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Food logging: an information literacy perspective

Abstract

Purpose

The aim of the paper is to explore the meaning of information literacy in food logging, the activity of recording food intake and monitoring weight and other health conditions that may be affected by diet, using applications (apps) accessed through mobile devices and personal computers.

Design/methodology/approach

Data was gathered from a small group of food logging app users through a focus group and interviews. Analysis was informed by practice theory and the growing interest in information literacy outside educational settings.

Findings

Food logging revolves around the epistemic modality of information, but it is the user who creates information and it is not textual. Food logging is associated with a discourse of focussing on data and downplaying the corporeal information associated with eating and its effect on the body. Social information was an important source for choosing an app, but data was rarely shared with others. Food loggers are very concerned with data quality at the point of data entry. They have a strong sense of learning about healthy eating. They were not well informed about the data privacy and access issues.

Practical implications

Food loggers need to be better informed about data risks around food logging.

Originality/value

This is the first study of food logging from an information literacy perspective.

Keywords

Information literacy, health literacy, practice theory, diet, mobile apps, food logging, mobile health

Introduction

Internationally governments and health agencies recognise that obesity is a major health challenge for this century. In England in 2013 67.1% of men and 57.2% of women were classed as obese or overweight (Lifestyles Statistics Team: Health and Social Care Information Centre, 2015). Being overweight is a critical issue for health and well-being. It increases the risk of a number of serious health conditions such as type 2 diabetes, stroke, heart disease and cancer (World Cancer Research Fund and American Institute for Cancer Research, 2007). Currently the annual cost to the UK economy of obesity is estimated to be £27bn a year (Public Health England, 2016) and the cost to the National Health Service (NHS) £5bn a year (Department for Environment Food and Rural Affairs, 2015). It is recognised by governments and public health organisations that tackling the “obesity epidemic” is not easy and will require change and input at multiple levels in society: individual, familial, community and national (Government Office for Science, 2007).

An important part of the challenge is that resources for health services are under pressure from many directions. In this context the increasing availability of “m health” – mobile and wireless health applications - is of great interest for managing and improving health (Nilsen et al., 2012). Mobile digital devices offer quick and easy ways to monitor, record and share health information (Lupton, 2015). Such apps facilitate self management of health conditions, potentially reducing demands on health services, as well as responding to calls for patient-centred models of healthcare (Handel, 2011). The ubiquity of mobile (smart) phones, their high technical specifications, connectivity and the overwhelming attachment people have to them are factors that contribute to their potential for health interventions (Klasnja and Pratt, 2012). Journaling applications (diaries) are one type of app

that have seen increasing popularity, to measure a range of health related information including activity, food intake, stress, blood pressure, risk behaviours and use of particular medicines (Klasnja and Pratt, 2012).

Keeping a food diary to assess diet has been a recommended practice since the 1930s (Stumbo, 2013). But recording food intake on modern devices such as mobile phones and tablets – food logging - is seen to be more effective overall than paper-based systems (Bert et al., 2014). Paper-based diaries are troublesome to carry, do not allow for longitudinal analysis and can be embarrassing to use in public (Cordeiro et al., 2015). In contrast apps provide a variety of summaries, reports and charts (Rusin et al., 2013). Some apps offer motivational email reminders related to the users stated fitness or diet goals, and may encourage users to share their personal data with Facebook or email contacts. Through mechanisms such as these users are invited to develop a body of personal data and become part of a community (Ackerman, 2013). Given that self-monitoring food intake through a food diary has been shown to help people eat more healthily (Klasnja and Pratt, 2012), food logging apps offer one important avenue to begin to address the obesity crisis.

Use of diet and fitness tracking apps is becoming widespread, with one of the most popular, MyFitnessPal having amassed 75 million registered users worldwide (MyFitnessPal, 2014). Indeed, it is estimated that there are over 10,000 apps that aim to target diet and weight loss (Azar et al., 2013). Interest in these apps is increasing: consumer research has shown that 79% of UK adults have some kind of health or fitness goal with 54% of consumers interested in logging or monitoring aspects of activity or wellbeing using apps (Intel, 2015). However the accuracy of recording food consumed using apps can be poor, and errors can be as high as 50%; furthermore these apps rely on large databases of foods, which contain unverified and incomplete information (Azar et al., 2013). It seems, then, that the use of these apps and interpreting both the information inputs and the

information outputs is not completely straightforward. Learning how to use these tools requires new ways of being information literate (Lipponen, 2010).

