Characterising the digital health citizen: a new typology to explain differences in the outcomes of online health use

Abstract

Background

A key challenge for health systems harnessing digital tools and services is that of digital inclusion. Typically, digital inequalities are conceptualised in relation to unequal access or usage. However, these differences do not fully explain the differing health outcomes individuals obtain through health-related internet use.

Objective

To derive a new typology of health internet users based on their antecedent motivations and enablers, to explain how the different orientations of individuals influence the health outcomes they achieve through health-related internet use.

Methods

A mixed methods design using qualitative data from 43 semi-structured interviews about individuals’ general and health-related internet use, and how this influenced their health perception and their help-seeking decisions, and quantitative data from the Oxford Internet Survey (OxIS), a household survey of 2,150 adults in England about their internet use and other characteristics. The interview data were used to identify constructs which described motivations and enablers affecting how internet use shaped their health perception and health service use. These constructs were then used to
identify variables in OxIS which provided a quantitative measure of these constructs. A hierarchical cluster analysis of these constructs was then undertaken using the numerical variables, to derive a proposed typology of health information-seekers.

Results

Both the qualitative findings and the subsequent cluster analysis suggested there exist six different types of individuals, categorised as learners, pragmatists, sceptics, worriers, delegators and adigitals. The learners have a strong desire to understand health better, and use the internet to make decisions about whether they need to see a professional, and to learn about their and others’ health. The pragmatists primarily used the internet to decide whether it was worth seeing a doctor. The sceptics are sceptical of physicians and the medical system and value the Internet for solving health problems that doctors may not be able to deal with. The worriers found it difficult to interpret health information online, describing health information-seeking online as frightening, and reporting a critical attitude towards it despite doing so frequently. The delegators are composed of non-users and users valuing the internet as an information-source, but not necessarily wanting or being able to use the internet themselves. The last group of adigitals comprises many non-users, but also users, who do not see the internet as a useful information tool and presented strong views on its low suitability for healthcare.

Conclusions

This research supports a shift in the understanding of the digital divide in health, away from only access and usage issues, towards also conceptualising an “outcomes divide”,
whereby different types of internet user derive differing benefits from their use. This new typology can be used to inform digital inclusion policies in health systems.

Keywords: eHealth; health information-seeking; perceived health; health service use; health outcomes; digital divide; digital inequalities
Background

Health systems are under increasing pressure to save money and improve quality [1]. There are hopes that over the next decade ‘digital health’ and specifically the internet harnessed as a health service tool, can address these aims by shaping individuals’ service use and their health perceptions. As new digital tools, and new models of health service provision emerge, there are implicit assumptions that health consumers will take on new roles and responsibilities as digital health citizens [2].

In this brave new world of technology-enhanced health care, where digital technology is increasingly becoming a determinant of health, a key challenge is that of digital inclusion. Even though the ‘digital divide’ in terms of internet access may have been reduced with rising internet penetration, inequalities remain in terms of the ability to make meaningful use of online resources and to obtain benefits from doing so [3,4]. Achieving health outcomes depends on enablers around internet skills [5-7], particularly in terms of making sense of information quantity and quality [8] and health literacy in the sense of being able to translate the findings into health-promoting behaviours [9-11]. In addition, motivations differ: not everybody can and wants to assume responsibility for their health [12,13]. Differences in outcomes are also reflected in the general shift towards referring to “digital inequalities” rather than to a single digital divide [14,15], and to distinguishing between the access divide around the turn of the millennium, the usage divide over the last 10 years [3], and, more recently, a third-level digital divide in relation to the benefits that individuals obtain online [4,16].
Following these developments, this research draws on empirical data to propose a new typology of individuals’ orientations towards online health information. These orientations shape how individuals use the internet in the health context in the first place, but also, as this paper argues, they can explain the differing outcomes that individuals obtain [17,18] in terms of their health perceptions and health service use. In doing so we propose the outcomes divide as a conceptualisation of digital inequalities in the context of health outcomes: i.e. even accounting for differences in access and usage, there remain inequalities in the health outcomes achieved through the use of digital tools by these different types of individuals.

