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1 **Running head:** CONSUMER EVALUATIONS OF PERSONALISED NUTRITION SERVICES

2  
3 **Understanding consumer evaluations of personalised nutrition services in terms of the**  
4 **privacy calculus: a qualitative study**  
5

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## Summary

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**Background:** Personalised nutrition (PN) may provide major health benefits to consumers. A potential barrier to the uptake of PN is consumers' reluctance to disclose sensitive information upon which PN is based. This study adopts the privacy calculus to explore how PN service attributes contribute to consumers' privacy risk and personalisation benefit perceptions.

**Methods:** 16 focus groups ( $N = 124$ ) were held in 8 EU countries, and discussed 9 PN services that differed in terms of personal information, communication channel, service provider, advice justification, scope, frequency, and customer lock-in. Transcripts were content analysed.

**Results:** The personal information that underpinned PN contributed to both privacy risk perception and personalisation benefit perception. Disclosing information face-to-face mitigated the perception of privacy risk and amplified the perception of personalisation benefit. PN provided by a qualified expert and justified by scientific evidence increased participants' value perception. Enhancing convenience, offering regular face-to face support, and employing customer lock-in strategies were perceived as beneficial.

**Conclusion:** This study suggests that to encourage consumer uptake, PN has to account for face-to-face communication, expert advice providers, support, a lifestyle-change focus, and customised offerings. The results provide an initial insight into service attributes that influence consumer uptake of PN.

**Keywords:** Personalised nutrition, consumers, adoption, privacy calculus, business models, focus groups, Food4Me

45 **Introduction**

46

47 As nutritional needs are known to differ within a population [1,2], nutritional intake  
48 recommendations differentiate for population segments such as children, adults, pregnant women  
49 and diabetics [3,4]. Technological advances in the fields of Genomics, Transcriptomics,  
50 Proteomics and Metabolomics [5,6] make it possible to further specify nutritional intake  
51 recommendations by tailoring them to individuals rather than sub-groups of a population. A  
52 detailed overview of the technological advances and their applications is provided by García-  
53 Cañas et al. [7].

54 The individual approach to dietary intake recommendations, called personalised nutrition  
55 (PN), is often associated with Nutritional Genomics [8-10]. Comprising both Nutrigenomics (i.e.  
56 the influence of nutrients on gene expression) and Nutrigenetics (i.e. the influence of genes on  
57 the response to nutrients), Nutritional Genomics studies the relationship between the genome,  
58 nutrition, and health [11]. PN is, however, not limited to the application of DNA [12]. It can also  
59 be based on phenotypic information such as blood chemistry, weight and height, or lifestyle  
60 information such as dietary intake [13,14].

61 Individually tailored dietary recommendations may be associated with major health  
62 benefits. Compared to advice aimed at population segments, tailoring dietary recommendations  
63 to the individual not only generates more appropriate recommendations, but it also increases the  
64 perceived (added) value of the recommendations in the eyes of the consumer [15]. In turn, such  
65 increased value perception is likely to contribute to higher levels of involvement in, satisfaction  
66 with and loyalty to personalised dietary recommendations [16-18]. The current drive for  
67 preventive PN applications comes from commercial enterprises, which are not necessarily

68 supported by regular health care services [19,20]. This implies that the uptake of PN largely  
69 depends on Direct-to-Consumer advertising rather than medical prescription. Regardless of the  
70 ethical desirability of Direct-to-Consumer PN applications and the need to regulate this  
71 development [21], at this stage it is reasonable to expect that the potential benefits of PN depend  
72 on the uptake and adoption of PN by consumers.

73 Central to the concept of PN is the use of personal and potentially sensitive information  
74 about the individual to generate personalised dietary recommendations. Once PN has reached its  
75 maturity, the specificity and with that value of the dietary recommendations will depend on the  
76 individuality and detailedness of the available information [22]. Receiving highly relevant and  
77 personalised dietary recommendations (i.e. personalisation benefit) will, therefore, come at the  
78 price of disclosing very personal and potentially sensitive information (i.e. privacy risk) about the  
79 self. With DNA being the most, and lifestyle being the least, personal and sensitive form of  
80 information.

81 In the Information Systems literature [23-25], tension between information disclosure  
82 risks and information disclosure benefits is considered typical for many (personalised) services,  
83 and is often dissolved in the privacy calculus. The privacy calculus [26,27] is a trade-off between  
84 information disclosure risk and associated (personalisation) benefits, which assumes that  
85 consumers will agree to disclose sensitive information about themselves as long as they expect to  
86 benefit from it. With the emergence of online banking, shopping, and governance, the privacy  
87 calculus has gained broad attention in the Information Systems literature. Nevertheless, it has not  
88 yet been widely used in relation to health. Limited evidence, however, shows that the privacy  
89 calculus can be relevant to the health domain [28-30] (figure 1).

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---INSERT FIGURE 1 HERE---

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Since PN advice cannot be generated without personal information, reducing the risk-benefit tension by fully removing the risk component is impossible. Consequently, ensuring that during the privacy calculus personalisation benefits will exceed privacy risks can only be achieved by mitigating privacy risk perceptions and/or amplifying personalisation benefit perceptions [31,32]. Hence, to consolidate the uptake of PN an acceptable balance between privacy risks and personalisation benefits needs to be established. Such balance may be created by focusing on the process of PN provision. The provision of PN is characterised by an information exchange process between a consumer and a service that generates PN advice [22]. This information exchange process involves three critical stages: 1) the consumer discloses personal information to the PN service; 2) using the personal information the PN service generates nutrition advice and initiates arrangements that stimulate consumers to adhere to the advice; and 3) the PN service provides the nutrition advice to the consumer. The three stages have been identified as essential elements of PN business models, of which nine “archetypes” (Table 1) are currently present in the market place [19].

---INSERT TABLE 1 HERE---

114 To date, none of the commercial PN services available in the market place seems to have  
115 succeeded in attracting large groups of customers [19]. This suggests that none of the current PN  
116 services has managed to create a widely acceptable balance between privacy risks and  
117 personalisation benefits. Building on the nine archetypical PN business models, this study aims  
118 to explore consumer evaluations of PN services and clarify how these evaluations contribute to  
119 an individual's privacy calculus. Such an understanding will provide guidance for the  
120 development of PN services that are considered worthwhile by consumers. Ultimately, an  
121 increased uptake and adoption of PN services could improve public health and thus contribute to  
122 both economic and social wealth. As improved public health is a vital goal for all EU member  
123 states [33-35], data was collected in eight EU countries.

124

## 125 **Methods**

126

### 127 *Design and participants*

128

129 Sixteen focus groups were held; two in each of 8 European countries (Greece, Spain, the  
130 Netherlands, Ireland, UK, Germany, Poland, and Norway) that were selected for this study. All  
131 124 participants were recruited through a market research company or the national data collection  
132 centres. Participants perceived themselves as healthy and were aged 18-65. Socio-demographics  
133 are provided in Table 2. Ethical approval was granted in accordance with international standards,  
134 and written consent was obtained from all participants.

135

136

137

---INSERT TABLE 2 HERE---

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145           The focus groups followed an extensive semi-structured interview protocol. The protocol  
146 was developed in English and translated into Dutch. The Dutch protocol was piloted in a focus  
147 group of 7 participants. The pilot study resulted in some minor amendments that were  
148 incorporated into the English protocol. The English protocol was translated into the national  
149 languages of the participating centres.

