

**A programme theory for Gentest, a personalised  
preventive health assessment and counselling  
service**

**A transdisciplinary realist evaluation of how to make people do  
healthy things**

Internship report by  
Jasmin Ackermann  
29th December 2021

Academic supervisors    dr. Elena Syurina, dr. Christopher Pell  
On-site supervisors     dr. Tomris Cesuroğlu, MD; Dr. Serdar Savaş

## Research and Funding

This internship report will be submitted as part of the Portfolio in fulfilment of the requirements of the degree of Research Master Global Health at the Faculty of Science, Vrije Universiteit Amsterdam Jasmin Ackermann, Student No. 2635417. The research for this project was performed on location in Istanbul and remotely from spring 2020 until summer 2021.

The internship project is a part of the collaborative Global Health Programme of Amsterdam Public Health (APH). This project involves Athena Institute (VU), Department of Public Health at Amsterdam UMC (location AMC), Amsterdam Institute for Global Health and Development (AIGHD) and Gentest Institute (Istanbul).

The project was funded by Gentest Institute and the Athena Institute at Vrije Universiteit Amsterdam.



## Acknowledgements

The author would like to thank her academic and onsite internship supervisors for their support: Elena Syurina, Christopher Pell, Tomris Cesuroğlu, and Serdar Savaş; also Karien Stronks for additional input on research design and data analysis; colleague Elise Garton; current and former staff at Gentest for their participation and collaboration: Kader Algül, Merve Can, Melike Cavus, Şevval Dural, Servet Ekiz, Esin Ergin, Fatma Idem, Ayçan Isler, Erhan Girgin, Cansu Gülercin, Mesture Hendem, Esin Tuna, and Özge Ünlütürk; and the Gentest consultees who participated in this study as interviewees.

## Summary

Non-communicable diseases cause about three quarters of all deaths globally, and only five conditions account for two thirds of this burden: cardiovascular disease, cancers, chronic respiratory disease, neurological disorders and diabetes mellitus/chronic kidney disease. The causes and development of these diseases is complex, long-term and often interrelated: They share metabolic risk factors, which are caused by unhealthy behaviours in combination with biological, *i. e.* genetic and environmental factors.

This study describes an innovative approach to NCD prevention and management, redefining the role of the physician in personal health care and counselling: the Gentest model. Gentest is a private health service provider, located in Istanbul, and aims to deliver preventive and early treatment measures through highly individualised and comprehensive health status assessment and counselling. Clients' health status and lifestyle assessment includes, for example, physical examination, psychological questionnaires, nutrition, exercise, several biomarker panels such as genetics, hormones and gut microbiome, long-term ECG, and living and working conditions. Based on this assessment, Gentest provides personalised counselling on health behaviour, specifically mainly nutrition and nutrition supplements, exercise, medications and medical follow-up.

Somewhat contrary to many mostly population-oriented policy interventions, Gentest offers a highly *personalised* approach to prevention and control of NCDs, and its service relies essentially on the communication, mediation and education between the staff consultants and physician on one side, and the consultee on the other. The consultee's behaviours as main outcome unfold in their individual environment of social, economic, natural and structural actualities. In this study, we aim to understand, how, in these environments, the Gentest programme brings about health behaviour changes in consultees' lives. We employ a transdisciplinary, theory-driven realist evaluation approach, and use qualitative data from implementors' and consultee's perspective.

Acknowledging the complexity of health behaviour and how an individual may change it, we take a realist approach to evaluating this programme: Rather than to make a judgement about "Does it work?", we aim to gather an understanding of "What works for whom, under what circumstances, and how?" The realist evaluation framework revolves around Mechanisms, or structures of what the programme does, comprised of a resource and a correspondent change in reasoning; Outcomes of these Mechanisms; and Context factors, which lie beyond the programme Mechanisms but affect its Outcomes.

Analysis of documents pertaining to the programme, observation of its implementation in the Gentest office and practice environment, and a workshop with staff allowed to build an understanding of main structures and elements of the programme: to outline its scope and main dimensions, define endpoints and outcomes, and identify first context elements and connections. To reflect these results, and complementing the rather abstract realist model, we integrated a middle-range theory, the I-Change model, an integrated model of behaviour change, into our conceptual framework. Semi-structured interviews with 15 clients and another workshop with staff then allowed to refine the programme theory to formulate concise Mechanisms, resources

and changes in reasoning, clearly frame proximal and distal Outcomes, and revealed a broad range of Context factors, and how they can affect specific Mechanisms or the programme in general.

The resulting programme theory integrates the realist evaluation and I-Change models, and adapts them to describe how the Gentest programme helps its clients gain awareness, motivation, and agency to implement and maintain a healthy lifestyle through its Mechanisms: personalisation; precision, prediction, prevention; comprehensiveness; participation; and mutual responsibility and trust. Each mechanism is represented by resources, provided by the service in the process of programme delivery, which each elicit changes in reasoning (mostly) in the client regarding, for example, their cognizance, self-efficacy, or action planning, as elements of awareness, motivation, and agency, respectively.

These, as the most proximal outcomes, give way to behaviour change, a healthy lifestyle, and a wide range of mostly positive more distal outcomes, up to, eventually, the prevention of NCDs, chronic disease, and healthy aging. We found that this range of outcomes often feeds back into the programme positively, for example when clients feel better after joining the programme, and are then more motivated to stay engaged.

Context factors such as the client's own or family medical history, cultural factors, and company staffing influence specific mechanisms. Perhaps even more interestingly, though, the analysis of context factors included factors that are essential to behaviour change, as conceptualised by the I-Change model, but are not addressed by the problem, such as intention, stability, and social influence. On the other hand, the personalised nature of the programme allows to circumvent or adapt to a range of context factors that might be barriers in a more rigid, conventional programme, to still provide effective service to the client.

Beyond its applicability to the Gentest service itself, this study offers conceptual insights to the models it employs, their practice, and compatibility. It also offers a perspective on individual interventions as a strategy for health promotion, and to prevent and manage NCDs and chronic disease, and on the role of the health practitioner.

# Contents

<b>1</b>	<b>Introduction</b>	<b>9</b>
<b>2</b>	<b>Context: health, health system and the Gentest model in Turkey</b>	<b>10</b>
2.1	Population health and NCDs in Turkey . . . . .	10
2.2	The Turkish health system at a glance . . . . .	12
2.3	Gentest and the 7K Medicine approach . . . . .	13
<b>3</b>	<b>Conceptual Framework</b>	<b>14</b>
3.1	Realist Evaluation . . . . .	14
3.2	Integrated Model of Behaviour Change . . . . .	14
<b>4</b>	<b>Methods</b>	<b>16</b>
4.1	Qualitative transdisciplinary evaluation design . . . . .	16
4.2	Document analysis, observation and staff workshop on Gentest implementation practice . . . . .	17
4.2.1	Data collection . . . . .	17
4.2.2	Data analysis . . . . .	19
4.3	Semi-structured interviews with consultees on expectations, experiences and outcomes . . . . .	19
4.3.1	Data collection . . . . .	19
4.3.2	Data analysis . . . . .	21
4.4	Ethical considerations . . . . .	21
<b>5</b>	<b>Results</b>	<b>22</b>
5.1	Data characteristics and data analysis progression . . . . .	22
5.1.1	Characteristics of data in document analysis, observation and staff workshop . . . . .	22
5.1.2	Characteristics of interview data . . . . .	24
5.1.3	Recursive and transdisciplinary data analysis . . . . .	24
5.2	Framing the programme theory with realist evaluation and I-Change model . . . . .	26
5.3	The Gentest Mechanisms, corresponding Outcomes, and mediating Context factors . . . . .	28
5.3.1	Personalisation . . . . .	28
5.3.2	Precision, Prediction, Prevention . . . . .	28
5.3.3	Comprehensiveness . . . . .	30
5.3.4	Participation . . . . .	31
5.3.5	Mutual Trust and Responsibility . . . . .	32
5.4	Larger setting and practical barriers as additional levels of context . . . . .	33
5.4.1	Setting circumstances affecting the programme as a whole . . . . .	34
5.4.2	Practical barriers overcome through responsive programme design . . . . .	36

5.5	Programme Outcomes and Feedback . . . . .	36
5.5.1	Range of programme outcomes besides and beyond health behaviour change . . . . .	36
5.5.2	Immediate effects create positive feedback for long-term engagement . . . . .	39
<b>6</b>	<b>Discussion</b>	<b>39</b>
6.1	Applying the I-Change model for a realist evaluation of Gentest . . . . .	40
6.2	Perspectives towards effective prevention and management of complex chronic diseases in healthcare . . . . .	41
6.2.1	Individualised disease prevention . . . . .	42
6.2.2	“Integration” of care . . . . .	43
6.3	Limitations and further research . . . . .	44
6.4	Conclusion . . . . .	46
	<b>Bibliography</b>	<b>48</b>
	<b>Supplements</b>	<b>57</b>
	Supplement 1: Staff workshop script and protocol . . . . .	57
	Supplement 2: Exemplary interview consent form . . . . .	62
	Supplement 3: CMOc’s with exemplary interview quotes . . . . .	64