In this paper we derive this typology by combining findings from both qualitative and quantitative work. We do this by identifying antecedent factors around individuals’ motivations (their attitudes and desire to use health information from online sources) and enablers (their ability and interest in accessing the internet, and making sense of the information found). This is in line with various studies which found that antecedent factors must be incorporated when analysing internet use [19,20], in particular with respect to individuals’ motivations and enablers [3]. Motivations and enablers form a complex relationship with how individuals obtain outcomes online: attitudes, awareness of technology, desire for information, job requirements, skills, and social contacts shape how individuals use technology, and what they need to get out of it – and the outcomes they obtain in turn shape their future expectations towards use [17,18].
Methods

Research design

We undertook a mixed methods research design using both face-to-face interviews and quantitative analysis of a survey dataset, as part of a larger study about the relationship between internet use and health outcomes. We conducted 43 face-to-face interviews about individuals’ general and health-related internet use, and how this influenced their health perception and their help-seeking decisions. Many of these interviewees were recruited through their participation in the survey we used for the quantitative analysis: the Oxford Internet Surveys (2013). This is a random sample survey conducted biannually since 2003 using a traditional pen-and-paper method, with data on online and offline activities, attitudes, and skills for 2,150 internet users and non-users in England. The ethics committee of approved this study (number: ).

We recruited 31 interview participants from respondents to OxIS following a two-stage sampling process: first, we purposively selected 14 “output areas” (statistical areas of about 300 individuals formed based sociodemographic homogeneity) from OxIS to obtain areas with diverse urban/rural characteristics and area classifications; second, we contacted all OxIS participants in these output areas between July and November 2014, and the lead author interviewed all those who agreed to participate in this follow-up research. Using former OxIS participants as interviewees for the qualitative part allowed comparison of the qualitative and quantitative elements for
single individuals. An additional 12 interviewees were identified through purposive sampling in public spaces of the output area, and snowball sampling based on recommendations of OxIS participants in order to include particularly information-rich cases and improve the coverage of the population. As a result, the interviewees included in the final sample covered the full sociodemographic spectrum in terms of gender, age, education, NS-SeC (National Statistics Socio-economic Classification) and long-term conditions.

Except for two interviews in which the interviewees requested to talk on the phone, all interviews were conducted in person, mainly at the individuals’ homes, and partially in public cafés. Informed consent was obtained from each participant in writing (and orally for the two telephone interviews). For the analysis, the interviews were audiorecorded and transcribed by one of the authors. All interviews were manually coded, with codes emerging from the data to ensure that unexpected themes were not missed [21].

**Analytical approach**

Our mixed methods analytic approach was to identify constructs from the qualitative interviews which described motivations and enablers affecting how internet use shaped their health perception and health service use, and then to identify variables in OxIS which provided a quantitative measure of these constructs. We were then able to undertake a cluster analysis of these constructs using the numerical variables, and test a proposed typology of health information-seekers. The clustering was done using hierarchical clustering, determining the number of clusters based on the qualitative
observations and the dendrogram. The underlying distance measure was Ward’s linkage with squared Euclidean distances, since it provided better results than other hierarchical methods in general [22], and specifically for OxIS [23]. The clustering solution was evaluated based on within/between cluster distance and entropy [24], and by checking which individuals fall into which type based on the qualitative data. This was enabled by the use of the same individuals in both parts of the mixed methods design.

Results

Motivations and enablers

In line with the central role of antecedent factors for understanding internet use and its outcomes, we found five main motivations for health-related internet use emerged from the qualitative interview data: convenience and speed of access at all times; preparing for appointments; “translating” health professionals’ advice through non-medical terminology online; building up further health-related knowledge; and connecting with others to get peer advice. Enablers could be traced back to four interrelated prerequisites for using the internet in the qualitative data: devices to connect to the internet; general technical skills and health literacy; interest in using the internet; and appropriate opportunities for use.