150           A local moderator and observer were assigned to conduct the focus groups within each  
151 centre. All moderators were trained to use the protocol during a two day workshop. The focus  
152 group discussions were audio-recorded and transcribed verbatim. Participants' individual  
153 deliberations were captured in a response booklet.

154           To assure translation quality, the protocol, transcripts and individual deliberations were  
155 checked by means of back-translations [36], following which translations were adjusted.

156

### 157 *Stimuli and materials*

158           Nine flyers representing fictitious PN services based on the business models identified by  
159 Ronteltap et al. [19], were used to facilitate discussion. Each flyer included all service attributes  
160 that are relevant for the three information exchange process stages (see Figure 2). Flyers were  
161 shown to the participants in three sets of three flyers. Per flyer set, only the service attributes that  
162 related to a particular information exchange stage varied across the flyers. The service attributes  
163 that did not represent the stage explored in a flyer set remained unvaried, with minor variations to  
164 enhance the realness and credibility of the flyers. The first flyer set contained flyers that differed  
165 with regard to the service attributes “personal information” (dietary intake, phenotype, DNA) and



166 “communication channel” (online, mail, personal contact). The second flyer set differed on the  
167 service attributes “service provider” (dietitian, company, government/employer), “advice  
168 justification” (scientific evidence, alternative medicine, success stories) and “customer lock-in”  
169 (high initial payment followed by cheap follow up, support group, free service dependent on  
170 good results). The third flyer set varied on the service attributes “advice scope” (diet plan, diet  
171 plan/exercise plan/personal food preferences, diet plan/exercise plan/shopping list/exercise  
172 facilities/lifestyle advice), “advice frequency” (one-off, once every 3 months, once a week) and  
173 “communication channel” (online, mail, personal contact). Table 3 provides an overview of the  
174 stimulus material.

175

176

177 ---INSERT FIGURE 2 HERE---

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181

182 ---INSERT TABLE 3 HERE---

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185

186 *Data generation procedure*

187

188 Participants were welcomed to the focus group. The moderator, observer and participants,  
189 introduced themselves. The moderator explained the ground rules (e.g. only one person speaks at  
190 a time) of the discussion.

191 As a warm-up, each participant wrote three words or short sentences about what PN  
192 meant to him/her in the provided response booklet. Half way through the warm-up, the definition  
193 of PN (i.e. healthy eating advice that is tailored to suit an individual) was presented to the

194 participants. Participants were invited to voice their understanding of PN. All words or phrases  
195 that were mentioned aloud were written down on a flipchart.

196 After the warm-up, printed A5 full colour flyers were handed to the participants one set at  
197 a time. Participants ranked the flyer sets individually, and recorded the rankings and reasons for  
198 their preferred order in the response booklet. Then individual preferences were compared and  
199 discussed within the group. When relevant or new discussion points ceased to emerge, the next  
200 set of flyers was introduced. There was a 10 minute break between the second and the third flyer  
201 set.

202 After all three flyer sets had been discussed, all nine flyers were ranked simultaneously.  
203 Each participant individually listed one flyer as "best" or "worst", two flyers as "moderately  
204 good" or "moderately bad" and three flyers as "neutral" in his/her response booklet. This ranking  
205 method was inspired by the Q-sort methodology [37]. A group discussion on the best and the  
206 worst flyer followed. To close the discussion, participants were asked to describe their "ideal"  
207 PN service. Table 4 provides an overview of the focus group protocol.

208 Each focus group consisted of 5-10 participants and lasted approximately 2.5 hours.  
209 Participants received a monetary payment equivalent to €35 as a compensation for their time.

210

211

212 ---INSERT TABLE 4 HERE---

213

214

215

216 *Data analysis*

217

218 First, the individual opinions written down in the response booklets were content coded  
219 using a predefined coding scheme that consisted of all service attribute levels (e.g. personal  
220 contact, dietitian, DNA) (see Table 3). Opinions were coded according to positive and negative  
221 attribute level evaluation. Positive codes were assigned to arguments for ranking a flyer as  
222 “best”. Negative codes were assigned to arguments for ranking a flyer as “worst. If a participant  
223 ranked a flyer as “worst”, but clearly stated that he/she liked one of its attribute levels, the  
224 attribute level was coded as positive and vice versa. If a participant evaluated the presence of an  
225 attribute level as positive, and the absence of that same attribute level as negative, only the  
226 positive evaluation was coded.

227 Second, discussion transcripts were content analysed starting from the code book that was  
228 used for the analysis of the individual opinions, but allowing for the identification of new codes.  
229 Transcripts were examined for rationales underpinning positive and negative attribute level  
230 evaluations. In order to form code families, three of the authors discussed how to assign the  
231 codes to the eight service attributes that were incorporated in the flyers. To limit the impact of  
232 isolated remarks, codes had to occur in at least two different focus groups. Data saturation was  
233 reached, as the last two transcripts did not generate any new codes.

234

235

## Results

236

237 Based on the total sample ( $N=124$ ), a clear pattern of preferred services emerged (Table  
238 5). Across all countries, the “health club” (52%) or the “face-to-face” (27%) service stood out as  
239 most preferred business models. Identifying the “health club” and the “face-to-face” services as  
240 the two most appreciated services was consistent across countries, with small deviations. For

241 example, in the Netherlands the “employee lifestyle guidance” was among the two most popular  
242 services, while in Spain the “standing strong together” service was one of the two favourite  
243 services. Table 3 provides detailed information regarding the content of the different services.

244

245

246

---INSERT TABLE 5 HERE---

247

248

249

250 Opinions regarding the “worst” service were more diverse. Across all countries, however,  
251 the “all-in-lifestyle guidance” and the “employee lifestyle guidance” services stood out as the  
252 least appreciated business models. Spanish participants (81%) were particularly averse to the  
253 “employee lifestyle guidance” service. The Polish, German, and in particular the Dutch  
254 participants seemed to hold less negative attitudes towards the “employee lifestyle guidance”  
255 service. Spanish, German and Norwegian participants also seemed to hold less negative attitudes  
256 towards the DNA-based “all-in lifestyle guidance” service. Finally, the majority of the  
257 Norwegian participants (55%) chose the “standing strong together” service as the worst service,  
258 while in all other countries opinion regarding the “standing strong together” service were positive  
259 or mixed.

260

261 *Disclosing personal information*

262

263 Individual opinions about *personal information* show that PN based on phenotype (e.g.  
264 blood, height, weight) generated unanimously positive opinions. Remarks regarding dietary-

265 intake-based PN were mixed in terms of valence. Comments concerning DNA-based PN were  
266 primarily negative, although a few participants expressed positive associations with DNA-based  
267 PN (Figure 3).