There have been many studies and reviews of food logging apps and their effectiveness from a (mobile) health information perspective (Azar et al., 2013; Bert et al., 2014; Klasnja and Pratt, 2012; Rusin et al., 2013; Stumbo, 2013), and studies that have looked at information literacy in relation to health (Lloyd et al., 2014; Yates et al., 2009, 2012) and healthy eating (e.g. Marshall et al., 2009, 2012; Niedzwiedzka et al., 2014). However to date there have been no studies examining the nature of information literacy in the use of mobile apps to monitor diet. The central aim of the paper is uncover what it means to be information literate in the landscape of food logging. In asking this question the research reflects a turn in thinking about information literacy away from purely educational settings, to recognising the multiple and complex aspects of information use across the life course (Lloyd, 2006) and in everyday life contexts (Lloyd, 2010b; Yates et al., 2009; Yates, Stoodley, et al., 2012). The approach taken here is informed by a practice-based view of information literacy. This focuses less on it as a set of approved behaviours for educational settings and moves towards recognising the very different ways information is defined and used in different contexts.

The paper is laid out as follows. It starts by placing food logging in a wider context of the quantified self movement. The relation of information literacy to health literacy is then considered and the practice based view of information literacy presented. Details of the method of the study: a focus group and interviews are then presented. The findings are given, followed by a discussion of the significance of the paper.

Food logging and the quantified self

Food logging and the use of personal wearable devices that monitor aspects of bodily function are part of the larger “Quantified Self” movement or “lifelogging”: the systematic gathering of data about the self (O’Hara et al., 2009). It is recognized that this voluntary self-tracking can contribute to

better health and disease prevention (Lupton, 2015). Simply providing people with “Information” e.g. lists of suitable food, has been found to be ineffective at changing habits and behaviours (Freeland-Graves and Nitzke, 2013; Nutbeam, 2000). It is desirable to provide tailored information on nutrition and physical activity to people who are overweight or obese, with the self identified desire for such information increasing with the degree of obesity in pre-diabetic individuals (Enwald et al., 2012).

Although food diaries are often recommended by doctors to encourage people to take more responsibility for their diet (Rusin et al., 2013), the accuracy of the recording of food consumed both in written and/or photographic format has been questioned (Zepeda and Deal, 2008). Recall of exact food consumed can be problematic, so devices that facilitate the recording of what has been eaten as soon as possible are seen to be advantageous (Rusin et al., 2013). Food logging apps, which offer a more targeted and interactive experience than simple paper diaries, have been shown to help to significantly reduce body weight in users (Flores Mateo et al., 2015). Yet in their review of the most downloaded smartphone apps for diet tracking, Azar et al., (2013) found that most apps did not use established theories of behaviour change in their design, and those that did have a more theoretical grounding were not popular. An early study also suggested that most apps did not promote thirteen of the most basic evidence informed weight loss practices (Breton et al., 2011).

Evidence of the practical benefits of logging food as such, have to be set in the context of controversies around the quantified self movement, and more widely in critical debates around “big data” (Lupton, 2014a, 2014b). Much of the critique of big data has focussed on the dehumanising effects of quantification and the potential for big companies to use it as a form of surveillance and social control through targeted advertising (Lupton, 2014b). Yet self-trackers purposefully generate data about and for themselves. For Rooksby et al. (2014), tracking is a “technology of experience,” a way that people shape their own daily experience in positive ways. It is part of how “people are using information and finding its meaning in their day-to-day lives” (p.1171). Its use is tied to valued

personal projects and bound up closely with personal self-esteem. Nafus and Sherman (2014), have coined the notion of “soft resistance” to describe the way that some self quantifiers create data about themselves for their own purposes. As they swiftly move between tracking different things as part of different projects, they both empower themselves, but also effectively reduce the value of the fragmented and partial data for the purposes of surveillance. Self-trackers do not seem to slavishly accept the quantified data as “the truth” rather they make intelligent decisions about its interpretation. Self quantification enables people to tell their own stories about themselves in a new way: through data (Lupton, 2014a). Nevertheless, the potential for unwanted surveillance remains and there are ethical concerns about access to health app data by insurers and employers (Lupton, 2015). Future access to one’s own data is not guaranteed. Further, self-tracking can be seen as a way that the individual disciplines themselves to be a self-reliant, self-responsible citizen, aligned to the model required of neo-liberalism. Self-tracking “is the apotheosis of self-reflexivity” (Lupton, 2014b). Other authors have expressed concern around the effects of quantification on human life. For example, Williams (2013) was troubled about how in his experience of self-tracking, it became an end in itself, usurping the place of direct sensory experience of the body. The notion of information literate self-tracker has to be understood in this context of wider controversies of empowerment and control.

Health literacy and information literacy

There has been much recognition of the importance of information in health care in UK Government and NHS strategies and documents (Marshall et al., 2012), however there is quite confusing advice coming to the public via the media about what is healthy eating. Many people do not know where to find information about diet, and the most popular sources of information were search engines such as Google (Niedzwiedzka et al., 2014). People are mistrustful of print and broadcast media which they find confusing and contradictory and find it difficult to trust the information they are given (Hopkins and van Mill, 2014). Information provided on the Internet by government agencies (e.g.