## List of Figures

1	Generative causation in realist evaluation . . . . .	15
2	RE mechanism as resource and change in reasoning . . . . .	15
3	Integrated Model of Behaviour Change . . . . .	16
4	Graphic summary of the Gentest programme theory . . . . .	27

## List of Tables

1	Metabolic risk factors for NCDs among the Turkish population . . . . .	11
2	Common risk behaviours contributing to NCDs among the Turkish population	11
3	Topic areas and exemplary questions from the interview guide . . . . .	20
4	Interview coding matrix categories and codes . . . . .	21
5	Documents analysed for this study . . . . .	23
6	Personalisation CMOc's . . . . .	29
7	Precision, Prediction, Prevention CMOc's . . . . .	30
8	Comprehensiveness CMOc's . . . . .	31
9	Participation CMOc's . . . . .	32
10	Mutual Trust and Responsibility CMOc's . . . . .	33
11	Practical barriers as context factors . . . . .	37
12	Range of outcomes reported by interviewees . . . . .	38



# 1 Introduction

The current state of global health has been termed an ‘NCD crisis’ – besides climate change, food insecurity and financial insecurity one of the biggest threats thwarting the substantial gains that have been achieved in economic growth, health, and living standards in the past century worldwide (Beaglehole et al. 2011). In 2017, NCDs caused over 41 million deaths, or 73 % of all deaths globally. 15 million of these deaths occur prematurely, among people between the ages of 30 and 70 (*GBD 2017*). Of all NCD-related deaths, only five conditions amount to two thirds of this burden: cardiovascular disease (CVD), cancers, chronic respiratory disease (CRD), neurological disorders and diabetes mellitus/chronic kidney disease (DM/CKD) (*GBD 2017*). This crisis will likely worsen with ongoing global developments: demographic transition, urbanisation, changed availability and consumption patterns of food, and increasingly sedentary lifestyle propel the epidemiological transition and are contributing to a rising burden of non-communicable disease (Habib and Saha 2010; *GBD 2017*).

The causes and development of these NCDs are complex, long-term and often interrelated. They share four main metabolic risk factors – raised blood pressure, obesity, hyperglycemia, hyperlipidemia – which are caused by unhealthy behaviours in combination with biological, *i. e.* genetic and environmental factors. NCDs then often occur as a range of endpoints, where disease entities share underlying risk factors, overlap and complicate each other (Darnton-Hill, Nishida, and James 2004; Gohlke et al. 2009; Grundy 2016; WHO 2018a). For the effects of interrelated risk behaviours, genetic risks and environmental risk factors to unfold towards the development of these metabolic changes, and to reach a stage of clinical disease takes years and decades. Also from diagnosis onwards, most NCDs take a chronic trajectory, require long-term care and treatment, and take a considerable toll on patients’ quality of life in higher age.

Much of the chronic NCD burden can be prevented by tackling five shared risk factors, which are largely behavioural: tobacco use, unhealthy diet, physical inactivity, harmful use of alcohol, and air pollution (Bennett et al. 2018; Nugent et al. 2018). To enable health systems globally to respond more effectively and equitably to the healthcare needs of people with NCDs, the WHO and others emphasise the need for public policies across sectors to address these risk behaviours and promote equitable access to efficacious and high-quality preventive and curative health care (UNGA 2018; WHO and UN 2018).

There have now long been efforts and commitment in the global community to compile comprehensive evidence and policy guidance for the prevention of NCDs (WHO 2011; WHO 2013; WHO 2017a; WHO 2017b) (WHO, 2011, 2013, 2017a, 2017b). Internationally endorsed and recommended interventions to curb the NCD crisis range across sectors and approaches, across prevention and treatment, as well as population- and individual-level measures; they include, for example, drug therapy for cardiovascular disease patients, cervical cancer vaccination schemes, reformulation of food products to reduce salt and trans-fats, and alcohol taxation and advertisement (WHO 2017b). And yet, with broader implementation, more recent review of these interventions has been mixed, and countries are not on target to reach their NCD-related goals as set in the UN Sustainable Development Agenda (Breda et al. 2019; WHO 2015; WHO

2018c). Several authors have emphasised the struggles national NCD units face when trying to implement any of the interventions. Despite existing high-level political commitments, practical implementation barriers of local context specificities and arrangements cannot be met with the resources, capacities and structures in place (Breda et al. 2019; Isaranuwatthai et al. 2019; Peters et al. 2019; WHO 2018b).

Not only are we still searching for effective interventions, we are also searching for the right kind of evidence to identify and document them. This study identifies an innovative approach to NCD prevention and management, redefining the role of the physician in personal health care and counselling: the Gentest model. Aim of the study is to conduct a theory-led evaluation of how Gentest consultees benefit from their service, and extract the critical elements that make the programme successful to explore options for programme improvement and transfer.

**RQ** How does the Gentest service model function to achieve health benefit for its clients?

**SQ1** Which structures, aims and design guide the business, its staff, and its clients through the service delivery and experience?

**SQ2** Which context factors and pathways influence or determine outcomes achieved through the Gentest service?

The study follows a transdisciplinary realist approach. It uses practice observation and qualitative interview data to formulate a programme theory, describing how the Gentest service works to achieve health benefit for its consultees. This includes building an understanding of its operations on a procedural level – how and within which architecture of structures and aims staff works and interacts with consultees; and an exploration of consultees’ expectations, experiences and outcomes with the programme. Before that, we situate the Gentest practice in its environment, as a single private health service located in Istanbul, Turkey.

## **2 Context: health, health system and the Gentest model in Turkey**

### **2.1 Population health and NCDs in Turkey**

Turkey has accomplished remarkable improvements in terms of health status in the last three decades, particularly after the implementation of the Health Transformation Programme (HTP) in 2003. Major health indicators such as overall life expectancy, infant mortality rate (IMR) and maternal mortality rate (MMR) have improved considerably (Tatar et al. 2011). While discrepancies between urban and rural areas, and different regions of the country remain, Turkey overall continues to narrow the gap towards OECD average (Tatar et al. 2011). In 2017, life expectancy was 77 years for men, and 80 years for women; under-5 mortality was 10.6 deaths per 1,000 live births (in 2018) and maternal mortality 17 deaths per 100,000 live births (in 2017) (*World Bank Open Data*). 68.8% of Turks rated their health as good or very good, while

9.4% rated it as bad or very bad (on a symmetrical 5-point scale with response categories very good, good, fair, poor, very poor), both numbers in the range of OECD average (OECD 2019).

Having gone through considerable demographic and epidemiological transition processes over the past decades, 88% of deaths, and 82% of DALYs in Turkey were due to NCDs in 2017 (GBD 2017). Similar to global patterns, CVD (36%), neoplasms (23%), CRD, neurological disorders and DM/CKD (7-8% each) accounted for the large majority (82% total) of all deaths and a considerable population risk of premature death (16%) (WHO 2018a; GBD 2017).

A 2017 household study found metabolic risk factors to be highly prevalent throughout the population, as shown in table 1. Half of the study respondents (51.2%) had three or more risk factors for an NCD, only 1.3% of the study population had none of the five risk factors (Üner, Balcılar, and Ergüder 2018). Correspondingly, risk behaviours are common, as shown in table 2 (Kontseyava et al. 2018; Üner, Balcılar, and Ergüder 2018).

**Table 1:** Metabolic risk factors for NCDs among the Turkish population according to 2017 household study (Üner, Balcılar, and Ergüder 2018)

Risk factor	Definition	Prevalence
Overweight	BMI $\geq$ 25 kg/m <sup>2</sup>	64.4 %
Obesity	BMI $\geq$ 30 kg/m <sup>2</sup>	28.8 %
Raised blood glucose	Fasting plasma venous glucose $\geq$ 126 mg/dl or HbA1c $\geq$ 6.5 %, or on medication for raised blood glucose	17.3 %
Raised blood cholesterol	Blood cholesterol $\geq$ 190 mg/dl	24.7 %
Raised blood pressure	Systolic blood pressure $\geq$ 190 mmHg or diastolic blood pressure $\geq$ 90 mmHg	27.7 %

**Table 2:** Common risk behaviours contributing to NCDs among the Turkish population according to Kontseyava et al. (2018) and Üner, Balcılar, and Ergüder (2018)

Risk behaviour	Definition	Prevalence
Tobacco use	Current smokers	19.7 % of women 43.6 % of men 10.4 % of youth (13 - 15 years)
Alcohol consumption	Consumed alcohol in the previous 30 days	3.0 % of women 13.1 % of men
Low physical activity	Not meeting WHO recommendations for physical activity	53.9 % of women 33.1 % of men
Salt intake	WHO recommendation: 5 g per day	9.9 g per day
Low fruit and vegetable intake	Less than 5 servings of fruit or vegetables on average per day	87.7 %