268

269 ---INSERT FIGURE 3 HERE---

270

271

272 In the group discussions participants indicated that medical tests are required to make PN truly  
273 personalised. Phenotypic information was considered a good foundation for PN, because  
274 measures such as weight, height and blood seemed very familiar, medical and informative about  
275 health:

276

277 *“But blood actually tells a lot about someone’s state of health and I think everyone is used to going to*  
278 *the doctor for a blood test, it does at least have a context.”*

279

280 (Germany)

281

282

283 Even though dietary intake should be accounted for during the development of a PN advice,  
284 dietary intake alone was considered too general to establish a proper personalised diet plan. With  
285 regard to DNA, participants often did not understand how DNA could contribute to the  
286 development of PN:

287

288 *“I thought that my DNA has little to do with my food. DNA has been determined at birth. So that has*  
289 *little to do with healthy eating.”*

290

291 (The Netherlands)

292

293

294 In addition to not understanding how DNA could contribute to PN advice, taking a DNA test at  
295 home without the help of a professional was regarded as unreliable or even impossible.  
296 Furthermore, DNA was seen as very personal and privacy intrusive. Mailing DNA to an  
297 unknown company, as was the case in the “All-in lifestyle guidance” service, was unacceptable.  
298 To prevent misuse of sensitive information like DNA, participants preferred to disclose DNA  
299 face-to-face, on location, to someone whom they trusted (i.e. hospital, doctor or dietitian):

300

301 *“That you do the DNA test yourself and send it by mail and then you have no idea who receives it. I find*  
302 *that a bit disturbing.”*

303  
304  
305

(Norway)

306

307 With regard to the *communication channel* individual opinions indicated that personal  
308 contact stood out to the participants as a positive and vital service attribute level. Online  
309 communication and communication through mail were hardly mentioned by participants (Figure  
310 3). Results from the group discussions point out that perception of the vital role of personal  
311 contact was engendered by the belief that being able to meet the service provider would increase  
312 the trustworthiness of the service:

313

314 *“I would not want to provide my personal information to anyone online who I don’t know, a company I*  
315 *don’t know... if I had to choose one it would be flyer 3 [the service where] I’m actually going to see*  
316 *someone.”*

317  
318  
319  
320

(UK)

321 Furthermore, personal contact made communication easier and more flexible, since it allowed for  
322 the use of, for example, body language. In addition, personal contact encouraged participants to  
323 reveal honest and complete information about themselves. Being able to communicate with the

324 service provider face-to-face, therefore, assured participants that their PN advice would be based  
325 on accurate and complete information:

326  
327 *“I assumed when I saw “personal interview” that I would be able to add in anything that I thought was*  
328 *important that might not have gone on the website form.”*  
329  
330 (Ireland)

331  
332  
333 The fact that personal contact was vital and highly appreciated did not dismiss internet  
334 communication. Communicating via the internet was perceived as convenient and by no means  
335 an obstacle as long as it was supported by personal contact. However, communicating via the  
336 internet was perceived as being unfeasible to those unable to use the internet:

337  
338 *“(…) older people would struggle more with Internet, or with receiving emails or writing them, than*  
339 *people who are working. (...) I’m not sure if my mother could write an email.”*  
340  
341 (Germany)  
342  
343

344 In summary, participants were highly sceptical about the extent to which different types  
345 of personal information, and the way they were measured, are suitable to generate a valuable and  
346 personalised dietary advice. Furthermore, in the case of DNA, the concern of possible  
347 information misuse emerged. Disclosing information in person increased participants’ trust in the  
348 service and as a result decreased the perception of potential privacy loss.

349  
350 *Generating advice and advice adherence*

351

352           The individual opinions relating to the *service provider* suggested that the involvement of  
353 a qualified expert (e.g. dietitian) was perceived as positive and highly appreciated. Opinions on  
354 the employer and the government as service providers were most often negative. Comments  
355 regarding an independent company as service provider were hardly made (Figure 4).

356

357

358

359

---INSERT FIGURE 4 HERE---

360

361 According to the group discussions, participants agreed that PN should be provided by a  
362 trustworthy, qualified, expert advice provider. Factors that contributed to the trustworthiness of a  
363 provider were credentials, positive word-of-mouth and portrait images. A physician was not  
364 always considered to be a qualified expert, because (s)he would neither have the time nor the  
365 expertise to discuss nutritional problems. Views on the government as a service provider were  
366 divided. Some participants supported the involvement of the government, because the  
367 government seemed to be trustworthy. Other participants did not favour the involvement of the  
368 government, as the government was considered to have a hidden agenda:

369

370

371

372

373

*“It’s very Big Brother is watching you.”*

(UK)

374 Also on the subject of the employer as an advice provider, opinions were divided. Participants  
375 who regarded an employer’s involvement as positive argued that it was nice to see an employer  
376 care for his/her employees. Another advantage of the involvement of the employer was that it  
377 was good to have an intervention in the workplace, so that one could combine PN with one’s job  
and have the support of colleagues. Participants who considered the involvement of the employer



378 as negative thought that the employer could not be trusted and stated that they did not want to be  
379 treated as a workhorse or lose their job. Another argument against the involvement of an  
380 employer was that PN should not be forced upon employees as it has nothing to do with the  
381 workplace. Lack of privacy and the service only being available to employed individuals were the  
382 final two reasons for the dismissal of employer-driven services.

383

384 Individual opinions concerning *customer lock-in* reflected an almost equal division  
385 between opponents to and advocates for support group meetings as a way to generate advice  
386 adherence. Not having to pay for the service dependent on good results was mainly perceived as  
387 a negative lock-in, but simultaneously also accounted for positive reactions. Monthly  
388 subscription fees and paying a substantial amount of money for the first consultation while  
389 receiving a discount on the following consultations did not receive much attention from the  
390 participants (Figure 4).

391 Group discussions show that the strong polarisation on support group meetings was caused by  
392 the individual difference of wanting to share personal matters with a group. Not having to pay for  
393 the service dependent on good results was regarded as a customer lock-in that could stimulate  
394 advice adherence by increasing motivation to comply:

395

396 *“A plus to it was that the Human Resources department contributed to it, that could be a great*  
397 *motivational factor if you did not have to pay 2600 kroner.”*

398

399 (Norway)

400

401 Nevertheless, opponents of this lock-in argued that it had a very negative vibe. Not having to pay  
402 dependent on good results was very threatening, almost like blackmail. It was also quite risky,  
403 because at the end one might end up paying a large amount of money. Not wanting to pay for the

404 service might even drive a person to extremes such as starvation. Not having to pay for a service  
405 also implied that the service provider could let someone fail on purpose just to obtain the money:

406

407 *“The main objective of a company is to earn money, so if they're telling you they are going to earn*  
408 *money if you don't get [good] results, I think, they are going to do something in order to not make me*  
409 *succeed .”*

410

411

(Spain)

412

413 Additionally, the lack of clarity concerning what constitutes “good results” and who would

414 define “good results” was raised as an argument against a lock-in dependent on good results.

415 According to some participants having to pay a substantial amount of money in order to get PN

416 advice was strong lock-in. Furthermore, the possibility of having to pay for a PN advice also

417 served as an indicator of quality:

418

419 *“I always think that when something is for free it's not worth the money. Then it's something you*  
420 *wouldn't value a lot.”*

421

422

(Norway)

423

424 Participants claimed that their commitment to PN would be highest if they would see that the

425 advice really works.

426

427 Individual opinions with regard to applied *advice justifications* did not evoke many

428 comments. There seemed to be a tendency to dislike alternative medicine as PN advice

429 justification (Figure 4).

430 Group discussions revealed that alternative medicine and organic products were two service  
431 attribute levels that stood out to the participants, in both a positive and a negative way. Some  
432 participants were quite interested in, and in favour of, alternative medicine:

433

434 *“Alternative medicine is interesting, I’d really like to hear something on that topic, and organic products*  
435 *too.”*

436

437

(Poland)

438

439 Participants who did not appreciate the idea of PN advice that is justified by alternative medicine  
440 and organic products argued that such advice is more expensive, vague, unreliable, and not  
441 scientific.