NHS Choices) is too generic to enable behaviour change in relation to weight management (Marshall et al., 2009). Therefore people need extensive information literacy and excellent critical thinking skills to interpret the “advice” they are given.

There is a large body of literature that uses the term “health literacy” to explore this. Health literacy is an evolving and complex concept that can be understood through many lenses (Berkman et al., 2010). The degree to which people are health literate has been found to be a stronger predictor of health than income, education, race and employment (Carbone and Zoellner, 2012). Yet many definitions of health literacy focus on textual information and formal information products. In this paper we take the position of Lloyd, Bonner, & Dawson-Rose (2014) who assert that “Health literacy is an expression of information literacy in context” (p. 3) and viewing it in this way invites a broader conception of the information used by people in a health context, moving beyond information in textual formats

The practice perspective on information literacy

In the last decade conceptualisations of information literacy have moved away from educational contexts and away from a normative model of a generic set of skills that can be taught, learnt and measured independently of context. It has been recast through a turn to a practice based approach, with its focus on different sites where bundles of practices are carried through, each potentially with its own local definition of information literacy (Cox, 2012, 2013; Haider, 2011; Lipponen, 2010; Lloyd, 2009, 2010b; Pilerot, 2016; Tuominen et al., 2005). Lloyd, (2010a) calls these settings “Landscapes” which is the term adopted in this paper to describe the setting for the practice of food logging. From the practice perspective, people coming to participate in social practices seek to develop competence in them, indeed are involved in an active way in negotiating what competence means (Wenger, 1998). In so far as such practices involve activities relating to information, so such competences constitute information literacy for that context. It follows that how information literacy is defined is specific to that particular site.

In the educational context, librarians make strong statements that students should be information literate, and follow a rational model of identifying need, planning to gather information, searching in appropriate places, evaluating what is found and using it effectively. But in a practice perspective outside a learning context, while information is often important to social practices, how important it is, what counts as information, what is given authority is actively negotiated by participants as a regime of competence within a set of practices (Wenger, 1998). Lloyd states that becoming information literate “involves developing an understanding of how and why information is produced and the ability to reflect critically on the complexity of that production”(Lloyd, 2010c p.30). What this looks like in any particular landscape is likely to vary.

The dynamic and contested nature of competence means that what information literacy means in a particular context is not necessarily easy to identify. Further, a bundle of practices are complex and messy, so therefore information literacy is also complex and hard to define in simple terms. Practices are continuously remade and renegotiated, through participation, innovations by new participants and through other changes, such as the impacts of new technology (Shove et al., 2012) Thus what constitutes information literacy is itself subject to change.

Lloyd (2009, 2010a, 2010b, 2010c) makes a number of suggestions that assist in defining information literacy in particular landscapes, outside the familiar educational contexts. She suggests that there are dimensions of information literacy characterized by three modalities of information in any information landscape. They are:

- 1) Epistemic, characterized by explicit, factual, generalised often textual information;
- 2) Social, the role of others;
- 3) Corporeal, characterized by information experienced and disseminated through the body.

This typology shifts the focus away from printed texts and encoded knowledge – typically central to information studies in the past - to give more weight both to the body as a means of knowing and

the importance of the social. Thus bodily experiences, particularly in the health arena, can be important sources of information (Lloyd et al., 2014; Wella, 2015; Yates et al., 2009, 2012). Illnesses are by definition directly experienced through the body (Lloyd et al., 2013). But Lloyd also shows that ambulance personnel have to learn how to translate knowledge from the classroom to bodily competence on an accident scene. They have to learn what an accident looks like, how injured bodies feel when touched and learn to interpret smells and sounds, as this sensory information provides vital information to help successfully appraise the situation (Lloyd, 2009).

Lipponen (2010) criticizes models such as the ACRL standards of IL for conceptualizing it as an *individual* competency that is removed from a social context. From a practice perspective, all practices are socially shaped and negotiated. Thus any definitions or models of IL need to reflect communal and collaborative aspects of information creation and sharing (Tuominen et al., 2005). To effectively research IL as a concept it is therefore important to include a focus on a community engaged around a bundle of practices.

Methodology

Given the focus on discovering how participants themselves viewed information literacy and our practice based approach, this exploratory study adopted an interpretivist, qualitative methodology. Data was collected from one focus group (seven participants) and five individual interviews with food logging app users. These were recruited through an email that was distributed to current staff and students at the University of Sheffield who had agreed to consider being participants in research projects. Participants were invited to take part on a self-selecting basis if they identified as current users of food logging apps. Participants were given the choice of focus group or individual interview.