Having identified these influence factors from the qualitative interview work, we mapped these on to variables which had been measured in the OxIS data, creating eight constructs for which we had quantitative data. First, constructs around Internet usefulness – the internet being an efficient means of finding information, making life easier and helping to save time – reflect the internet’s convenience. Second, the
motivation relating to interpreting and extending professional advice and building up further knowledge is encapsulated in individuals’ learning attitudes. Third, the motivations around building up further knowledge also reflected a certain level of online enjoyment: enjoying reading and understanding all about certain topics online. Fourth, people’s attitudes towards medical professionals were revealed in the motivation to check on the doctor, for which the quantitative concept of trust in medical doctors may be an acceptable reflection.

With respect to enablers, self-rated Internet skills conceptualise the skills dimension. Ideally one would additionally include a specific measure of health literacy to account for the ability to find and carefully interpret medical information online [25], which, however, was not available in the OxIS data. For the attitudinal aspect captured in the dimensions of interest and usage opportunities, Internet interest reflects an individual’s desire to access and use the internet. Technology attitude, about how individuals viewed the general upsides and downsides of technology, relates to the wider attitudinal aspects in relation to enablers. Finally, self-efficacy also reflects the health behaviour literature [26], capturing to what extent individuals consider themselves as actively shaping their health, which surfaced in several interviews.

A typology of health information-seekers

Having identified constructs qualitatively, and identified quantitative variables from the OxIS data that measured these, our next step was to conduct the cluster analysis using OxIS. Based on the dendrogram shown in Figure 1, different numbers of groups could have been justifiable, but six clusters were chosen as this reflected (and supported) the
qualitative findings. Indeed, over the course of the interviews, the findings increasingly indicated that individuals could be grouped into six different types in terms of their motivations and enablers, which in turn affected how the internet shaped their health perception and health service use.

The average within-cluster distance is smaller (2.5) than the between-cluster distance (4.3), with an entropy value of 1.7, so that the quality of the solution is in the range of other cluster models [24].

FIGURE 1: Dendrogram for hierarchical clustering of typology

Note: Percentages are taken from weighted OxIS data.

Based on the distribution of the constructs within each type, the six types were named

*the learners, the pragmatists, the sceptics, the worryers, the delegators* and *the*
**adigitals** (Figure 2). Despite a user/non-user split visible in the dendrogram, these types cut across users and non-users: 1-4% of individuals in the first four types are non-users (of which nearly all cited a lack of devices or skills as their main reason for non-use), while 28% of the delegators and 91% of the adigitals do not use the internet. All groups include those with long-term health conditions (between 10 and 20% across the first five types), particularly the adigitals (48%). The frequency of health information-seeking also differs, with the worriers looking up health information most frequently ($\mu=1.8$ on 5-item Likert scale).

**FIGURE 2: Typology of health information-seekers – cluster dimensions**

<table>
<thead>
<tr>
<th></th>
<th>Learner</th>
<th>Pragmatist</th>
<th>Skeptic</th>
<th>Worrier</th>
<th>Delegator</th>
<th>Adigital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning attitude</td>
<td>4.3 (0.4)</td>
<td>3.7 (0.5)</td>
<td>3.7 (0.5)</td>
<td>3.8 (0.5)</td>
<td>3.6 (0.7)</td>
<td>2.9 (0.7)</td>
</tr>
<tr>
<td>Online enjoyment</td>
<td>4.0 (0.4)</td>
<td>2.8 (0.4)</td>
<td>3.7 (0.6)</td>
<td>3.7 (0.7)</td>
<td>3.0 (1.0)</td>
<td>2.6 (0.8)</td>
</tr>
<tr>
<td>Trust in doctors</td>
<td>4.3 (0.7)</td>
<td>4.1 (0.4)</td>
<td>2.5 (0.8)</td>
<td>4.1 (0.4)</td>
<td>3.6 (1.2)</td>
<td>3.9 (1.0)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>4.3 (0.5)</td>
<td>3.9 (0.7)</td>
<td>3.6 (0.8)</td>
<td>2.7 (0.7)</td>
<td>3.8 (0.9)</td>
<td>3.7 (0.9)</td>
</tr>
<tr>
<td>Technology attitude</td>
<td>4.1 (0.6)</td>
<td>3.4 (0.6)</td>
<td>3.4 (0.5)</td>
<td>3.7 (0.6)</td>
<td>3.1 (0.6)</td>
<td>2.4 (0.6)</td>
</tr>
<tr>
<td>Internet usefulness</td>
<td>4.6 (0.4)</td>
<td>4.0 (0.4)</td>
<td>4.0 (0.5)</td>
<td>3.9 (0.5)</td>
<td>3.8 (0.7)</td>
<td>3.2 (0.8)</td>
</tr>
<tr>
<td>Internet skills</td>
<td>4.4 (0.7)</td>
<td>3.8 (0.9)</td>
<td>3.7 (0.7)</td>
<td>4.2 (0.7)</td>
<td>3.4 (0.7)</td>
<td>1.2 (0.4)</td>
</tr>
<tr>
<td>Internet interest</td>
<td>4.6 (0.5)</td>
<td>4.3 (0.5)</td>
<td>4.1 (0.4)</td>
<td>4.6 (0.5)</td>
<td>1.7 (0.5)</td>
<td>1.1 (0.2)</td>
</tr>
</tbody>
</table>
Note: All values follow the notation: “mean [standard deviation]”. The diagram shows the divergence from the arithmetic mean for each of the clustering dimensions. All constructs are measured on 5-item Likert scales.