## 2.2 The Turkish health system at a glance

With total health expenditure amounting to only 4.2% of GDP – or 1,227 USD per capita; 3.3% from government or compulsory schemes and 0.9% voluntary expenses – Turkey had the lowest figure among OECD countries in 2018; 296 USD in health expenditure per capita were spent out-of-pocket, also the lowest among OECD countries (OECD 2020b). Health services are financed through a social security scheme, the General Health Insurance Scheme (GHIS, Genel Sağlık Sigortası), which covers the majority of the population, and services provided by both public and private sector facilities. The Social Security Institution (SSI, Sosyal Güvenlik Kurumu), financed through payments by employers and employees, and government contributions in cases of budget deficit, constitutes the monopsonic power on the purchasing side of health care services. On the provision side, the Ministry of Health is the main actor and provides primary, secondary and tertiary care through its facilities across the country; universities are an additional major providers of tertiary care in the system. The private sector has gained power over recent years, particularly after arrangements paved the way for private provision of services to the SSI (Tatar et al. 2011). The HTP has brought significant improvements to strengthen primary and family care; however, Turkey continues to struggle with a shortage of health professionals, with the lowest numbers of physicians and nurses per population – 1.9 and 2.1 per 1,000 inhabitants, respectively – among OECD countries (OECD 2020a; OECD 2020c).

Within this system, the Gentest company places as a private service, which can be purchased out-of-pocket by clients on top of their GHSI insurance. The Gentest service does not replace a general or family care practice, but offers additional, more comprehensive and cross-disciplinary health status assessment and advice by placing a strong emphasis on patient history from all medical disciplines, and on a detailed account of the client's genetic background, health status, lifestyle and behaviour.

While the market of private health care schemes complementary or supplementary to the GHSI is growing, it is still not common, with only 3% of the population in a complementary scheme, and, as of 2017, one million Turkish inhabitants in a supplementary scheme (Erdoğan 2020). Private health spending is low also relative to the disposable household income of 21,989 USD gross net per capita per year in 2017 (OECD 2021), with only 1.21% (OECD average 6.92%), with one study finding a variation of out-of-pocket expenditure across income quintiles of factor ten (Yardim, Cilingiroglu, and Yardim 2010). Considering this background, the exclusivity of Gentest in terms of its pricing is particularly stark: Its services range from 1.200 USD to 6.100 USD, with the main product priced at 2.400 USD<sup>1</sup> for the initial health and behavioural assessment, Life Plan and several months of counselling follow-up. The consultee may opt for additional follow-up check-ups and tests later on at additional charge. Corresponding to its high cost, Gentest is exclusive in its services: It is, to our knowledge, the only company worldwide offering such a compilation and range of assessments and consultation.

---

<sup>1</sup>Prices are based on Gentest catalogue prices in 2019 of 1.050 EUR, 1.950 EUR, and 4.950 EUR, adding 8% VAT. For better comparability with other figures, they are calculated to USD using the average conversion rate in 2019 of 1.142 USD/EUR. Prices are given in EUR rather than TRY, as the Gentest price considerably depends on service providers outside Turkey *e.g.* for biosample analyses, keeping the EUR price stable despite the recent volatility of the TRY.

### 2.3 Gentest and the 7K Medicine approach

'7K Medicine' is an innovative approach to prevention and management of NCDs, developed since the early 2000s in Turkey. It aims to offer personalised, predictive, preventive, comprehensive, precise, evidence-based and participatory medicine (words that all begin with K in Turkish), enabling practitioners and health systems to more effectively deliver preventive and early treatment measures through highly individualised health status evaluation. This evaluation includes personal characteristics and personal and family medical history as well as lifestyle factors, genotyping, and biomarker analyses (Cesuroglu, Karaca, and Erge 2009; Cesuroglu 2016). An implementation model of 7K Medicine was first developed as GENAR at Hacettepe University and later founded as a private business with the name Gentest in Istanbul in the early 2010s. Gentest was identified as a best practice model for public health genomics in Europe by the Public Health Genomics European Network in 2008 (Cesuroglu 2016).

Gentest has been delivered to more than 2,000 individuals who, as part of the programme, provided comprehensive lifestyle and health data: it includes in-depth analysis of an individual's lifestyle, including intake of several macro and micro nutrients, nutrition patterns, physical activity and exercise, smoking status and assessment of the living and working conditions. Psychological questionnaires are applied to assess stress. Furthermore, various biomarkers are analyzed in specific subsets of individuals, such as genomic markers (nutrigenomics and chronic disease risk-related polymorphisms), broad check-up panels (blood and urine), hormone status, blood amino acids, gut microbiome, and heart rate variability. Based on these measurements, the business, *i. e.* practicing dietitians and a physician, supported by IT, admin and research staff, compile a comprehensive analysis of the client's health status and provide recommendations on lifestyle, nutrition supplements, medications and medical follow-up plans. The consultee is then followed-up over several months to aid and monitor their progress in implementing target behaviours, including physical and biomarker check-ups (source: personal communication, internal documentation).

Somewhat contrary to many mostly population-oriented policy interventions, Gentest offers a highly personalised approach to prevention and control of NCDs. It is a behavioural intervention, as it aims to assess and, if necessary, change, the client's behaviours regarding, for example, diet, physical activity, and screening appointments, considering their health status, environment and genetic background.

The Gentest service relies essentially on the communication, mediation and education between the staff consultants and physician on one side, and the consultee on the other. The consultee's behaviours as main outcome unfold in their individual environment of social, economic, natural and structural actualities. To understand, how, in these environments, the Gentest service brings about health behaviour changes in consultees' lives, we employ a transdisciplinary, theory-driven realist evaluation approach, and use qualitative data from implementors' and consultee's perspective.

## 3 Conceptual Framework

### 3.1 Realist Evaluation

Gentest is a complex intervention, comprising various actors and stakeholders; processes; levels of influence and outcomes (Connelly 2007; Craig et al. 2008). Acknowledging that “complex interventions need complex evaluations” (Elise’s paper), we adopt the realist evaluation approach, as first formulated by Pawson and Tilley in 1997 (Pawson and Tilley 1997). We do not aim to make judgement about “Does it work?”, but rather an understanding of “What works for whom, under what circumstances, and how?”

Although every evaluation effort accepts a certain set of axioms and theories, this is usually implicit, and in concurrence to whatever theoretical basis the programme itself is built on, or what is established in the respective field of work. Realist evaluation is explicit about the theoretical foundations it assumes, and they are discussed and negotiated as the evaluation progresses. As a result, a realist evaluation study starts by assuming a theory of how and why a programme works, which will then be revised and refined towards a more accurate reflection of reality as data is gathered and analyzed throughout the study, resulting in a final ‘programme theory’ (Wong et al. 2017a; Wong et al. 2017b; Wong et al. 2017e).

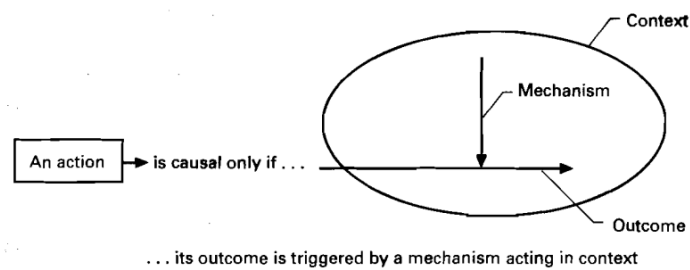
A realist evaluation identifies Mechanisms, or structures, of what the programme does, Outcomes of these programme mechanisms, and Context factors, which are basically all factors outside the programme mechanisms, which possibly affect the delivery and outcomes of the programme (the terms Mechanism, Context and Outcome will be capitalised in the following when used as RE constructs). These three elements together form Context-Mechanism-Outcome configurations (CMOc, figure 1), to show which parts or principles of the programme produce which outcomes under which circumstances (Pawson and Tilley 1997).

We use the conceptualisation of the realist Mechanism according to Dalkin et al. (2015), distinguishing the resource a programme offers, and the change of reasoning it evokes in an actor, to add a level of depth within the CMO configuration: It allows to carry the theory-derived programme principles into more technical aspects of implementation as they become evident from investigation of service delivery (resource); and it allows to focus on behaviour change as the eventual outcome, while still looking at the process of it in more detail, considering facets and aspects as described in the I-Change Model (reasoning) (figure 2).