Table 1 below gives details of the participants:

| Focus Group | | | | | | |
|--------------------|---------------|------------|--------------------|-------------------------|----------------------|-------------------|
| Participant | Gender | Age | Nationality | Current app used | Length of use | Motivation |
| | | | | | | |

| | | | | | | |
|--------------------|---------------|------------|--------------------|------------------------------|----------------------|---|
| FG1 | F | 26 | Middle East | Myfitnesspal MapMyFitness | 2 weeks | Weight loss |
| FG2 | F | 29 | USA | MyFitnessPal | 4 years | Monitoring nutrition of a vegetarian diet |
| FG3 | F | 36 | British | MyFitnessPal | 10 years | Weight management |
| 4 | M | 26 | British | MyFitnessPal | 1 years | Weight management and exercise logging |
| 5 | F | 26 | USA | MyFitnessPal | 4 years | Weight management |
| 6 | F | 57 | British | MyFatSecret | 2 years | Weight management |
| 7 | F | 43 | British | MyFitnessPal MySymptoms | 2-3 years | Weight management and symptom monitoring |
| Interviews | | | | | | |
| Participant | Gender | Age | Nationality | Current app used | Length of use | Motivation |
| IN1 | F | 43 | British | MyFitnessPal Fitbit | 2 years | Weight loss |
| IN2 | F | 27 | British | MyFitnessPal | 1-2 years | Weight loss |
| IN3 | F | 48 | British | MyFitnessPal | 6 months | Weight loss |
| IN4 | F | 24 | Chinese | MyFitnessPal | 1 year | Weight management and fitness |
| IN5 | M | 25 | British | MyFitnessPal | 3 years | Weight loss |

Table 1: participants

Although the number of participants was relatively small, given that they were recruited from staff and students at one institution and so co-located in a narrow setting increases the credibility of the analysis, particularly in the context of an exploratory study with a strong theoretical commitment. It

is similar in scale to similar studies of information literacy such as Lloyd (2009) and Yates et al. (2009).

Participants were asked semi-structured questions about their personal journey in using food logging apps; how they found, selected and evaluated the app and the information it gave them; their information sharing practices related to the app; and any perceived risks or barriers to food logging. The interview and focus group questions are reproduced in Appendix A. The study received ethical approval from the University of Sheffield. We address the aim of discovering the meaning of information literacy in the landscape of food logging with the following research questions which are framed by practice theory and the information literacy landscape theories of Lloyd, in particular the dimensions of IL expressed as “modalities” (Lloyd, 2010c)

1. What is the character of food logging as a practice?
2. How do the three modalities of information (epistemic, corporeal and social) underpin knowledge in the landscape? (Lloyd 2009; 2010b, 2010c; 2014)
3. To what degree do participants understand and critically reflect on information as part of their food logging practice, and what importance is invested in this by participants? (Lloyd, 2010b)

The interviews and focus group were audio recorded and transcribed. In the first stage of analysis the transcripts were subject to a thematic analysis using the NVivo software package, and the emerging themes discussed by the research team. In the second stage, the data was analysed through the lens of practice-based theorisation of Information Literacy landscapes as outlined in the literature review.

The three research questions are used to structure the results section below.

Results

Eleven of twelve participants used the popular MyFitnessPal app, which allows the user to track both food consumption and exercise, and can be synchronised with several other apps and devices, particularly wearables and tracking devices, including the popular Fitbit. Some of the participants

also used separate exercise logging apps, often in conjunction with the use of a smart device, and synchronising data with MyFitnessPal.

The nature and boundaries of food logging as a practice

A feature of social practices is that they are often complex, messy and dynamic, and as a result identifying the character of a practice or bundle of related practices, and delineating their boundaries, is difficult. Thus, the data reveals much variation in how the food logging was carried through (in routine and sometimes non routine ways) and the meaning attached to it.

“The main features I use within My Fitness Pal are the food logging feature, which I use first thing in the morning, so write in the things that I’ve got in my lunch bag that I’m going to eat during the day, I invariably eat everything that’s in there. And then I also log into it again and add the food that I’ve eaten as part of my evening meal. I also at that point add in any exercise that I’ve done that hasn’t been automatically synced across from the Fitbit.”

“I get to work and I sort of, you know, open up the PC, and it’s one of the programs I open up. And then while I’m at work everything I eat or drink, you know, even down to cups of coffee.”

“So I usually don’t use it until about lunchtime, at which point I’ll sit down and put in my breakfast and everything I’ve eaten in the morning, and my lunch. And then I’d probably sit down again at night and put in what I’ve eaten for the rest of the day, and then I’ll put my exercise in [...] So if I get to lunch time and I’ve eaten quite a lot I’ll sometimes put my exercise for the morning in so I know what I’ve got left for the rest of the day.”

There was significant variation in how food logging was woven through participants’ everyday lives e.g. whether it was a continuous small background activity or created a few reflective moments in a day. There was also variation in how it was being used and the purposes and meanings attached to it. Thus some logged at set periods, some continuously. Entering data continuously allowed constant monitoring and adjustment of behaviour, such as adjusting one’s food intake over a day. Entering data

at a set time, even in advance seemed to reflect an attempt to exert control. For example, it could be linked to meal planning, itself usually seen as a beneficial dietary practice.

