative content analysis. In U. Flick (Ed.), *The Sage handbook of qualitative data analysis* (pp. 170–183). SAGE.
- Silk, M., Millington, B., Rich, E., & Bush, A. (2016). (Re-) thinking digital leisure. *Leisure Studies*, *35*(6), 712–723. <https://doi.org/10.1080/02614367.2016.1240223>
- Smith, W., & Treem, J. (2017). Striving to be king of mobile mountains: Communication and organizing through digital fitness technology. *Communication Studies*, *68*(2), 135–151. <https://doi.org/10.1080/10510974.2016.1269818>
- Stragier, J., Evens, T., & Mechant, P. (2015). Broadcast yourself: An exploratory study of sharing physical activity on social networking sites. *Media International Australia*, *155*(1), 120–129. <https://doi.org/10.1177/1329878X1515500114>
- Sullivan, A., & Lachman, M. (2017). Behavior change with fitness technology in sedentary adults: A review of the evidence for increasing physical activity. *Frontiers in Public Health*, *4*(289), 1–16. <https://doi.org/10.3389/fpubh.2016.00289>
- van Dijck, J. (2009). Users like you? Theorizing agency in user-generated content. *Media, Culture & Society*, *31*(1), 41–58. <https://doi.org/10.1177/0163443708098245>
- van Dijck, J., & Poell, T. (2013). Understanding social media logic. *Media and Communication*, *1*(1), 2–14. <https://doi.org/10.17645/mac.v1i1.70>
- Wang, H., Zhang, R., & Wellman, B. (2018). Are older adults networked individuals? Insights from East Yorkers' network structure, relational autonomy, and digital media use. *Information, Communication & Society*, *21*(5), 681–696. <https://doi.org/10.1080/1369118X.2018.1428659>
- Xie, H., Chen, Y., & Yin, R. (2020). Running together is better than running alone: A qualitative study of a self-organised distance running group in China. *Leisure Studies*, *39*(2), 195–208. <https://doi.org/10.1080/02614367.2019.169864>