442

443

444 The few remarks that were made about success stories pointed out that participants liked reading  
445 success stories, but that they did not regard successes stories as a reliable advice justification:

446

447 *“Success stories always make me suspicious you know, because you wonder do they just sit down and*  
448 *make up this stuff.”*

449

450

(Ireland)

451

452 To summarise, PN being provided by a qualified expert increased participants’ value  
453 perception of the dietary advice. Furthermore, value perception was determined by the approach  
454 that justified the advice. Stimulating advice adherence was perceived as beneficial as long as it  
455 fitted the individuals’ views and personality. Being able to trust the service provider determined  
456 participants’ general willingness to engage in a PN service.

457

458 *Providing advice*

459

460  
461 Individual opinions concerning *advice scope* indicated that providing exercise advice, in  
462 addition to dietary advice, was perceived as a positive feature of PN services. In line with the  
463 importance of exercise, providing exercise facilities was considered a valuable addition to PN  
464 advice. Furthermore, a shopping list and lifestyle advice were seen as valuable extensions to PN.  
465 Accounting for personal food preferences was considered negative as well as positive (Figure 5).

466

467 ---INSERT FIGURE 5 HERE---

468

469

470 Group discussions reflected that PN should have a broader focus than merely weight loss.

471 Participants agreed that PN should aim at changing someone's lifestyle:

472

473 *"Personalised nutrition should become lifestyle, to learn how to eat right or put exercise in our life, not*  
474 *because we have to, for losing weight, but because... it's good for my health."*

475

476

(Greece)

477

478 In line with this lifestyle focus and the fact that diet and exercise were often seen as inextricably  
479 linked, exercise was one of the most important advice extensions:

480

481 *"Everyone knows that that is the best... Diet and exercise."*

482

483

(The Netherlands)

484

485

486 In addition, advice extensions like exercise facilities and a shopping list were regarded as

487 valuable, because they increased convenience and therefore made adhering to the advice easier.

488 Advice adherence was also stimulated by progress measurement and support, especially when  
489 these were provided face-to-face:

490

491 *“When someone is monitoring you, then you follow the diet, because you get embarrassed the next time*  
492 *you go to a meeting and say you did not lose a gram.”*

493

494

(Greece)

495

496

497 Moreover, some participants perceived accounting for personal food preferences as an attribute  
498 that contributed to advice adherence. Yet, other participants stated that personal food preferences  
499 did not belong in a proper/healthy diet because they often are unhealthy:

500

501 *“The [personal food] preferences were the very reason that you now need to diet.”*

502

503

(The Netherlands)

504

505

506 Addressing psychological issues and teaching individuals how to eat healthily, were two  
507 attributes that came up without being mentioned in any of the service flyers.

508

509 Individual opinions relating to *advice frequency* indicated that most participants  
510 appreciated weekly meetings. However, a few participants considered weekly meetings to be too  
511 often. A one-off advice was regarded quite negatively. Receiving updated advice once every  
512 three months did not generate many comments, although the participants who did comment on  
513 this advice frequency level perceived it as insufficient (Figure 5).

514 Group discussions offered more insight into participants’ underlying reasoning by revealing that  
515 regular meetings to measure progress and provide support were considered important, as they  
516 generated motivation for advice adherence. The meaning of “regular” varied strongly between

517 participants. For some, regular meetings were weekly, while for others, regular meetings came  
518 down to once or twice a month. According to the participants, at the beginning of the lifestyle-  
519 change-process, frequent meetings were essential for compliance. Once one is accustomed to the  
520 new lifestyle, meeting frequency could be phased out:

521

522 *“In the beginning you might have the need for close follow up and then, when you start to gain more*  
523 *control, then you don’t need it that often.”*

524

525 (Norway)

526

527

528 Regardless of the advice frequency, follow-up should always be based on an individual’s  
529 progress:

530

531 *“Unless you are providing somebody with information of how you’re changing and how you’re sticking*  
532 *to your diet a follow up diet is useless.”*

533

534 (Ireland)

535

536 One-off advice was regarded as insufficient, not only because it did not provide motivation or  
537 advice updates, but also because services that offered one-off advice seemed untrustworthy:

538

539 *“With flyer 5 (once off advice) it does seem like it’s, we’re going to take your money and run. (...) It just*  
540 *seems like a £50 payment to have one diet plan and we’ll never speak to you again, what’s the point. You*  
541 *know, you need to change, it needs to change with you. Yeah that just seems really dodgy.”*

542

543 (UK)

544

545 Furthermore, the perception of service trustworthiness was decreased by having to pay one single  
546 payment in advance:

547

548 *“To begin we only have to pay this three hundred fifty zloty once, (...) and then we don’t know what*  
549 *comes next. If we have some questions, doubts, will they send us answers?”*

550

551 (Poland)

552

553 In line with the results that were found for the disclosure of personal information,  
554 personal contact was again the most appreciated *communication channel*. Both the individual  
555 opinions and the group discussions mirrored the previously discussed results regarding the  
556 disclosure of personal information (Figure 5).

557 In summary, PN extending beyond pure dietary advice was perceived to be beneficial, as  
558 the added extras often increased convenience and stimulated advice adherence. Advice adherence  
559 was also stimulated by regular face-to-face meetings. Furthermore, participants used meeting  
560 frequency to assess the trustworthiness of a service. Paying in advance for one-off services was  
561 regarded as particularly risky.

562

## 563 Discussion

564

565 Using structured focus group discussions in 8 EU member states, this study explored  
566 consumer evaluations of different PN services. PN requires consumers to disclose personal and  
567 potentially sensitive information about themselves. This study adopted the privacy calculus (i.e.  
568 the trade-off between privacy risks and personalisation benefits) as its underlying framework, and  
569 linked it to the three stages of PN provision: disclosing personal information, generating PN  
570 advice and advice adherence, and providing PN advice. Service attributes of all three stages were  
571 expected to influence consumer uptake of PN through the perception of privacy risks and/or the  
572 perception of personalisation benefits.

573

574           The results suggest that, in contrast to disclosing phenotypic or dietary intake  
575 information, most participants were rather negative about disclosing DNA to a PN service. The  
576 reluctance to disclose DNA was in part triggered by consumer scepticism about how DNA can  
577 contribute to the generation of PN advice. This finding is in line with recent research [38-40],  
578 which states that consumers are often not familiar with the link between DNA and nutrition  
579 advice. Ignorance about the fact that DNA is relevant for the generation of PN might have  
580 lowered the perception of personalisation benefit. In addition to perceiving DNA as irrelevant to  
581 PN, and consistent with studies into consumer attitudes [41-43], disclosing DNA to a PN service  
582 was identified as very privacy sensitive. Participants, for example, mentioned that DNA should  
583 not fall into the wrong hands. Worrying about how DNA might be used for purposes beyond the  
584 creation of PN advice may have increased participants' privacy risk perception. Concerns  
585 regarding privacy loss were not, however, prominent when utilising dietary intake and  
586 phenotypic information. Given that DNA-based PN failed to provide clear benefits [44] and  
587 simultaneously accounted for a high awareness of potential privacy loss, it is not surprising that  
588 DNA was often seen as the least favourite foundation of PN. Nevertheless, we should be cautious  
589 about fully dismissing DNA-based PN as not all consumers hold a negative attitude towards  
590 genetic testing [45]. This may be especially true of individuals with an above average risk of  
591 developing chronic diseases, as they are more prepared to undergo genetic testing for the purpose  
592 of PN [46].