“I’m the classic unconscious eater it turns out. And unless I really write down seriously everything I have right down to the very last, I don’t know what I’m doing.”

Meanings attached to food logging were complex. Several participants were primarily interested in weight loss (as a “directive form” of food logging to achieve a particular goal (Rooksby et al., 2014) but were also simply curious about finding out more about their bodies (“documentary tracking”) and liked the modern feel of the gadgets: what Rooksby et al. (2014) label as “fetishized tracking”. Another combined directive weight loss food logging with diagnostic tracking, e.g. to determine the cause of particular symptoms.

In the practice perspective this variation is understood not through the concept of individual motive or personality, rather it is seen as shaped through the unfolding of individual trajectories of participation in practices (e.g. becoming more or less involved), and the way that participation in multiple practices (e.g. food and exercise logging) and work at and across boundaries between practices, complicates how any one practice is understood. Several participants had quite complex histories of involvement of weight management and tracking over a long period including periods of engagement and disengagement with the practice. Another only logged in the summer.

The boundaries between one practice and another are often far from easy to delineate: the picture is “messy”. For example, most participants in the study combined food logging and some sort of exercise tracking. Again what was being logged differed and how the relation between the two sets of activities was perceived also differed. But as one interviewee began to articulate, the feel of these practices could be quite different. Whereas she religiously and purposefully logged food for a “directive” purpose; tracking fitness was more informational, “documentary”.

“I think I use it differently because the food is just there as a static, this is what you’ve done today or this is a preparation for what you’re going to do today. Whereas the Fitbit is very much, this is what you’ve achieved, it was entirely without forethought.”

The feel, the “taste” of the practices (Gherardi, 2009) of food logging and of exercise logging were very different, yet they could be closely intertwined, at the level of everyday routine.

To complicate things still further, the practices themselves were evolving. For example, several focus group participants pointed to a new feature of MyFitnessPal, that improved perceived data quality, by showing whether user-entered nutritional estimates had been checked. This could shift how the app was used, since it meant that data input by other users was perceived as more trustworthy. Another participant in the study had abandoned use of one app because changes in the interface had made it unusable the way she wanted to use it. The technologies evolve rapidly, with people adapting to this.

Thus delineating food logging in a simplistic way as a practice (as if it were a thing) is not possible, and it is difficult to define its boundaries. It is useful at a theoretical level to consider food logging a practice, but we need to recognise the complex and messy nature of what that might look like on the ground. We may also not be able to say in a simple way that food logging is an “information practice” since that implies the central purpose is informational (Cox, 2013). On the surface it seems self-evident that recording data about food intake is informational. However, sometimes it appeared that the purpose of logging the food was not to record data to generate information; rather the act of recording data was a way to control behaviour in itself. The information generated might not even be used. Thus it is perhaps wrong to label food logging as necessarily an information practice, though clearly like many practices, there is a thread of information activities such as creation, seeking, use, evaluation etc running through it.

The three modalities of information

In trying to capture the role of information in this social site of food logging practices, and then to think about what constitutes information literacy in this context, Lloyd's (2010a, 2010c) concept of the three modalities of information is a useful starting point.

The epistemic modality of information

Studies of information behaviour and literacy have typically been preoccupied with the epistemic modality, that is, with encoded information: knowledge recorded and communicated in texts.

Typically studies examine how users search for such texts that have been produced by another, in order to add to their own knowledge (e.g. scholars or students searching for journal articles on a topic). Often understanding how to do this turns on a grasp of how knowledge is produced and circulated (e.g. of the scholarly publishing process). Food logging is similar in revolving around codified information. But in several respects it is rather different from the usual cases explored in studies of information literacy in an educational context. In food logging a key information activity is recording one's own food intake (and often exercise). Thus the user is actively involved in producing the information they consume; they are embedded in the information production process. Also it is unusual that this information is about the self. Certainly a common activity was the interpretation of information generated by the app. This is analogous to evaluating information from a text, though again in several ways it departed from what is usual. Often the form of this information was a) quantitative or a visualisation: numbers and charts rather than text or traffic light signals on progress, and b) in the form of information applied to the self, rather than the typical generalised information found in information seeking.

"I quite like the graphs and if you go through a period of using it for quite a while the graphs are quite cool."

"I respond to the green and red, like stupidly, I'm like yes!"

More details of how this data was produced and used, are explored below, but first let us consider the other modalities.