To delineate the types using the clustering dimensions and further sociodemographic characteristics, Table 1 presents a logistic regression on each type. It shows sociodemographic features are less informative for determining individuals’ types, and illustrates that individuals are not deterministically assigned a type, but rather have a higher probability of falling into one type or another based on their antecedent factors. Returning to the qualitative interview data, a representative of each type is introduced in more detail below.

TABLE 1: Logistic regression for types of health information-seekers (odds ratios)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Types of health information-seekers</th>
<th>Learner</th>
<th>Pragmatist</th>
<th>Sceptic</th>
<th>Worrier</th>
<th>Delegator</th>
<th>Adigital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning attitude</td>
<td>1.83***</td>
<td>0.94</td>
<td>0.55***</td>
<td>0.51***</td>
<td>1.44*</td>
<td>0.15***</td>
<td></td>
</tr>
<tr>
<td>Online enjoyment</td>
<td>5.32***</td>
<td>0.45***</td>
<td>1.07</td>
<td>1.13</td>
<td>1.35*</td>
<td>0.13***</td>
<td></td>
</tr>
<tr>
<td>Trust in doctors</td>
<td>2.76***</td>
<td>1.21**</td>
<td>0.10***</td>
<td>3.80***</td>
<td>0.97</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>5.14***</td>
<td>3.02***</td>
<td>0.44***</td>
<td>0.05***</td>
<td>0.81</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>Technology attitude</td>
<td>1.86***</td>
<td>0.54***</td>
<td>0.56**</td>
<td>0.79</td>
<td>0.82</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Internet usefulness</td>
<td>1.80***</td>
<td>0.71***</td>
<td>0.43***</td>
<td>2.70***</td>
<td>2.68***</td>
<td>0.30**</td>
<td></td>
</tr>
<tr>
<td>Internet skills</td>
<td>3.99***</td>
<td>0.60***</td>
<td>3.04***</td>
<td>0.55*</td>
<td>73.69***</td>
<td>0.00***</td>
<td></td>
</tr>
<tr>
<td>Internet interest</td>
<td>4.14***</td>
<td>17.98***</td>
<td>14.15***</td>
<td>20.03***</td>
<td>0.00***</td>
<td>0.00***</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.04</td>
<td>1.15</td>
<td>1.18</td>
<td>0.88</td>
<td>0.59**</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1.06</td>
<td>1.00</td>
<td>1.06</td>
<td>1.90</td>
<td>1.25</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.88</td>
<td>1.17</td>
<td>1.09</td>
<td>0.94</td>
<td>0.98</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>NS-SeC</td>
<td>1.04</td>
<td>0.98</td>
<td>1.10</td>
<td>0.98</td>
<td>0.83</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Long-term condition</td>
<td>0.92</td>
<td>0.90</td>
<td>0.92</td>
<td>0.93</td>
<td>0.78</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td><strong>0.73</strong></td>
<td><strong>0.48</strong></td>
<td><strong>0.62</strong></td>
<td><strong>0.71</strong></td>
<td><strong>0.77</strong></td>
<td><strong>0.98</strong></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2,150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Largest condition index</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The learners have a strong desire to understand health better, and use the internet to make decisions about whether they need to see a professional, and to learn about their and others' health. Miriam (58, NS-SeC class 2, education level 2 of 4), who has had a minor stroke and arthritis, is an example of this group. Before and after seeing the doctor, she usually reads everything she can find, in line with the generally high learning attitude of the learners ("The doctors give you the basic information that you need to know, this is what it's called, [but] it explains a lot more on the internet."). Consequently, she also reduced her health service use ("I still do go back to that and rather than go to the doctors and say, well this has happened [...] I would go on there and reread through it."). Reflected by the high level of online enjoyment and skills, Miriam also enjoys looking up health information, also for other people’s conditions ("I do like to read up on these, so I see if there’s something I haven’t got, just see how people [...] deal with a situation"). Miriam also set herself up as a "lay expert" for other people in her social circle ("If somebody’s brought something up that something’s happened to them, I tell them that I would give them my point of view once I’ve read up on it on the internet.").