593           Consumer perception of privacy risk and personalisation benefit did not merely depend  
594 on the required personal information. A substantial part of the trade-off between privacy risks  
595 and personalisation benefits could be explained by the design of a PN service. Especially the  
596 presence of face-to-face communication was important in determining the extent to which



597 personalisation benefits and privacy risks were perceived. Being able to communicate face-to-  
598 face was perceived vital for the quality of the PN advice and as a consequence the perception of  
599 personalisation benefit. According to the participants, disclosing information in person resulted  
600 in more accurate and detailed information, which is necessary for truly personal dietary advice.  
601 Furthermore, communicating face-to-face induced the feeling of interacting with a “real” person  
602 with whom one is “acquainted”. Experiencing such feeling may have given participants a greater  
603 sense of control over service provision, which determines the extent to which consumers trust  
604 that service provision will proceed as agreed [47]. Therefore, trust induced by the feeling of  
605 perceived control may have contributed to a decreased perception of privacy risk [48-50].

606         Face-to-face communication did, however, fail to mitigate privacy risk perception when  
607 participants perceived the service provider as untrustworthy. Service providers that appeared to  
608 be driven by financial gain or information misuse, as was often the case with the employer and  
609 the government, were generally perceived as untrustworthy. Participants gave the impression of  
610 being more comfortable with scientifically trained experts related to a dietitian’s practice or a  
611 fitness club. Placing trust in experts who are focused on health improvement rather than financial  
612 gain or information misuse, corresponds with the three drivers of service trustworthiness,  
613 namely: ability, integrity and benevolence [51]. Perceiving the service provider as being able,  
614 having integrity, and being benevolent might have mitigated privacy risk perception and  
615 amplified personalisation benefit perception, because these characteristics ensure that a service  
616 provider will keep to his word [52]. The preference for scientifically trained experts related to a  
617 tangible service might also be explained by the fact that when it comes to health western  
618 consumers are accustomed to personal interaction [53] with qualified professionals trained in  
619 conventional medicine [54]. Often, consumers tend to choose services to which they are

620 accustomed, because such services strengthen their confidence in the success of service provision  
621 [55]. Consequently, having confidence in the success of the service provision may decrease  
622 privacy risk perception and increase personalisation benefit perception.

623 Participants argued that for them to take full benefit from the provided PN advice, a PN  
624 service should aim at changing an individuals' lifestyle rather than merely serving as a weight-  
625 loss tool. To achieve this aim, the incorporation of exercise was essential. Moreover, to increase  
626 benefit perception PN should be convenient and include a level of support that stimulates advice  
627 adherence. Participants did not agree on the way in which advice adherence should be stimulated.  
628 The desirability of an advice adherence strategy depended on the extent to which the strategy was  
629 perceived as risky. Some participants were, for example, not keen on support group meetings,  
630 because attending such meetings required sharing personal matters and with that giving up one's  
631 privacy. To maximise convenience and advice adherence, PN services should be tuned to  
632 individual preferences. This finding is in line with the study of Stewart-Knox et al. [56], which  
633 states that PN should indeed be tailored to consumers' lifestyle, motivations, and efficacy. Since  
634 attempts to change dietary habits often fail [57,58], paying attention to individual needs  
635 regarding advice adherence may prove vital to make engaging in PN attractive.

636

637 Although the focus groups yielded a wealth of information, this study is not without  
638 limitations. It should be kept in mind that focus group discussions are a qualitative research  
639 method that provides purely indicative results. In addition, focus group discussions are not  
640 suitable to identify specific cross-country differences, which places cross-cultural comparison  
641 beyond the scope of this study. Hence, to identify cultural differences, quantify the results, and  
642 firm the findings a large-scale quantitative data collection stream is required. Furthermore, the

643 fact that lay-out, wording and price differed across the nine flyers used as stimulus material may  
644 have influenced participants' opinions regarding the different PN services. However, since the  
645 two most (79%) and two least (58%) appreciated services accounted for a large proportion of  
646 participants' preferences for PN services, we can assume that the effect of flyer lay-out, wording,  
647 and price was limited. Furthermore the group discussions did not give the impression that  
648 participants placed greater importance on lay-out and wording than on content. Using different  
649 lay-outs and wordings may, however, have helped participants to perceive the flyers as different  
650 PN services, making ranking easier, more realistic, and more useful.

651

652

### **Conclusion**

653

654 As a basis for quantification in future research, this study provides an initial insight into  
655 service attributes that influence consumer uptake of PN. The qualitative results confirm that  
656 disclosing personal information in order to receive PN advice may encounter resistance due to a  
657 high perception of privacy risk (i.e. DNA) and/or a low perception of personalisation benefit (i.e.  
658 dietary intake). This finding supports the assumption that consumers evaluate PN services  
659 according to a privacy calculus. Adoption of PN could be increased if in its positioning PN  
660 services would account for attributes that reduce privacy risk perceptions and amplify  
661 personalisation benefit perceptions. This study suggests that to do so, PN services should include  
662 face-to-face communication, exercise in addition to diet, and trustworthy expert advice providers.  
663 Furthermore, it is important to include service attributes that increase advice adherence. Even  
664 though including such attributes would most likely amplify benefit perception, advice adherence  
665 strategies that are not in line with consumers' needs may have the opposite effect or even

666 increase risk perception. Hence, service attributes that enhance advice adherence should be  
667 tailored to the needs of specific consumer segments. Above all, consumers' benefit perception of  
668 PN could be amplified by contextualising PN services as lifestyle instead of dietary advice  
669 focused.

670

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672

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678

## 679 **References**

680

- 681 1 German JB, Zivkovic AM, Dallas DC, Smilowitz JT: Nutrigenomics and personalized  
682 diets: What will they mean for food?; in Doyle MP, Klaenhammer TR (eds): Annual review of  
683 food science and technology, vol 2. Palo Alto, Annual Reviews, 2011, vol 2, pp 97-123.
- 684 2 Bouchard C, Ordovas JM: Fundamentals of nutrigenetics and nutrigenomics. Progress in  
685 molecular biology and translational science 2012;108:1-15.
- 686 3 Joost HG, Gibney MJ, Cashman KD, Gorman U, Hesketh JE, Mueller M, van Ommen B,  
687 Williams CM, Mathers JC: Personalised nutrition: Status and perspectives. British Journal of  
688 Nutrition 2007;98:26-31.
- 689 4 de Roos B: Personalised nutrition: Ready for practice? Proceedings of the Nutrition  
690 Society 2013;72:48-52.
- 691 5 Little J, Hawken S: On track? Using the human genome epidemiology roadmap. Pub  
692 Health Genomics 2010;13:256-266.
- 693 6 Fenech M, El-Sohemy A, Cahill L, Ferguson LR, French TAC, Tai ES, Milner J, Koh  
694 WP, Xie L, Zucker M, Buckley M, Cosgrove L, Lockett T, Fung KYC, Head R: Nutrigenetics  
695 and nutrigenomics: Viewpoints on the current status and applications in nutrition research and  
696 practice. J Nutrigenet Nutrigenomics 2011;4:69-89.