The corporeal modality of information

In contrast to this stress on textual knowledge, in a number of works Lloyd has shown the importance of corporeal information in information landscapes. Thus within a particular practice we learn to interpret information from the senses in particular types of way. Many discourses around food involve corporeal information, be that the gourmet's aesthetic delight in the taste of food or in photographic "food porn". But the practice of food logging seemed not to be closely related to information from the senses about either food e.g. it tasting or smelling nice; or from the body e.g. feeling hungry, bloated or looking fat. The ways that participants talked was strongly suggestive that food logging is implicated in a discourse whose aim is precisely to erase the sensory and embodied from the experience of eating. Its point is to quantify the amount of food consumed, in an objectivist way. Food is weighed and analysed, rather than focusing on its taste. Similarly, the condition of the body is usually evaluated through its weight, not through direct sensory experience. The point is to quantify, de-sensualise and rationalise the body. Thus the central task is entering numbers into an app. This separates one from the tastes of food or indeed the anxieties around eating. At one point in the focus group several participants talked of food logging being about "de-pleasuring" food. One could go further and perhaps identify it as the de-sensualisation of food. The point of food logging was seen as "*focussing*", "*controlling*".

"It's kind of a drug to me. Whereas you might take a diet suppressant or an appetite suppressant or something like that, I'll use the app in much the same way, it helps me monitor my intake in that sense."

This discourse of datafication of food is evidently a strategy to counter the perception of the strength of bodily desire for food or fears around the power of bodily sensation and the seemingly

inability to control it. Indeed, the few times the body was mentioned in our research data, it was often to assert the unreliability of the senses.

“I don’t necessarily see it directly in the mirror. I’ll still sort of see the fat me, but then I’ll look at that and go, actually look how far you have come and sort of used to--, what you’re pushing in the gym used to be what you were carrying around every day and that does actually make a difference to the way in which you view yourself.”

What was visible was distrusted, and had to be struggled against. Bodily sensations such as feeling bloated or hungry all the time were mentioned as problems, that might be controlled through food logging.

Clearly such a datafied discourse is far from being the only discourse around food, but it did appear that the practice of food logging is bound up with an informalisation of food, in which the sensual is usually erased, and if mentioned, treated with suspicion.

The social modality of information

Most participants were willing to share that they were logging with others and talk about it as an experience. But this fell short of sharing logging data with others, except in a few cases and then in quite a limited way. Others were sometimes an inspiration and a support, but there seemed for many a strong desire to be discreet about the actual act of food logging, be it to avoid becoming too obsessive or being perceived as obsessive; to avoid being boring and to avoid de-pleasuring food for others; or to protect young people who were vulnerable to eating disorders.

“I would be very discreet at home, I think because I’ve got a teenage daughter and I’m really mindful of that she’s at a prime age for eating disorders.”

The social skills and awareness in managing these subtleties was evidently part of the competency of food logging.

From an information perspective, others were often a source of recommendation of apps: sometimes other successful users or sometimes experts like personal trainers. NHS health service professionals were never mentioned as sources of advice. Sometimes achievements were shared with others, but little of the process was shared: others often seemed not to be involved closely in the logging of food or interpretation of information.

Information literacy and competency in food logging

In this section we consider how participants thought about competency in the information aspects of food logging, and how important such skills were seen. This can be understood through three different aspects of food logging: choice of the app, use of the app and wider awareness of data privacy.

Choice of an app

Participants' choice of app seemed rarely to be based on careful decision making. Several specifically commented that they had not "researched" the options. Usually choice was made on the basis of recommendation: sometimes from another user, sometimes an expert, like a personal trainer. This suggests a strong sense of bounded rationality where pragmatically some basic steps are taken to inform a decision, but information use, especially of epistemic sources, is limited. Some interviewees explained a lack of evaluation on the fact that the apps were free. Ease of use was often cited as a factor in choice, and this usually seemed to mean ease of data entry e.g. the barcode scanning offered by MyFitnessPal. Since many of the reasons why food logging fails link to the chore of data entry this seems reasonable criteria (Cordeiro et al., 2015).

Where participants did have clear idea of the functions they wanted, it was usually because they had previous experience of using a number of other apps, rather than because they had researched or as the outcome of considered reflection. Thus experiential knowledge seemed to be more important than ideas derived from reading or general advice.

A few key features influencing choice were the size of the food database, because this reduced the effort of entering information, and the ability to share data with other applications, usually activity trackers of some sort, reflecting the common linking of food logging and activity tracking.

Data entry and information

While choice of an app was not a central activity of food logging, in contrast, participants were very concerned about information quality at the point of food data entry. This concern reflected that they themselves were entering data, and the usefulness of outputs were dependent to some degree on the accuracy of data input. Several participants were very fastidious about recording things with great precision.

“I’m a slave to my scales, so I weigh everything that goes in that isn’t just a single item that can be logged as you know, one apple, say.