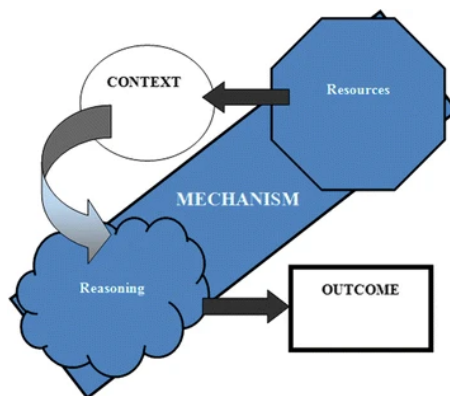
### 3.2 Integrated Model of Behaviour Change

Considering the central role of individual health behaviour change in our approach, we combine the realist evaluation approach with a behavioural model to build the conceptual framework for this study. We found the Integrated Model of Behaviour Change, or short I-Change model, to be useful and applicable for our purposes (figure 3) (Vries 2017; Vries et al. 2003).

It brings together a number of landmark behavioural theories (namely, Ajzen’s Theory of Planned behaviour, Bandura’s Social Cognitive Theory, Prochaska’s Transtheoretical Model, the Health Belief Model, and goal setting theories (Vries 2017)) and their constructs to form an explanatory model of an individual’s behavioural change as a process of awareness, motivation and action, where each of these stages have a number of cognitive elements, such as risk perception, perceived response efficacy, or intention, which are established constructs in behavioural science and psychology. This provides a comprehensive set of terminology to disentangle the behaviour change processes Gentest clients aim for and achieve throughout the programme.



**Figure 1:** Illustration of “generative causation” according to realist evaluation: In a given context, a mechanism triggers an outcome; this can be summarised as a context-mechanism-outcome configuration (CMOc). From Pawson & Tilley (1997)



**Figure 2:** The mechanism in realist evaluation is operationalised as a resource, which, under in the given context, elicits a change in reasoning that will lead to the outcome. From Dalkin et al. (2015)



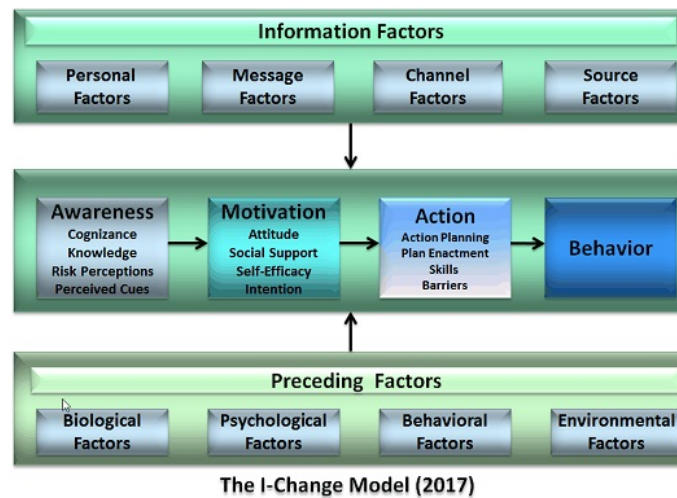


Figure 3: The Integrated Model of Behaviour Change. From <https://www.heindevries.eu/interests/change>.

## 4 Methods

### 4.1 Qualitative transdisciplinary evaluation design

An inherent component to the realistic evaluation approach, Pawson et al. (2005, pp. S1-28) have emphasised the importance of “active and ongoing dialogue with the people who develop and deliver the interventions, since they are the people who embody and enact the theories that are to be identified, unpacked and tested.” The transdisciplinary approach embraces and enhances this idea to “a new form of learning and problem-solving involving co-operation between different parts of society and science in order to meet complex challenges of society.” (Thompson Klein 2001, p. 7).

Grounded in an ongoing programme, this study aims to gather practice-based evidence that is applicable to the reality of programme implementation and development (Gabbay and Le May 2011). Through continuous consultation with stakeholders (*i. e.* fellow researchers, the programme designer and Gentest head physician, and the Gentest scientific advisor) throughout the project we co-designed study aims, methods, framing and dissemination, we integrate perspectives and knowledges to produce results that are both relevant and actionable (Nurius and Kemp 2014; Walter et al. 2007). The study was conducted in close proximity to implementation practice, with the main researcher working from the Gentest office alongside staff, and with two interactive workshops with all Gentest staff contributing to data collection and analysis (Bryson, Patton, and Bowman 2011; Thompson Klein 2001).

Qualitative data were collected in two phases, each also an iteration cycle of programme theory development: The first phase focused on implementation structures and practice, while the second phase enriched this architecture with clients’ experiences and perspectives.



## 4.2 Document analysis, observation and staff workshop on Gentest implementation practice

To understand how the Gentest service works for its consultees, it is necessary to understand what it does: To learn how Gentest as a business and health counselling service operates on a procedural level, how stakeholders – staff and consultees – interact, and which structures, aims and design guide the staff and the business as a whole in their service delivery. Cassell and Symon have published extensively on the value and suitability of qualitative methods to such organisational topics, and as well as methodical guidelines and compendia (Cassell and Symon 1994; Cassell and Symon 2004; Symon and Cassell 2012). According to them, only qualitative methods are sensitive enough to allow the detailed analysis organisational dynamics, and insight into the processes and stakeholders involved (Cassell and Symon 1994). To build such an understanding of the programme architecture and implementation practice, we analysed documents on and documentation from within the company, observed practitioners in their work, and held an interactive workshop with staff.

### 4.2.1 Data collection

**Document analysis** Documents regarding corporate vision and strategy, documentation of work processes, output documents for consultees, and coverage of the programme in academic literature was gathered from staff. Information was extracted on work practices and processes among staff members and among staff and consultees; staff tasks, responsibilities and organisation; programme design, aims and medical background; clientele, target groups, and business strategy; and form, elements, and content of the service delivered to the consultee (Bowen 2009).

These documents, and the “social facts” (Atkinson and Coffey 2004, p. 47) they produce, use, and share were used for three purposes: they provided supplementary research data on the company and business, and details of the service content, where there was no other evidence available and the documents were deemed suitable and reliable as a factual source; they were taken to suggest including specific issues and incidences in further data collection steps, such as observing specific situations, and asking specific questions in staff workshops and consultee interviews; and, as “text providing context” (Bowen 2009, p. 29), provided background information on the environment in which the staff operates and which the consultees experience (Bowen 2009).

**Observation** Observations were conducted during the primary researcher’s 6-week-long stay with the company in Istanbul between February and April 2020. During this stay, the researcher was living in a company-sponsored apartment shared with a co-worker and a co-researcher, spending the workday in the Gentest offices, and participating in the employees’ routine of working hours, schedules, and meetings. Participant observations, with the researcher adopting a participant-as-observer role, of Gentest staff were gathered in regular and event-specific meetings, and through day-to-day encounters in the office environment. Direct observations,

with the researcher taking a position of the passive observer, were gathered in meetings involving consultees (Brannan and Oultram 2012; Schensul and LeCompte 2012). The timeframe for on-site observations was cut short by the Covid-19 pandemic, necessitating, initially, reduced office hours, and eventually the researcher's departure from Istanbul. Nonetheless, the observations gathered allowed a sufficiently comprehensive insight into work practices and culture for the purpose of this study.

We observed the practitioners of the Gentest programme, *i. e.* the Gentest staff, in their “natural” setting as professionals, *i. e.* the workplace: the Gentest offices, meeting spaces and medical examination rooms. With an “ethnomethodological” perspective, as described by Clancey (2006), we sought to understand how they, among the staff, with clients, and with collaborators, “coconstruct what constitutes a problem to be solved and how the product will be evaluated” (Clancey 2006, p. 128). This perspective is suitable for our aim to build a programme theory, as it considers not only technical knowledge of actors, but also incorporates values and criteria for judging the quality of the work as an underpinning to how work activity becomes coordinated and rationalised (Clancey 2006).

Observations were documented as field notes and reflections in a journal.

Again, observation was intertwined with the document analysis and the staff workshop in this research phase, with observations including for example production of some of the documents that were included in the analysis, and the staff workshop addressing areas of work that were invisible to the observer.

**Staff workshop** After the first five weeks of observations and document analysis, a workshop was held with all local Gentest staff – the head physician, the attending nurse, five trained dietitian counsellors, the IT specialist, three staff scientists, and the administrative secretary, except the driver and two cleaning staff – to gather their feedback and additional input on these first results on programme implementation structure, based on document analysis and observation so far. Serving as both a group interview and a moment of action research, we aimed to, firstly, together discuss their individual and group roles in the programme; and secondly, to test our first findings and analyses against the practitioners' experiences, and identify the most relevant perspectives and aspects for the following research.

The workshop was held in English, and three of the staff who were not confident in their language proficiency were assigned “buddies” from among the other staff to help out with ad-hoc translations whenever necessary. Using a timeline structure combined with brainstorming, mapping and clustering techniques, we collaboratively developed a visualisation of programme architecture, staff roles and tasks, and work processes. The participants were asked to develop frame and structure the programme in terms of its aims and milestones, and to indicate their individual tasks, communication pathways, consultee encounters and resources, and place them in programme delivery as a whole. The workshop followed a semi-structured design, with sections outlined regarding aims and methods, and the participants were asked to take turns to add their input to allow for balanced and equal input, but space for emerging discussion, additions or questions was allowed and given. The workshop was, with verbal consent of

all participants, audio recorded, documented with an activity protocol, and the produced flip charts were digitalised for further analysis (Steyaert and Bouwert 2004; Wolfram Cox 2012). A preparation script and documentation protocol of the staff workshop is included as [supplement 1](#).