697 7 García-Cañas V, Simó C, León C, Cifuentes A: Advances in nutrigenomics research:  
698 Novel and future analytical approaches to investigate the biological activity of natural  
699 compounds and food functions. *Journal of Pharmaceutical and Biomedical Analysis*  
700 2010;51:290-304.

701 8 Astley SB, Elliott RM: The european nutrigenomics organisation: Linking genomics,  
702 nutrition and health research. *J Sci Food Agric* 2007;87:1180-1184.

703 9 Kussmann M, Fay LB: Nutrigenomics and personalized nutrition: Science and concept.  
704 *Pers Med* 2008;5:447-455.

705 10 Mutch DM, Wahli W, Williamson G: Nutrigenomics and nutrigenetics: The emerging  
706 faces of nutrition. *Faseb J* 2005;19:1602-1616.

707 11 Farhud DD, Yeganeh MZ, Yeganeh MZ: Nutrigenomics and nutrigenetics. *Iranian*  
708 *Journal of Public Health* 2010;39:1-14.

709 12 Gibney MJ, Walsh MC: The future direction of personalised nutrition: My diet, my  
710 phenotype, my genes. *Proceedings of the Nutrition Society* 2013;72:219-225.

711 13 Boland M: Innovation in the food industry: Personalised nutrition and mass  
712 customisation. *Innovation: Management, Policy and Practice* 2008;10:53-60.

713 14 Rimbach G, Minihane AM: Nutrigenetics and personalised nutrition: How far have we  
714 progressed and are we likely to get there? *Proc Nutr Soc* 2009;68:162-172.

715 15 Simonson I: Determinants of customers' responses to customized offers: Conceptual  
716 framework and research propositions. *J Mark* 2005;69:32-45.

717 16 Fan HY, Poole MS: What is personalization? Perspectives on the design and  
718 implementation of personalization in information systems. *J Organ Comp Electron Commer*  
719 2006;16:179-202.

720 17 Wu CH-J: A re-examination of the antecedents and impact of customer participation in  
721 service. *Service Industries Journal* 2011;31:863-876.

722 18 Sunikka A, Bragge J: What, who and where: Insights into personalization. *Hawaii*  
723 *International Conference on System Sciences, Proceedings of the 41st Annual* 2008:10.

724 19 Ronteltap A, van Trijp JCM, Berezowska A, Goossens J: Nutrigenomics-based  
725 personalised nutritional advice. In search of a business model? *Genes Nutr* 2013;8:153-163.

726 20 Goddard KAB, Robitaille J, Dowling NF, Parrado AR, Fishman J, Bradley LA, Moored  
727 CA, Khoury MJ: Health-related direct-to-consumer genetic tests: A public health assessment and  
728 analysis of practices related to internet-based tests for risk of thrombosis. *Pub Health Genomics*  
729 2009;12:92-104.

730 21 Ahlgren J, Nordgren A, Perrudin M, Ronteltap A, Savigny J, Trijp H, Nordström K,  
731 Görman U: Consumers on the internet: Ethical and legal aspects of commercialization of  
732 personalized nutrition. 2013;8:349-355.

733 22 van Trijp JCM, Ronteltap A: A marketing and consumer behaviour perspective on  
734 personalised nutrition; *Personalized nutrition: Principles and applications*. Boca Raton, FL  
735 (USA), CRC Press, 2007, pp 185-204.

736 23 Xu H, Teo HH, Tan BCY, Agarwal R: The role of push-pull technology in privacy  
737 calculus: The case of location-based services. *J Manage Inform Syst* 2009;26:135-173.

738 24 Li T, Unger T: Willing to pay for quality personalization&quest; trade-off between  
739 quality and privacy. *European Journal of Information Systems* 2012;21:621-642.

740 25 Li H, Sarathy R, Xu H: Understanding situational online information disclosure as a  
741 privacy calculus. *J Comput Inf Syst* 2010;51:62-71.

742 26 Pavlou PA: State of the information privacy literature: Where are we now and where  
743 should we go? *MIS Quarterly* 2011;35:977-988.

744 27 Smith HJ, Dinev T, Xu H: Information privacy research: An interdisciplinary review.  
745 *MIS Quarterly* 2011;35:989-1015.

746 28 Anderson CL, Agarwal R: The digitization of healthcare: Boundary risks, emotion, and  
747 consumer willingness to disclose personal health information. *Inf Syst Res* 2011;22:469-490.

748 29 Oliver JM, Slashinski MJ, Wang T, Kelly PA, Hilsenbeck SG, McGuire AL: Balancing  
749 the risks and benefits of genomic data sharing: Genome research participants' perspectives. *Pub*  
750 *Health Genomics* 2012;15:106-114.

751 30 Wendel S, Dellaert BGC, Ronteltap A, van Trijp HCM: Consumers' intention to use  
752 health recommendation systems to receive personalized nutrition advice. *BMC Health Services*  
753 *Research* 2013;13

754 31 Li Y: Theories in online information privacy research: A critical review and an integrated  
755 framework. *Decision Support Systems* 2012

756 32 Xie E, Teo H-H, Wan W: Volunteering personal information on the internet: Effects of  
757 reputation, privacy notices, and rewards on online consumer behavior. 2006;17:61-74.

758 33 Eurostat: Population structure and ageing" - statistics explained, European Commission,  
759 2011, 2012,

760 34 Eurostat: Overweight and obesity - bmi statistics - statistics explained European  
761 Commission, 2011, 2012,

762 35 Commission E: Together for health: A strategic approach for the eu 2008-2013. Brussels,  
763 Commission of the European Communities 2007,

764 36 Brislin RW: Back-translation for cross-cultural research. *J Cross-Cult Psychol*  
765 1970;1:185-216.

766 37 Taylor CW: The study of behavior - q-technique and its methodology - stephenson,w.  
767 *Educ Psychol Meas* 1960;20:400-401.

768 38 Pavlidis C, Karamitri A, Barakou A, Cooper DN, Poulas K, Topouzis S, Patrinos GP:  
769 Ascertainment and critical assessment of the views of the general public and healthcare  
770 professionals on nutrigenomics in greece. *Pers Med* 2012;9:201-210.

771 39 Adamkova V, Veleminsky M, Zimmelova P, Hubacek JA: Volunteer's willingness to  
772 genetic testing - lack of the understanding of the matter. *Physiol Res* 2009;58:S53-S54.

773 40 Sanderson S, Diefenbach M, Streicher S, Jabs E, Smirnoff M, Horowitz C, Zinberg R,  
774 Clesca C, Richardson L: Genetic and lifestyle causal beliefs about obesity and associated  
775 diseases among ethnically diverse patients: A structured interview study. *Pub Health Genomics*  
776 2012

777 41 Bloss CS, Ornowski L, Silver E, Cargill M, Vanier V, Schork NJ, Topol EJ: Consumer  
778 perceptions of direct-to-consumer personalized genomic risk assessments. *Genet Med*  
779 2010;12:556-566.

780 42 Goldsmith L, Jackson L, O'Connor A, Skirton H: Direct-to-consumer genomic testing:  
781 Systematic review of the literature on user perspectives. *Eur J Hum Genet* 2012;20:811-816.

782 43 Heeney C, Hawkins N, de Vries J, Boddington P, Kaye J: Assessing the privacy risks of  
783 data sharing in genomics. *Pub Health Genomics* 2011;14:17-25.