The pragmatists primarily used the internet to decide whether it was worth seeing a doctor. For example, Hugh (45, NS-SeC class 1, education level 4) primarily
wants to make quick decisions about health service use and the required urgency, with a low level of enjoyment (“I would use it just to kind of get a handle on whether it’s worth going to the doctor or not, not for kind of detailed self-diagnosis.”). Hugh also showed high skills and high trust in doctors combined with professional respect (“I might challenge [the doctor], but I let him to give his diagnosis first. […] You have to rely on the expertise of the professional first.”). Like other pragmatists, Hugh does not want to share and discuss health problems online, but valued official information and online health services (“I wouldn’t be any more concerned about privacy or security than with internet banking.”). Like Hugh, many pragmatists showed a high understanding of the need for new approaches to health provision (“I’m all for putting less pressure on the health service through faster [and] more efficient forms of medical support […] [but] in Britain people are very proud of their health service… [it’s] sacred ground.”).

In contrast, the sceptics are sceptical of physicians and the medical system and value the Internet for solving health problems that doctors may not be able to deal with, as Brian (53, NS-SeC class 1, education level 3) openly shows (“The doctors are more and more useless now as time goes on […] [online] there’s forums and you can cross-reference things a bit better, rather than [depend on] the opinion of one person like the GP.”), also due to the availability of user-written information. Brian thought the internet reduced his health service use overall (“Probably if I didn’t have the information via the internet, maybe I would need to go and see the doctor more often.”), although he also provided examples of increased health service use (“I have high blood pressure, and [the doctor] said that’s nothing to worry about. […] So I took my own blood pressure...”)
readings [...] went back to the doctor, and he said, okay, I’ll give you some blood pressure tablets.”). In general, the sceptics mainly saw the doctor’s role as a provider of medication.

The **worriers** found it difficult to interpret health information online, describing health information-seeking online as frightening, and reporting a critical attitude towards it despite doing so frequently. Helen (43, NS-SeC class 1, education level 4) suffers from epilepsy and enjoys browsing through health topics (“It's not necessarily about epilepsy, it's other things. I can spend ages on it, going on things that aren’t relevant to me, but I can also really forget most information.”). However, health information makes her feel afraid (“I'm afraid of what I might find. If you’re on your own and look at a website, and find something really bad, [it’s] really dangerous.”). In line with low self-efficacy of this group, Helen does not proactively want to address epilepsy (“I haven’t brought up [my childrens’ potential epilepsy] with my doctors. Because I think I’m afraid to do it. And I haven’t looked on websites because it’s very personal.”). She exhibits high trust in her doctors (“It’s really important that you work with your doctors and your specialist and not go on the website, because it could really make it worse.”), showed a strong normative attitude about health information online (“I only really look up official websites [...] I’ve always been told by people not to look up healthcare [...] because you always see the horror stories”) and expressed she would value recommendations about specific websites from her doctors.