#### **4.2.2 Data analysis**

As a realist evaluation, our conceptual departure point for data analysis was the realist context-mechanism-outcome configuration (fig. 1). With its relatively abstract categorisation, it served as the first guiding framework for data analysis from the very beginning of the study, and would remain as such, perhaps enhanced but not in itself changed, throughout the study and for the compilation of a summative model. The first step in data analysis was, therefore, to outline: the scope of the programme, in content and form, to frame Mechanisms; factors that lie beyond the programme scope, but are relevant to its progress, which would make up Context; and which aims drive the programme, its practitioners and clients, and which results they achieve, to define endpoints and Outcomes. Within these major domains, we initially relied on inductive, bottom-up searching to examine the entire data set, as it was collected, for smaller and larger themes and patterns, before we would later on consider complementing the CMO framework with a suitable established middle-range theory, as is common in RE (LeCompte and Schensul 2010; Pawson and Tilley 1997).

Early on during data collection, a few hypotheses were brought forward by staff, especially the head physician, to formulate concrete CMOC's, which is an often used technique in RE programme theory building. However, we found they were rather too specific to build upon as a basis for a summative programme theory, so that we included them in further analysis, but generally opted for generally more open, inductive analysis approach, both in this first phase of data analysis, as well as when conducting interviews with clients later on, to first more clearly frame the understanding of Mechanisms, Outcomes, and Context.

### **4.3 Semi-structured interviews with consultees on expectations, experiences and outcomes**

#### **4.3.1 Data collection**

Informed by the basic understanding of implementation structures and practice of the Gentest service, fifteen consultees were interviewed about their expectations, experiences and outcomes as Gentest clients, in a semi-structured manner following an interview guide (Arnold and Nott 2010; Gugiu and Rodríguez-Campos 2007). The interviewee sample was provided by Gentest, and compiled to reflect sex and age groups of participants equally, and a range of experiences. A reflection upon the bias potentially inflicted by this sampling procedure is included under the discussion of limitations below.

Consultees were approached by the researcher with an introductory message via WhatsApp, as this is the usual way they stay in touch with their Gentest counsellor, after their counsellor had informed them about this study and asked for consent to share their contact with the researchers. Consultees were informed that their participation was voluntary and would be confidential. When consultees agreed to an interview, a time and platform was set. Interviews were conducted in English or in Turkish with a Turkish native speaker attending together with the interviewer to provide ad-hoc interpretation. At the beginning of the call, interviewees were sent an informed consent form in Turkish, and asked to, after going through it carefully, provide their digital signature via the SignRequest service, which proved technically challenging several times but worked out overall. An exemplary signed consent form is included as [supplement 2](#). With the interviewees additional verbal consent, interviews were recorded.

The interviews followed a loose semi-structured guide, addressing mainly four topic areas: defining the outcome the consultee expected, consultee’s service experience, consultee’s actual service outcomes, and consultee’s opinion on access factors. An overview of the topic areas and exemplary questions is shown in [table 3](#). The interview guide was piloted and revised with one of the supervisors of this study, who is also a Gentest consultee, but not directly affiliated with the company. Interviews were transcribed verbatim in a word processing software for analysis.

**Table 3:** *Topic areas and exemplary questions from the interview guide*

<b>Topic area</b>	<b>Exemplary questions</b>
Defining the outcome the consultee expected	I asked you to have this conversation because you are a Gentest client. My first question is: Why are you a Gentest client? Why did you choose Gentest? What did you expect from Gentest? How is becoming a Gentest consultee relevant or related to your health?
Consultee’s service experience	What was your experience with Gentest? Please describe/walk me through your “Gentest experience”. How did you get there, what was done and what did you do? Walk us through your experience of being a Gentest client: What happened? What was it like, how did it make you feel?
Consultee’s actual service outcomes	Were these outcomes appropriate for the health issues you mentioned initially? Are you happy with the outcomes? Did they address your concerns? Can you name three concrete changes in your daily life or routine that you made due to Gentest?
Consultee’s opinion on access factors	Would you recommend Gentest? To whom? Who do you think could benefit from Gentest, and who wouldn’t? Imagine talking to a friend about health, they mention they have some health issues and they ask you if you can recommend going to Gentest – what would you say? Would you recommend it to your family? Did you actually refer someone?

### 4.3.2 Data analysis

Interview transcripts were coded into a coding matrix spreadsheet, along two dimensions: programme mechanisms (y-axis) and a Mechanism-Context-Outcome progression (x-axis). Within the previously outlined CMO domains, each line of transcript would code for one example of a Mechanism, leading to the corresponding Outcome, with, if applicable, a mediating Context factor in between, as described by an interviewee.

The final coding matrix would include the categories Mechanism, Outcome, Resource, Reasoning, Context, and a section for additional free notes, either regarding specific CMOc's or other issues such as points of observation on interviewees, or observations or criticism from interviewees regarding the programme. An overview of the coding categories and their codes is shown in [table 4](#).

**Table 4:** Final categories and codes in interview analysis as used in matrix to code consultee interviews into CMOc's

Category	Codes
Mechanism	Personalisation; Precision, Prediction, Prevention; Comprehensiveness; Participation; mutual Trust and Responsibility
Outcome	Awareness; Motivation; Agency
Resource	description of each resource with verbatim quotes
Change in Reasoning	description of each change in reasoning with verbatim quotes
Context (if applicable)	description of context factors mediating between Mechanism and Outcome, with verbatim quotes

Two workshops were conducted with Gentest staff to collaboratively develop data analysis, one with the two main programme designers, and another with all counselling dietitians on staff. We discussed, compared, and clarified – anonymously – some reports from interviewees, for example whether they would classify as common and exemplary or extraordinary.

### 4.4 Ethical considerations

Ethical approval for this research was obtained from the Askadar University Ethics Committee on 10 March 2020. Ethical considerations followed the principles of the World Medical Association Declaration of Helsinki per Üsküdar University policy.

Gentest employees signed a general consent form at the beginning of the research which informed them of the purpose of the research and guidelines for workshop participation. Participants provided verbal consent to recording the in-person and online workshops, and recordings were destroyed following analysis. Outside of the workshops, some Gentest employees shared opinions or expertise privately that they felt would jeopardise their reputation or position at

work. In these cases, their right to privacy was upheld and attributable information was not shared with other employees or supervisors.

Consultee interviewees were contacted for interviews by the researcher after obtaining their consent to sharing their name, age, gender and contact via their counsellor for this purpose. Interviewees digitally signed a consent form which informed them of the purpose of the research, their rights as participants and the privacy of their data in Turkish. The interviewer did not have access to the interviewees' health or client data, and the interviews were used exclusively for this research, so that results were shared with Gentest only anonymously. Even when, due to the small pool of Gentest-selected interviewees, some instance of recognition of a specific experience on the side of Gentest employees cannot be ruled out, it was ensured that interview data would not affect Gentest service delivery. Participants provided verbal and written consent to recording the interviews; recordings were destroyed and transcriptions anonymised following analysis. The interpreter who facilitated some of the interviews signed a non-disclosure agreement.

## **5 Results**

### **5.1 Data characteristics and data analysis progression**

#### **5.1.1 Characteristics of data in document analysis, observation and staff workshop**

The documents gathered and analysed included eight digital or physical documents, either text-based or spreadsheets. The documents can be categorised in three groups: three were documents used for service delivery with consultees, another three were presentations of the business or internal processes, and two were academic publications. A detailed list is provided in [table 5](#).

Participant observations of the work at Gentest were gathered in regular weekly meetings with all 12 staff, where work updates and recent developments are shared, tasks are assigned, and specific cases are discussed (duration 45min - 1,5h each); in additional meetings of a subset of staff regarding specific cases, tasks, or research topics, for example an introductory meeting for the visiting researchers where the head physician explained the assessment and counselling process, the IT staff explaining the process of assembling consultee data into the Life Plan report to a fellow external researcher, or a meeting of the head physician two dietitians to compile a "case map" for a consultee with complex health issues or to prepare a consultee meeting (1-2 per week, 30min - 1h each); and daily observations in the shared office environment, where dietitians, IT and admin would work on their respective tasks, such as writing to or calling consultees, compiling consultee data and reports, preparing case discussions, or researching topics assigned, for example for product development or for a specific case.