In one case the exacting data entry seemed to relate to an understanding that under-estimating food intake was a common error (or form of self deception) in dieting. Others were more loose in their practice. But all the participants were eager to discuss issues around data quality, including:

- The accuracy of their own data entry;
- The difficulties of estimating inputs when eating out or when someone else prepared food;
- The accuracy of information uploaded about foods by other users;
- The fact of certain types of food being rarely in databases;
- Problems arising from the use of US cup measurements in some recipes;
- The inability of apps to fully account for different metabolisms, and related to this, the accuracy with which apps recorded different types of activity.

Thus participants showed a critical awareness of issues around information quality and the information authority of the app as an information source. Most recognised that data contained inaccuracies; but claimed it was good enough for their purposes. Thus they saw food logging apps as having authority as information sources, and that how they entered data as being crucial to this.

Nevertheless, there were some quite interesting anomalous behaviours around consistency of logging.

“Generally, I think the only thing I don’t record too much is alcoholic drinks, and that’s probably a little bit of denial and a little bit of I don’t want to get that obsessed about it. I know there’s calories in drinks but I’ll let it go and deal with it another day.”

“So sort of Friday night through to Sunday night nothing gets tracked, that’s my time off. It sounds really daft but my health is sort of Monday to Friday evening and then the weekend is mine [laughs].”

Thus some people did exclude counting certain types of consumption or simply stopped recording for certain periods. The logic seemed to be that sustaining any control in the long run required periods of easing off. This reinforces the sense that the act of gathering information (not analysis) and control go hand in hand.

Furthermore, one person discussed tangentially the potential of lying to oneself through the tool.

“I think you could get a bit obsessed with the actual app itself, with making the app say what you want it to say, you know, thinking well, you know, maybe I did cycle for a little bit longer, you know, being quite untruthful, just so you come out with a yes you’re doing quite well.”

Another mentioned stopping daily sharing of data with a friend because of the hazard of it leading to such misrepresentations, of “kidding myself” despite a desire to be honest. This suggests that at times quality of information seemed secondary to other considerations, such as avoiding too much stress.

However, notwithstanding these question marks, discussions with participants did suggest that they used the information from the apps in powerful ways. One commenting on how they used it, said that:

“It was as a learning tool”

They were skilful in combining multiple tools and selecting from information outputs what were of interest to them. Sometimes data was used immediately for regulating food intake, sometimes more long term analyses were conducted. Thus participants referred to

- Learning the calorific and nutritional values of particular foods;
- Learning what an amount of food actually looks like;
- Learning to move away from calorie counting to a more sophisticated focus on balance of food types;
- Being prompted to search for more information to understand what they had discovered from their log;
- Discovering causes of particular symptoms or problems e.g. what caused bloating or an upset stomach;
- And several mentioned going back to explore what had worked in past to try and improve current weight control.

Thus on balance it seemed that whether indeed they were always entering accurate data, use of the app was associated with greater knowledge and curiosity about nutrition, resulting in greater understanding and success in achieving objectives.

Data/privacy literacy

We asked participants directly about privacy. Many were aware of data privacy issues, but some felt since the tools were free, the use of their data was a fair exchange. In this case they usually felt that the data they shared was not personal, perhaps not aware of the risks posed by the joining up of data from different sources. They seemed more preoccupied with the privacy of the data between them and their acquaintances, than some seemingly remote service provider. Another had concerns, but seemed resigned to it being unavoidable; she thought it was impossible to be “off the grid”. One had experienced data loss, when they had tried to retrieve historic data from an app they had used in the past, it was found to be inaccessible. No one else mentioned any concern around long term access to their data.

Discussion

Food logging is a complex, messy and changing practice, often closely connected to activity tracking. There is considerable variation in how it is performed and the meaning attached to it. Lloyd's concept of three modalities is a useful framework for analysing information within this landscape. Food logging revolves around the epistemic modality of information, though it is unusual in that the user has a central role in producing information, and that this information is often output to them in numbers or visualisations. Food logging seems to be directly associated with a discourse of de-sensualising the experience of food; it actively seeks to focus attention away from corporeal information onto epistemic information. The sheer act of gathering data was an act of control, regardless of how the data was used. As regards the social modality of information, other people were important in the choice of an app, but app choice was not seen as a very important process. Participants shared that they were food logging, but sharing data with others was rare. Food loggers were disconnected from formal health advice through the NHS.

Participants were casual about choosing an app, showing bounded rationality in information behaviours related to this decision. This shows that the choice of the app was not very salient to the competency of food logging. In contrast, food loggers were very aware of quality issues around data entry. On balance they felt the data was accurate enough for their purposes, although there was some evidence of use of the tools to blunt information (Miller, 1995), to avoid it e.g. by selective monitoring. Participants in the research had a strong sense of learning about nutrition and what worked or them through the app. Competency in food logging was closely linked to this learning.

Participants had some issues around the privacy of data, but were resigned to this risk. There was limited awareness of the potential for losing their data in the future. From a data literacy perspective, participants seemed uncertain.