784 44 Ronteltap A, van Trijp JCM, Renes RJ: Consumer acceptance of nutrigenomics-based  
785 personalised nutrition. *British Journal of Nutrition* 2009;101:132-143.

786 45 Nielsen DE, El-Sohemy A: A randomized trial of genetic information for personalized  
787 nutrition. *Genes Nutr* 2012;7:559-566.

788 46 Stewart-Knox BJ, Bunting BP, Gilpin S, Parr HJ, Pinhao S, Strain JJ, de Almeida MDV,  
789 Gibney M: Attitudes toward genetic testing and personalised nutrition in a representative sample  
790 of european consumers. *British Journal of Nutrition* 2009;101:982-989.

791 47 Tan Y-H, Thoen W: Toward a generic model of trust for electronic commerce.  
792 *International Journal of Electronic Commerce* 2001;5:61-74.

793 48 Belanger F, Carter L: Trust and risk in e-government adoption. *Journal of Strategic*  
794 *Information Systems* 2008;17:165-176.

795 49 Green DT, Pearson JM: Integrating website usability with the electronic commerce  
796 acceptance model. *Behav Inf Technol* 2011;30:181-199.

797 50 Kim DJ, Ferrin DL, Rao HR: A trust-based consumer decision-making model in  
798 electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support*  
799 *Systems* 2008;44:544-564.

800 51 Mayer RC, Davis JH, Schoorman FD: An integrative model of organizational trust. *The*  
801 *Academy of Management Review* 1995;20:709-734.

802 52 Colquitt JA, Scott BA, LePine JA: Trust, trustworthiness, and trust propensity: A meta-  
803 analytic test of their unique relationships with risk taking and job performance. *Journal of*  
804 *Applied Psychology* 2007;92:909-927.

805 53 Andreassen HK, Bujnowska-Fedak MM, Chronaki CE, Dumitru RC, Pudule I, Santana S,  
806 Voss H, Wynn R: European citizens' use of e-health services: A study of seven countries. *BMC*  
807 *Public Health* 2007;7:53.

808 54 Nissen N, Schunder-Tatzber S, Weidenhammer W, Johannessen H: What attitudes and  
809 needs do citizens in europe have in relation to complementary and alternative medicine?  
810 *Forschende Komplementärmedizin/Research in Complementary Medicine* 2012;19:9-17.

811 55 Gefen D, Karahanna E, Straub DW: Trust and tam in online shopping: An integrated  
812 model. *MIS Quarterly* 2003;27:51-90.

813 56 Stewart-Knox B, Kuznesof S, Robinson J, Rankin A, Orr K, Duffy M, Poínhos R, de  
814 Almeida MDV, Macready A, Gallagher C, Berezowska A, Fischer ARH, Navas-Carretero S,  
815 Riemer M, Traczyk I, Gjelstad IMF, Mavrogianni C, Frewer LJ: Factors influencing european  
816 consumer uptake of personalised nutrition. Results of a qualitative analysis. *Appetite*  
817 2013;66:67-74.

818 57 Dellande S, Gilly MC, Graham JL: Gaining compliance and losing weight: The role of  
819 the service provider in health care services. *J Mark* 2004;68:78-91.

820 58 Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D: Motivation, self-  
821 determination, and long-term weight control. *International Journal of Behavioral Nutrition and*  
822 *Physical Activity* 2012;9

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**Figure 1.** Conceptual framework

**Figure 2.** Schematic overview of the PN information exchange process and its attributes

**Figure 3.** Evaluations of the “Disclosing personal information” service attribute levels

**Figure 4.** Evaluations of the “Generating advice and advice adherence” service attribute levels

**Figure 5.** Evaluations of the “Providing advice” service attribute levels



859 **Table 1.** Descriptions of archetypical PN business models

	<b>Business model</b>	<b>Description</b>
1	“Employee lifestyle guidance”	An employer offering a lifestyle advice program to its employees
2	“Standing strong together”	Enhancing healthy lifestyle through social support (e.g. Weightwatchers)
3	“Health club”	A fitness club enabling lifestyle change by providing training facilities and coaching
4	“Do-it-yourself-healthy-diets”	An internet based business model, with little or no follow up
5	“Step in, step out”	An (often) internet based business model allowing for personal contact, which provides optional follow up on monitored progress
6	“Test and run to the finish”	An (often) internet based business model allowing for personal contact, which provides repeated follow up on consumers’ progress and the possibility to adjust the dietary advice
7	“All-in lifestyle guidance”	Enhancing healthy lifestyle through a broad DNA based lifestyle advice
8	“Face 2 face”	Traditional dietitian’s practice
9	“We told you so”	Healthy lifestyle advice offered through mass-media communication channels by non-profit organisations to improve public health

860  
861

862 **Table 2.** Socio-demographic characteristics of the sample ( $N = 124$ )

<b>Variable</b>	<b>Proportion</b>
<i>Age</i>	
18-30	20.2%
30-45	39.5%
45-65	38.7%
Not recorded	1.6%
<i>Gender</i>	
Male	49.5%
Female	49.5%
Not recorded	1.0%
<i>Marital status</i>	
Married	47.6%
Lives with partner	16.1%
Divorced	4.0 %
Single	29.0%
Other	1.6%
Not reported	1.7%
<i>Education<sup>1</sup></i>	
Primary	11.3%
Secondary	36.3%
Higher	50.0%
Not reported	2.4%
<i>Modal wage<sup>2</sup></i>	
Less than modal	20.2%
Approximately modal	16.1%
Higher than modal	42.7%
No answer	21.0%

863 <sup>1</sup> Primary = levels 0,1 and 2 of the international standard classification of education.

864 Secondary = levels 3 and 4 of the international standard classification of education.

865 Higher = level 5 and 6 of the international standard classification of education

866 More details can be found on:

867 [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Glossary:International\\_standard\\_classification\\_of\\_education\\_\(ISCED\)](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:International_standard_classification_of_education_(ISCED))

868 <sup>2</sup> Compared to the national modal wage of the participant's country of origin

**Table 3.** Overview of the stimulus material

	Stage 1			Stage 2			Stage 3		
	Disclosing personal information	Generating advice and advice adherence	Providing Advice	Disclosing personal information	Generating advice and advice adherence	Providing Advice	Disclosing personal information	Generating advice and advice adherence	Providing Advice
Business model	Personal information	Communication channel (C2S)	Service provider	Advice justification	Customer Lock-in	Advice scope	Advice frequency	Communication channel (S2C)	
<b>Set 1</b>	“We told you so”	Dietary intake	Online	Company	Scientific	€ 175	Diet plan	1x 2 months	Online
	“All-in lifestyle guidance”	DNA	Mail	Company	Scientific	€ 195	Diet plan	1x 3 months	Online
	“Step in, step out”	Phenotype	Personal contact	Company	Scientific	€ 185	Diet plan	1x 3 months	Online
<b>Set 2</b>	“Face-to-face”	Phenotype	Personal contact	Dietitian	Scientific	First 2 consultations € 200, all following consultations € 20	Diet plan, lifestyle advice	1x per week	Personal contact
	“Standing strong together”	Phenotype	Personal contact	Company	Alternative medicine & organic products	Support group meetings/ subscription	Diet plan, lifestyle advice	1x per week	Personal contact
	“Employee lifestyle guidance”	Phenotype	Personal contact	Government/ Employer	Success stories	Getting the service for free in depending on good results	Diet plan, lifestyle advice	2x per month	Personal contact
<b>Set 3</b>	“Health club”	Dietary intake	Online	Dietitian	Success stories	Subscription €50 per month	Diet plan, exercise plan, shopping list, lifestyle advice, exercise facilities	1x week	Personal contact
	“Do-it-yourself-healthy-diets”	Dietary intake	Online	Dietitian	Success stories	€ 50	Diet plan, exercise plan, personal food preferences	Only once	Mail
	“Test and run to the finish”	Dietary intake	Online	Dietitian	Success stories	€ 75	Diet plan	1x 3 months	Online