Direct observations were obtained in two consultee encounters, both with verbal consent from the respective clients: the physical examination of a new consultee, including taking biosamples, by the head physician, nurse, and nurse assistant as part of initial health assessment (ca. 45min);

**Table 5: Documents analysed for this study**

<b>Document group</b>	<b>Document</b>	<b>Topicality</b>	<b>Format</b>	<b>Volume</b>
Documents used for service delivery to consultees	Documentation of health assessment interviews and questionnaires used	In use at time of study	Physical document	ca. 20 pages
	Consultee information file template where all quantitative consultee interview and assessment data (but not meeting notes or free text documentation, as dietitians may collect in addition) is collected and compiled into report format	In use at time of study	Spreadsheet	19 sheets, 14,305 cells, 548 pages, 2,516 formula groups <sup>2</sup>
	Life Plan report as a consultee would receive it, including updates to recommendations and documentation of follow-up interviews and check-ups	In use at time of study	Physical document	ca. 100 pages
Presentation of the business or internal processes	Slideshow for public presentation of Gentest and 7K Medicine	In use at time of study	Powerpoint presentation	25 slides
	Slideshow on business plan and business strategy for internal use, covering market competition and positioning, target clientele, pricing, brand identity and architecture, and portfolio strategy	In use at time of study	Powerpoint presentation	41 slides
	Slideshow on internal processes, tasks and responsibilities in the counselling service for training new staff	In use at time of study	Powerpoint presentation	6 slides
Academic publications	“A practice model for personalised healthcare with a public health genomics perspective” by Cesuroğlu, Karaca & Erge 2009	Published 2009	PDF of published article	4,946 words
	An unpublished concept paper draft on 7K Medicine as approach to health care from 2020 by Savaş (Gentest head physician) & Cesuroğlu (Gentest scientific advisor)	Draft as of January 2020	Text file	818 words



and the meeting with a consultee couple to discuss both their Life Plan reports, including their assessment results and recommendations (1,5h altogether).

All staff attending the workshop seemed engaged and provided valuable input, describing their roles, tasks, and the work processes they were involved in at Gentest. Several lively discussions unfolded regarding programme outcomes, outcomes feeding back into consultee engagement or referrals, and the relevance of different tasks for different purposes. The participants produced three flip charts summarizing their ideas.

### **5.1.2 Characteristics of interview data**

Of the initial sample of 15 consultees who were approached for interviews, three did not respond to the researchers' introductory message, and Gentest provided three additional contacts to reach the targeted sample size. Of the final sample of 15, seven were male and eight were female; four were below 40 years old, seven between 40 and 60, and four above 60, with men and women evenly represented in each age group. The interviewees had been consultees of Gentest for a range of durations, between five years and two months, but were all currently actively engaged with the programme. They reported both mostly positive experiences with the programme, but also some negative, and a few points of criticism. Interviews were conducted via video call, mostly WhatsApp as preferred platform. Four interviewees opted to have the interview in Turkish with ad-hoc interpretation as described above. Duration of the recorded portion of the interviews was between 30 minutes and 1:24 hours, and 54 minutes on average.

The workshops with staff to discuss interview analysis were important to contextualise consultee's experiences in the overall programme. The head physician as one of the two programme designers oversees all cases and could therefore provide valuable input on overall consultee characteristics and patterns, while the other staff, mainly counselling dietitians, were more immersed into the specific cases and long-term experience of their smaller group of consultees, and could give more detailed and differentiated accounts of consultees' progress.

### **5.1.3 Recursive and transdisciplinary data analysis**

As common when using ethnographic methods as we do in this study, analysis of the data is recursive: spiraling, iterative, continually revising, and oscillating between induction and deduction. Data collection, analysis and interpretation are intertwined, starting from the first day of data analysis and ending only with the final script (LeCompte and Schensul 2010). RE uses the term "retroduction" to describe exactly that as the basis of programme theory development: going back and forth between theory and observed patterns, iteratively moving towards a causal understanding (Pawson and Tilley 1997; Wong et al. 2017c). This non-linear way of data handling, however, is not easy to convey coherently, and can render eventual results somewhat detached from original data. To avoid intransparency of the eventual, rather abstracted results, we want to briefly recapitulate major steps in our analytical progression.



The findings from the first phase of data collection – document analysis, observation, and the first staff workshop – were used as an initial stage-setting of what to look for in a programme theory, and how to frame Mechanisms, Outcomes, and Context. Early on, two main themes emerged here that would become the basis of the final summative programme theory: 7K Medicine was identified as guiding theoretical concept in developing the Gentest programme, and was adopted as a starting framework for Mechanisms; and, considering the emphasis the programme put on the concept of “personalisation” and client-centeredness, we decided to adopt an individual consultee’s perspective “into” the service, and use individual health behaviour, or behaviour change, as axis for framing the programme processes.

While the endpoint of this process was for the practitioners mostly determined by the length of time the consultee chose to show up for check-ups or stay in touch via texting, the data collected in interviews solidified and concretised the understanding of Outcomes as a range of endpoints: From becoming aware of one’s own behaviour all the way to health benefit, prevention of disease, and healthy aging – which can all hold different meaning for consultees. Health behaviour change, and steps towards it, as one of points in this range that everyone could identify with, was found to be a practically useful middle ground between still reliably observable and already significant for the interviewees and the programme practice, and was thus adopted as the level of Outcome the programme theory would include.

While quite a few context factors had come up in the first phase of data analysis, this was much more focused on when interviewing consultees, when a wide range of instances when and how consultees’ environment influenced different elements of the programme and their own response became apparent – when comparing interviews, but often even brought forward by themselves, reflecting on their own experience. The breadth and depth of data here allowed the identification of Context factors that affect specific Mechanisms, but also of more structural or practical influences that shape the programme delivery and experience, to distinguish “levels of context”. These “levels” were also discussed with dietitians during the interview analysis workshop, and slightly revised and expanded based on their feedback.

Soon after data collection was completed, we adopted specifically the I-Change behavioural model as a middle-range theory, because it resonated well with the conceptual domains found, and was flexible enough to allow adaption and some conceptual re-structuring to reflect the patterns that had emerged, in order to build a meaningful and theoretically substantiated programme theory. The model also allowed to integrate to model of Mechanisms as resources and changes in reasoning, to include elements of implementation practice, and effectively transforming the model from a purely behavioural one into one linking a programme’s abstract principles and concrete actions with behavioural outcomes. The graphic summary of the resulting programme theory, shown in [figure 4](#), also graphically integrates both conceptual frameworks, superimposing the lattices of CMOC’s and the I-Change model.

The recursive progression of data analysis across both phases of data collection and after, and the continuous collaboration with staff to analyze and interpret the data means that all results – every CMOC, every resource, and every change in reasoning – are grounded in evidence from both implementation practice and consultees’ experiences. [Supplement 3](#) gives an overview of

Mechanisms, similar to the one below, with additional illustrative quotes by interviewees for each resource and corresponding change in reasoning.

## 5.2 Framing the programme theory with realist evaluation and I-Change model

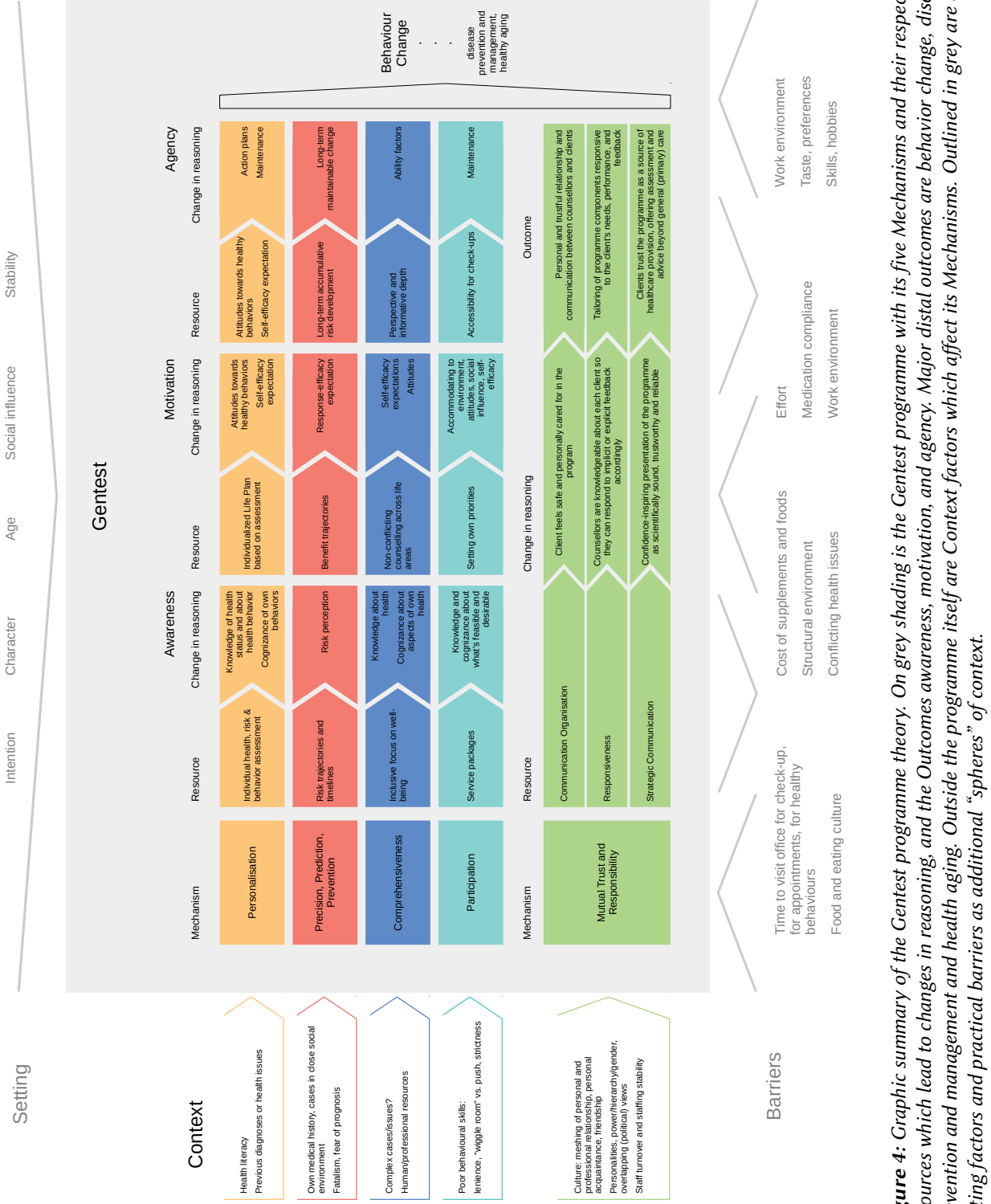
The programme theory formulated in this study applies the realist evaluation formula of CMOc's to the I-Change Model of health behaviour change. By using the I-Change model as a scaffold, the programme theory reflects mainly the journey of the individual consultee, who aims to change concrete health behaviours of theirs. As Outcomes, the three phases of behaviour change, awareness, motivation, and action (or agency, as the ability to take action), are adopted.