The **delegators** are composed of non-users and users valuing the internet as an information-source, but not necessarily wanting or being able to use the internet themselves. Kathleen (75, NS-SeC class 1, education level 0) had elaborate networks to
access health information ("I can go and get it from the library. [...] If I really do want more, I’ve got a friend in London who’s got a computer, and she would [...] phone me back and tell me or she’ll send it down to me."). Kathleen also actively read health information in the local paper, showing her interest in health and feeling responsible for her wellbeing. While trust in doctors was different among delegators, as evidenced by the high standard deviation in this group, Kathleen placed high trust in her doctor, and – illustrating again the delegation aspect – valued that he followed up newspaper articles that she took into the consultation ("He doesn’t just do it like from what it says in the paper [...] but takes it home and googles it on his computer.")

The last group of adigitals comprises many non-users, but also users, who do not see the internet as a useful information tool and presented strong views on its low suitability for healthcare. Charlotte (78, NS-SeC class 2, education level 0) is a non-user, and generally does not like to work with technology, also due to health-related reasons ("My fingers have never worked in a way that I can use a keyboard of any sort, piano, computer keyboard, I can’t separate them. So I lost patience."). For health information, she would either ask the doctor, but above all thought that she knew what was best for her ("In most ways you know your own body. [...] I follow] just my own instincts. And I found out that they never let me down, fortunately.”). While the adigitals did not show a consistent picture in terms of trust in medical professionals, they generally expressed concerns about how people use the internet for health information
(“They’ll worry themselves into goodness knows what and they do the same on the computer – as soon as she sneezes she looks it up on the computer.”)

Discussion

In line with the shifting digital divide from the access to the usage divide [3,15], this research supports a further shift to conceptualising an “outcomes divide” or “outcomes inequalities”, whereby different types of internet user derive differing benefits from their use. In contrast to the existing literature [4], the outcomes divide proposed in this paper may only partially be traced back to sociodemographic factors, as understanding outcomes requires a more nuanced view not necessarily following the user characteristics underlying the several existing digital divide conceptualisations [27].

Instead, this paper showed the central role of antecedent factors to internet use for deriving outcomes. The qualitative data confirmed motivations [28,29] and enablers [30] found in previous research, and indicated that outcomes may be shaped by types of health information-seekers formed based on these motivations and enablers. This confirms that previously existing health behaviours translate to the online realm [28,31,32], as well as an emphasis on attitudes and skills as mediators for internet outcomes [17]. In that sense, online health resources become part of normal health practices, help-seeking, and everyday life information-seeking [33-35]. This ties in with the wider argument that individuals use technologies to satisfy existing needs, with technological innovation merely creating new ways of doing so [36], as reflected in theories around the social shaping of technology [37].
The qualitative data suggested that two of our six types: the learners and the pragmatists, use the internet efficiently in health-related contexts, both to increase the appropriateness of their health service use and – in the case of the learners – to gain self-efficacy for self-care and extending professional advice. In that sense, individuals in both groups consistently gain benefits from using the internet.

Then again, outcomes do not necessarily have to be positive. For the sceptics, the relationship to perceived health was negative, which may indicate that using the internet was less beneficial than the sceptics thought. In support of this, other research found that low-trust individuals tended to substitute physician services through health information online [38,39], and while those sceptical towards medical care had lower health service use, they also often showed worse health behaviours and lower health perception [40,41]. For the worriers, internet use was barely associated to any changes in perceived health and health service use. While health information-seeking does not necessarily lead to higher health service use and worse health perceptions, the findings indicated that this group did not necessarily realise any outcomes, partially because they stopped looking up health information as a consequence.

Finally, the effects of internet use were lowest for the delegators and the adigitals, although with higher effect sizes for the former. Some non-users in the delegator group used the internet more intensely (via intermediaries) than users, building support networks with different individuals for different purposes. While both the delegators and the adigitals are largely comprised of non-users, this shows how internet outcomes may not follow the lines of the users/non-user split. This is further corroborated by the relatively similar outcomes for users and non-users in the delegator
group, which may partially be due to their preference for outsourcing health-related information-seeking.

The typology introduced in this research therefore presents a tool for systematising orientations towards health information-seeking to conceptualise the outcomes divide. This is similar to other typologies in research on health and internet use [42,43], which serve to “shift study of the internet away from an overly narrow focus on comparing users and non-users, and [focus] more research and debate on other variations among users and non-users that have equally significant implications for the future of the internet” [23, p.9].