**Table 4.** Overview of the focus group protocol

<b>Protocol stage</b>	<b>Content</b>
Introduction	Introduction of the staff and participants, clarification of discussion ground rules.
Warm-up	Defining the meaning of PN before and after definition
Round 1: Disclosing personal information	<ul style="list-style-type: none"><li>• Individual ranking of flyer set1</li><li>• Plenary discussion of flyer set 1 ranking</li></ul>
Round 2: Providing advice	<ul style="list-style-type: none"><li>• Individual ranking of flyer set 3</li><li>• Plenary discussion of flyer set 3 ranking</li></ul>
Break	
Round 3: Generating advice and advice adherence	<ul style="list-style-type: none"><li>• Individual ranking of flyer set 2</li><li>• Plenary discussion of flyer set 2 ranking</li></ul>
Round 4: Overall ranking	<ul style="list-style-type: none"><li>• Individual ranking of all flyers</li><li>• Plenary discussion of best/worst flyer</li></ul>
Wind-down	Discussion on the “ideal” PN service
Wrap-up	Final thoughts and word of thanks

**Table 5.** Observed service preference in percentages per country

Service	Total sample (N=124)		Ireland (N=20)		UK (N=17)		Netherlands (N=19)		Norway (N=11)		Spain (N=16)		Greece (N=13)		Germany (N=14)		Poland (N=14)	
	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst
"Health club"	52%		55%		88%		63%		46%		20%		39%		43%		50%	
"Face-to-face"	27%		25%		12%		5%		46%		38%		62%		36%		14%	
"Standing strong together"	9%	11%	5%	10%	12%	12%	11%	5%	55%	55%	31%	81%	46%	7%	21%	14%	21%	14%
"Employee lifestyle guidance"	5%	32%	5%	30%	29%	29%	16%	5%	27%	27%	6%	6%	7%	21%	7%	7%	7%	14%
"Step in, step out"	3%	2%	5%						9%	9%								
"Do-it-yourself-healthy-diets"	3%	2%	5%		12%	12%	5%	5%			6%	6%						
"All-in lifestyle guidance"	1%	26%		40%	18%	18%		58%	9%	9%	6%	6%	23%	14%	14%	21%	21%	21%
"We told you so"	1%	14%		5%	18%	18%	5%	11%					15%	29%	29%	36%	36%	36%
"Test and run to the finish"	14%		15%		12%	12%	16%	16%	9%	9%	6%	6%	15%	29%	29%	7%	7%	7%

Figure 1

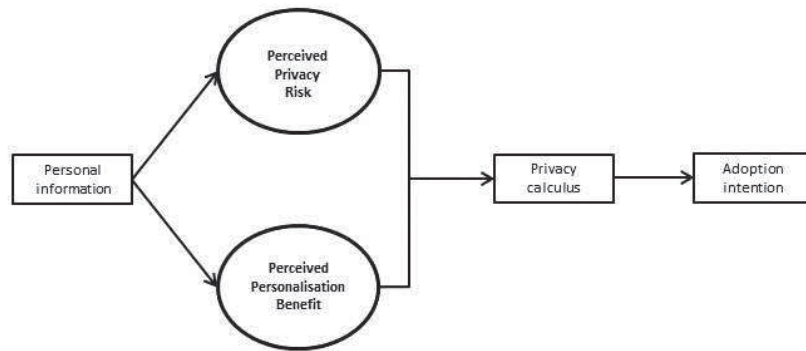


Figure 2

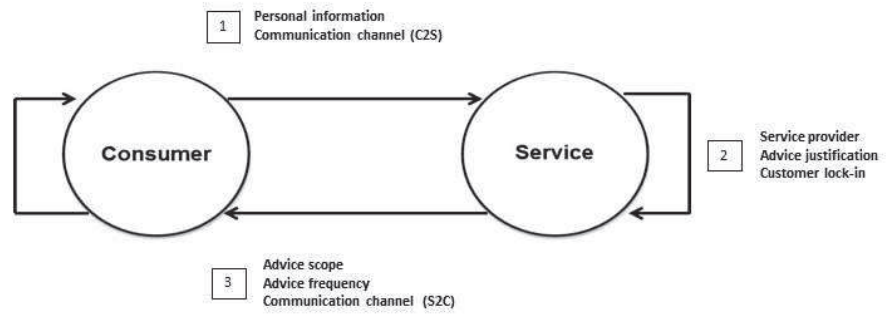


Figure 3

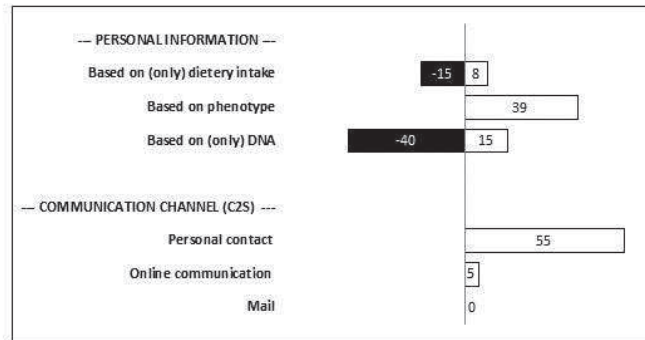




Figure 4

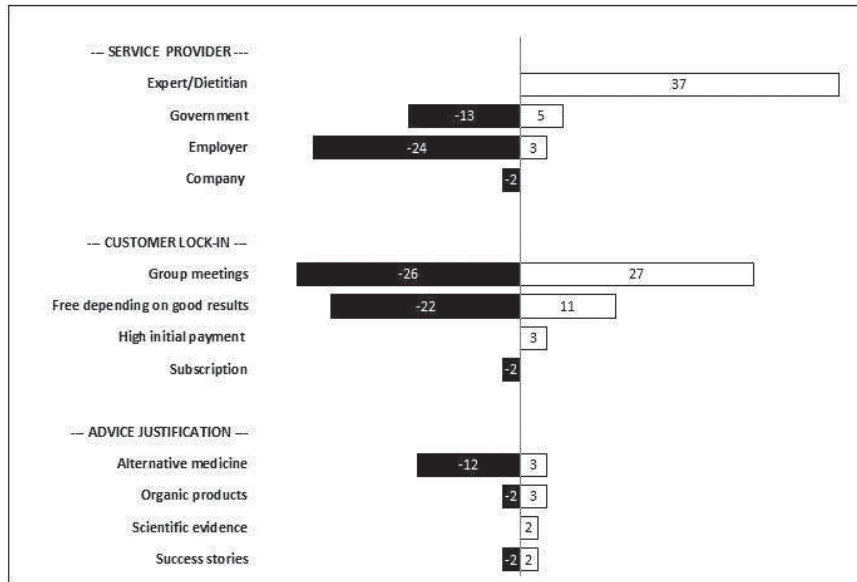


Figure 5