If information literacy is to be seen as having a "deep awareness, connection and fluency with the information environment" (Lloyd 2006: 578) food loggers can be considered moderately information literate. They were deeply embedded in processes of information production through logging data.

They used outputs and had a strong sense of learning through using the app. Breton et al., (2011) evaluate weight loss apps on whether they support twelve “evidence-informed practices” such as maintaining a calorie balance, portion control, reading nutrition fact labels, eating a diet rich in fruits and vegetables, meal planning, drinking water rather than soda or juice. However, well the apps performed in themselves, our participants showed evidence of having absorbed many of these messages. They did seem to blunt some information; they lacked awareness of data privacy issues. Being information literate at least in certain areas, such as understanding data entry issues and using information outputs was therefore a competence of food logging.

This picture chimes with Rooksby's (2014) stress on the need to recognise agency in how people use such technologies. The strong link to personal self-esteem noted by the same authors was found here too. Participants felt empowered through the use of self tracking, using it in ways that made sense to them, especially because it helped them achieve their goals and allowed them to learn. Yet the experience of tracking seemed rather strenuous and stressful, e.g. compared to activity tracking. It was often talked of as an addiction. It was empowerment through self discipline. The taste of the practice was rather more self-disciplinary than the playful activities captured in Nafus and Sherman (2014). Gaps in data entry could more plausibly be interpreted as self-deception than as a form of “soft resistance”. Social sensitivities also made it a rather solitary pursuit. The way that discourses around food logging erase direct experience of the body echo the concerns of Williams (2013) that quantified data becomes almost real than direct sense information.

While participants used the food logging in quite a sophisticated way to learn in useful ways, they were also relatively passive about the risk of loss of data privacy. They lacked much foresight about future loss of their data. Thus in important ways what constituted information literacy in food logging for participants, could be seen as falling short in awareness of data privacy issues. This reflects how parts of an information landscape can remain invisible to participants.

Conclusion

The paper explains what food logging looks like through the lens of practice theory. The answer to the first research question shows its nature as a messy, complex set of activities, carried through in different ways by different social actors. Through answering research question two the paper also reinforces the value of exploring information in social practice through Lloyd's three modalities. Food logging is about epistemic information, but unusually it is information that people themselves actively create about the self, and data and visualisations of data rather than text. We found that epistemic information was used to decentre direct embodied information. Social information was important to the choice of app; but there were strong inhibitions to sharing food data with others. The answer that was constructed to the third research question shows a patchy character to information literacy in food logging. Participants were preoccupied with data quality in some areas but would also self-consciously avoid information; they were relatively apathetic about data privacy. Answering these research questions helps us understand more about the meaning of information literacy in this landscape, which was the paper's aim. The messiness and variation in this practice mean that defining information literacy is itself complex. We cannot identify the kind of normative rules familiar from information literacy in educational settings. Different modalities of information are used in quite specific ways, so competencies in using them relate to such specific uses, eg skills in interpreting visualisations of dietary information happen to be central here. We can define areas where information issues such as data quality seem central for social actors and areas where, as information professionals, we might have fears that the information or data literacies need to be improved.

Thus this paper contributes some significant empirical findings around the meaning people give to food logging: the variation in how it is practised, the complex link to activity tracking, its association with a discourse erasing sensory experiences of food, the concern with data entry quality and by identifying the rich range of learning that are accomplished. This is also the first study of the important emergent movement of self-tracking that takes an information literacy perspective. The

work fits within the new perspectives on Information Literacy from a practice theoretical perspective developed by a number of authors, but most notably Lloyd. It confirms the value of examining the character and relation of the epistemic, corporeal and social dimensions of information. It also sets this perspective in a context of how IL can be understood within a wider social perspective, around the links between data, information literacy and social empowerment.

This study was exploratory, based on rather restricted data from food loggers in one time and place, but seems to demonstrate the value of an information literacy approach to food logging. Further research is needed to extend the study to explore the evolution of concepts of information literacy across the complex practices of self-logging. Intriguing aspects of the findings, e.g. around data literacy and awareness of data privacy call for further study. In keeping with a practice theory lens methods such as ethnographic observation combined with interviews would be appropriate approaches to such studies.

The research has practical implications. Some participants seemed to be blunting information. It would be useful to offer advice on how effective apps are if certain types of food are not monitored or if the app is only used at certain times. Creating and analysing data about themselves was a central aspect of food logging, yet participants appeared to be unclear about the data privacy risks. This is an area where more transparency from app providers combined with advice about controlling one's own data would be useful. Greater openness from app providers would assist. Participants also seemed not to have thought ahead to how they could retain long-term access to the data: advice to do so would be beneficial. These suggestions are consistent with wider thinking in the quantified self movement around the ownership of data (Lupton, 2014a).

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