A limitation of our approach is that for 6 of the 31 OxIS interviewees, the quantitative and qualitative classification did not correspond, so that these were manually reclassified based on the qualitative data. There are three reasons for this mismatch: First, in line with the process-based models of perceived health [44], individuals may transcend the type boundaries over time, which became evident in two interviewees’ altered views of the health system after major health incidences. Second, the typology lacks specificity due to the non-availability of health-related items such as health literacy. Even though health information-seeking is similar to other informational activities online [45], two interviewees had particular attitudes about health online that differed from their general internet views. Third, two interviewees showed different attitudes in the interview for no evident reason, which highlights the constructed nature of survey and interview data, and the challenges of their triangulation. This ties in with the wider limitation of using a dataset derived through spatial microsimulation with no one-to-one relationship between observations for single individuals.
Further research should attempt to replicate and/or refine the developed typology, ideally with health-related dimensions by including more specific constructs around health literacy and health-related self-efficacy [7,46,47]. Due to transitions of individuals between types over time, the typology should also be based on longitudinal measurements on the same individuals from multiple points in time, as individuals may develop and fall into different types following different events in their lives. For the broader context of internet research, it would be relevant to understand whether the established typology also describes orientations that are relevant for other internet-based outcomes. This would cross-validate the results of this research, and thereby provide theoretical support for a more general outcomes divide beyond the health context.

These type-based findings have implications for policy and practice, particularly for health systems seeking to maximise digital inclusion. A multi-faceted approach is required to address the differing needs of the six types. Non-users of the learner and pragmatist type in particular should be provided with access to digital resources, as most individuals of these types cited the non-availability of devices as the main reason for non-use. In addition, worriers may benefit from additional guidance: they highly appreciated medical professionals, and suggested that doctors should recommend specific websites reflecting their preference for professional guidance and managing uncertainty [48]. They would, for example, use initiatives which provide official endorsement or certification of digital resources and health apps. This stands in contrast to the sceptics, who – independently of the internet – might benefit from building up trust in doctors and the medical system to change their health behaviours, evaluate the
appropriateness of health service use, and ensure compliance with medical recommendations [39,40].

Particularly for delegators, but also for all others with lower skills, the social environment is of crucial importance for internet-based outcomes. As the name implies, obtaining value from the internet depends on being able to delegate. Here, addressing social and digital inclusion becomes a joint priority, where not everyone has to be online, but everyone should benefit from online resources. Finally, for the adigitals, it may be most important to address motivations for internet use. This applies to users and non-users alike: 80% of non-users of this type have referred to a lack of interest as the main reason for non-use, whereas users mainly explained why the internet was not suitable for health-related matters.

Conclusion

This research showed how internet-based health outcomes in terms of perceived health and health service use may be conceptualised based on a typology of six orientations towards online health information-seeking. The findings illustrate that the digital divide is increasingly more complex to delineate [49], indicate that previously existing health behaviours transcend to the online realm [31], and support the shift towards an “outcomes divide” in terms of the benefits that individuals of differing types obtain online [4]. This research also showed that outcomes are primarily shaped by antecedent factors such motivations and enablers [3,17], rather than sociodemographic factors [4]. This research therefore makes one of the first empirical contributions to an emerging
literature assessing how differences in outcomes represent the next stage of continuously shifting digital inequalities.
References:


8 Sillence E, Briggs P, Harris PR, Fishwick L. How do patients evaluate and make use of online health information? Social Science & Medicine 2007;64(9):1853–1862. PMID: 17328998 DOI: 10.1016/j.socscimed.2007.01.012


http://doi.org/10.1111/j.1468-2885.2012.01416.x

http://www.webcitation.org/707aUnfEW


Fergus TA. Cyberchondria and intolerance of uncertainty: examining when individuals experience health anxiety in response to Internet searches for medical information. Cyberpsychology, Behavior, and Social Networking
2013;16(10):735–739. PMID: 23992476 DOI: 10.1089/cyber.2012.0671

van Dijk JA. The deepening divide: Inequality in the information society.
http://dx.doi.org/10.4135/9781452229812