Mechanisms are cornerstone principles, or generative drivers of the programme, which are all relevant to each of these phases, or Outcomes. Each Mechanism is implemented, or operationalised through a concrete resource in each of the three phases, eliciting a certain change of reasoning in (mostly) the consultee and contributing to the Outcome. These resources were identified from Gentest implementation practices (*e. g.* a specific report, information, or communication), while the changes in reasoning were framed using the cognitive constructs defined in the I-Change model (*e. g.* knowledge, risk perception, self-efficacy expectation).

What is termed "Information Factors" in the I-Change Model turns out to be essential and central to a counselling programme, which runs on counsellors and consultees communicating and sharing information with each other. The relationship between these two, and which messages, channels, and sources are used is therefore conceptualised as a programme Mechanism in its own right, which we named Mutual Trust and Responsibility.

Context factors are any and all factors outside the programme that affect the programme functioning and effectiveness. Some elements that are included in the I-Change Model are not directly addressed by the Gentest programme and hence are also Context factors, rather than forming integral elements of this programme theory. These are namely "Preceding factors", "Social influences", and, to some extent, the vaguely framed "Barriers" (*e. g.* structural environment). Also "Intention" and "Perceived cues to action" are external factors, as they're understood to refer to a consultee's decision to join the Gentest service, and thus precede the processes within the programme.

[Figure 4](#) is a graphic summary of the final programme theory, comprising the scope of programme, and which Mechanisms within contribute how to behaviour change via building awareness, motivation, and agency; also indicated are context factors, outside the programme itself, and outcomes beyond behaviour change.



**Figure 4:** Graphic summary of the Gentest programme theory. On grey shading is the Gentest programme with its five Mechanisms and their respective resources which lead to changes in reasoning, and the Outcomes awareness, motivation, and agency. Major distal outcomes are behavior change, disease prevention and management and health aging. Outside the programme itself are Context factors which affect its Mechanisms. Outlined in grey are also setting factors and practical barriers as additional “spheres” of context.

### 5.3 The Gentest Mechanisms, corresponding Outcomes, and mediating Context factors

Based on the 7K Medicine vision, five Mechanisms of Gentest were identified: Personalisation; Precision, Prediction, Prevention (as one); Comprehensiveness; Participation; and Mutual Trust and Responsibility. They are observable in programme practice, and relevant to both implementers and consultees. This section gives an overview of all Mechanism, with a brief description of the principle, and a table of resources and changes in reasoning through which it contributes to the Outcomes awareness, motivation, and agency. Each subsection also includes the Context factors that influence the implementation or outcome of each Mechanism. [Supplement 1](#) contains an extended overview of the Mechanisms with additional quotes from interviewees illustrating their implementation.

#### 5.3.1 Personalisation

**Mechanism, resources, changes in reasoning and Outcomes** The term “personalisation” in medicine usually refers to pharmacological profiling, but it is meant in a different sense here: Personalisation in the Gentest counselling service covers medical and healthcare service provision more generally rather than pure pharmacogenomics or algorithmic risk stratification. As a health service business, Gentest tends to each of its clients individually, including assessment, counselling and follow-up. Each consultee undergoes extensive individual assessment of their health status and behaviours; receives a set of individually formulated recommendations based on this assessment; and is offered implementation support for these recommendations that meets each consultee in their individual current behaviours, living situation and environment ([table 6](#)).

**Context factors** How far the personalised health and behaviour assessment is able to provide the intended increase in knowledge and cognizance depends significantly on the consultee’s previous awareness. For those who already know a lot about their health and health behaviours, through their own medical history, their lifestyle, or general health literacy, results tend to be “as expected”. Others tend to take away considerable new, and sometimes surprising information. The assessment can be particularly informative for consultees who have suffered from health issues that had been previously unrecognised, not properly attended to, or not correctly diagnosed by other physicians.

#### 5.3.2 Precision, Prediction, Prevention

**Mechanism, resources, changes in reasoning and Outcomes** Rather than a generic population-based estimate for chronic disease risk, the consultee is given an individual and precise assessment of their health status, risks and outlook. Based also on the personalised assessment described above, specifically genetic and biomarkers, Gentest calculates risk scores

**Table 6:** Personalisation resources, corresponding changes in reasoning and Outcome, and Context factors

Resource	Change in reasoning	Outcome
Individual health, risk & behaviour assessment	Knowledge of own health status	Awareness
	Knowledge about health and healthy behaviours, about significance of nutrition and diet for well-being (general knowledge, not personalised recommendations)	
	Cognizance: recognition and reflection of own health behaviours	
Individualised Life Plan based on health, risk & behaviour assessment	Change of attitude towards the recommended behaviour: response-efficacy expectation and emotional and rational pro-con-lists	Motivation
	Improving perceived self-efficacy by step-wise change	
Implementation guidance of action plan is anchored in individual living circumstances	From intention towards action through clear action plans and behavioural support	Agency
	Supporting transition from trial towards maintenance by offering follow-up contact, meetings and check-up physicals and labs	
<b>Context factors:</b> Health literacy, previous diagnoses or health issues		

for a range of diseases, and illustrates risk trajectories, projecting current health status and behaviours into future disease development. To do so, Gentest uses publicly available tools such as QRISK® (*QRISK*) and the Siteman Cancer Center risk assessment (*Your Disease Risk*) in addition to its own proprietary calculations. It offers its consultees an individually calculated, clearly comprehensible picture of their risks and outlooks. Through illustrations and explanations, it also aims to build an understanding in consultees of lifetime risk and the accumulative long-term effect of their health behaviours, promoting healthy behaviours to prevent or delay disease development (table 7).

**Context factors** A consultee’s own medical history and that of their close social environment influences the impact of Gentest’s risk scoring and projection. Consultees who have seen friends or relatives suffer from a chronic disease tend to have a clearer severity perception, and, should they find out they are at considerable risk, take this information as more of a push to strive for prevention. If a consultee themselves has suffered from a disease in the past, this may create sensibilities and trauma, and the communication about persisting or new risks must accordingly be navigated tactfully. Some consultees have even completely opted out of receiving their risk scores as part of their assessment results, citing fear of bad prognoses and aversion to foretelling as reasons, connected perhaps to a faith-based fatalism. While for many consultees, these concerns can be turned into relief upon having clarity, and empowerment with an action plan to address their risks, some decline this approach.

**Table 7:** Precision, Prediction, Prevention resources, corresponding changes in reasoning and Outcome, and Context factors

<b>Resource</b>	<b>Change in reasoning</b>	<b>Outcome</b>
Numerical and graphical (precise, easily interpretable) risk trajectories and timelines show long-term accumulative development of chronic disease risk, clearly illustrated and explained, and make individual risk explicit	Risk perception: Quantification of individual risk, and explanation of risk quantification	Awareness
Clear definition of expected individual health benefit, also for long-term prevention of chronic diseases, through graphic risk trajectories and explanations	Attitude: Response efficacy expectation: quantification of prevention and immediate effect and benefit	Motivation
Graphical risk trajectories show long-term accumulative development of chronic disease risk, and relate current day-to-day behaviours with long-term health outcomes	From intention towards action through clear action plans and behavioural support	Agency
<b>Context factors:</b> Own medical history, cases in close social environment; fatalism, fear of prognosis		

### 5.3.3 Comprehensiveness

**Mechanism, resources, changes in reasoning and Outcomes** The assessment of health and behaviour, as well as the respectively formulated recommendations, go beyond common medical practice, bridge the established silos of medical, prevention, lifestyle, and behavioural expertise, and take a broad, inclusive approach to general practice including basics of several other medical disciplines. Under the label of a healthcare service, Gentest includes not only the consultee’s medical history and clinical issues they may experience currently, but is also open to subclinical and unexplained conditions that may affect them, based on a holistic understanding of health as complete well-being. Even beyond healthcare, its service also branches out into diet, exercise, and sleep, covering a breadth of fundamental and interrelated areas of life which are all relevant for health behaviour and health promotion. Besides this topical breadth, the programme also offers a range of perspectives and stimuli, from long-term outlooks and considerations on health status and aging to concrete implementation guidance through action plans applicable in daily routine (table 8).

**Context factors** Programme implementers claim that its comprehensive approach makes Gentest particularly beneficial for consultees with multiple or complex health conditions by compiling a holistic picture across medical disciplines, providers, and specialists that patients would otherwise have to navigate and coordinate by themselves. Not all interviewees felt that this aim was met, or even desirable. Some with complex issues did indeed rely on Gentest as a sounding board and comprehensive adviser for all their health concerns. Others with multiple and complex health issues, however, consulted Gentest mainly for its core area of expertise — nutrigenetics – and saw other specialists for other issues, without looking to

**Table 8:** *Comprehensiveness resources, corresponding changes in reasoning and Outcome, and Context factors*

<b>Resource</b>	<b>Change in reasoning</b>	<b>Outcome</b>
Inclusive understanding of well-being across areas of life, overcoming medical/prevention silos	Knowledge, cognizance: perceptions of being healthy as holistic	Awareness
Coordinated and harmonised (non-conflicting) whole-lifestyle-counseling	Self-efficacy expectations, attitudes: no conflicting advice	Motivation
Perspective and informative depth, from abstract reflection on own health, behaviours, and goals, to concrete exercises, meal plans, and practical, step-wise guidance for daily routine	Behavioural support to build necessary ability factors	Agency
<b>Context factors:</b> Complex cases/issues (?), human/professional resources		

connect these expertises. Beyond how consultees take up this particular aspect of the service, the comprehensiveness of Gentest counselling is also always dictated by the expertise available among its personnel. While at the time of this study all counsellors besides the head physician were trained nutritionists and dietitians, the counselling staff had in the past also included a psychologist, and could be expanded to include for example health coaches, behavioural coaches, trainers etc. One interviewee emphasised the synergy of their participation in Gentest and their experience with mindfulness-based stress reduction (MBSR), in which they received a coaching license while with Gentest. They suggested that the combination of these two approaches was particularly eye-opening, “one [saying] what to do, the other, how to do it”. Gentest has since introduced MBSR apps into their stress-related counselling repertoire, but more generalisable conclusions to its added value were not yet apparent. Another interviewee mentioned that she temporarily stopped Gentest during her pregnancy, and can’t follow all of her Life Plan recommendations while breastfeeding, which might be overcome by building better networks across medical and health disciplines, such as gynecologists or midwives, to be able to adjust the programme to the needs of women during pregnancy or breastfeeding.

### 5.3.4 Participation

**Mechanism, resources, changes in reasoning and Outcomes** The consultee is not only client of a pre-arranged service package, but can be a proactive decision maker about the purpose, significance, weight and focus of the programme for themselves. They are actively involved in formulating the goals they aim to achieve when joining the programme, and their priorities, preferences and decisions are acknowledged and supported in programme delivery (table 9).



**Table 9:** Participation resources, corresponding changes in reasoning and Outcome, and Context factors

<b>Resource</b>	<b>Change in reasoning</b>	<b>Outcome</b>
Discussing and choosing programme focus based on different service packages offered	Knowledge and reflection about what is feasible, achievable, and desirable for one’s own health with (by joining) the programme	Awareness
Negotiability to set priorities within programme, and between programme and lifestyle, <i>e. g.</i> beliefs, preferences	Fitting the programme and the effort it requires into the consultee’s intention, preceding and environmental factors, attitudes, social norms, and own self-efficacy – attitudes	Motivation
Accessibility for check-ups (meetings and/or labs, as preferred)	Long-term follow-up with the programme, with extent and depth of the engagement adaptive to client’s priorities and perceptions of health	Agency
<b>Context factors:</b> Poor behavioural skills: lenience, “wiggle room” vs. push, strictness		

**Context factors** The participative nature of the programme gives the consultee the freedom to ‘fit’ the programme into whatever space they make for it in their life. With regard to adapting to a consultee’s commitment, however, this flexibility can result in a lack of insistence. Consultees who are actually aware of the importance of changing their health behaviours, and even motivated to do so, but fail to go through due to poor enactment skills may also fail to clearly identify or communicate their need specifically for behavioural support. It is then challenging for counsellors to pick up on the challenges their consultees experience, and balance their behavioural support between leaving wiggle room for the consultee to accommodate whatever keeps them from putting their intentions into action – stress, instability, lack of time, circumstances – on the one hand, and pushing for action with cues and monitoring on the other. Psychological training among counsellors may strengthen the programme in this regard, but the only interviewee who did work together with the formerly employed staff psychologist for behavioural support reported they didn’t particularly benefit from their counselling.

### 5.3.5 Mutual Trust and Responsibility

**Mechanism, resources, changes in reasoning and Outcomes** The programme (r)evolves around the relationship and communication between counsellors and consultees, and these are characterised by mutual trust and responsibility: Counsellors are trusted by clients to responsibly deliver and adapt the programme to the client’s individual needs and wishes, using their professional expertise and skills, and with the client’s physical, emotional and social well-being as central goal; while the clients are trusted by their counsellors to be active, responsible participants, taking charge of their own lifestyle and sharing feedback about successes and barriers with their counsellors. In implementation practice, this manifests in three ways: the terms on which the communication between counsellors and consultees is organised, to build this trustful relationship; the way counsellors, based on their knowledge and expertise on each of their consultees, can responsively tailor the programme and its components to their needs;



and the presentation of the programme as scientifically sound and transparent, which consultees can trust and confide in. It results not in awareness, motivation, or agency specifically, but more fundamentally shapes the platform on which the Gentest service takes place throughout these phases (table 10).

**Table 10:** *Mutual Trust and Responsibility resources, corresponding changes in reasoning and Outcome, and Context factors*

<b>Resource</b>	<b>Change in reasoning</b>	<b>Outcome</b>
Communication Organisation	Client feels safe and personally cared for in the programme	Personal and trustful relationship and communication between counsellors and clients
Responsiveness	Counsellors are knowledgeable about each client so they can respond to implicit or explicit feedback accordingly	Tailoring of programme components responsive to the client's needs, performance, and feedback
Strategic Communication	Confidence-inspiring presentation of the programme as scientifically sound, trustworthy and reliable	Clients trust the programme as a source of healthcare provision, offering assessment and advice beyond general (primary) care

**Context factors:** Culture: meshing of personal and professional relationship, personal acquaintance, friendship; personalities, power/hierarchy/gender; overlapping political views; staff turnover and staffing stability

**Context factors** This Mechanism seems to be strongly mediated by cultural and individual factors. The relationship between counsellors and consultees tends to be friendly and communication informal. Many consultees consider the head physician a personal acquaintance or even a friend as well as a health professional. This relationship is sometimes encouraged with invitations social events, and may be supported by shared political or ideological views such as criticism on the Turkish government or health system. Cultural contexts where professional relationships are more distant, and distinctions between the personal and the professional are stricter may pose a barrier to the trustful and easy rapport that is essential to effective service delivery. The authority the head physician and programme designer enjoys may also be related to his identity as a senior White male physician in the context of respective patriarchal stereotypes. Another, more economically-driven determinant to establish long-term relationships between counsellors and consultees is the length of employment of counselling staff. One interviewee emphasised how the repeated change of their counselor over just a few months bothered them as a consultee. This personnel stability or turn-over of course hinges on a plethora of other factors, economic, strategic, organisational and personal.

#### 5.4 Larger setting and practical barriers as additional levels of context

A key premise of realist evaluation is that the mechanisms through which programs work will only operate if the circumstances are conducive (Pawson and Tilley 1997). Based on the insights

of both consultee interviewees and programme implementers, a number of circumstances were identified which affect the programme in one way or another. Strictly speaking, Context in RE refers to factors that affect specific Mechanisms. However, as Wong et al. point out, “different ‘types’ of context interact and influence each other. Moreover, contexts operate at all levels of systems, from the atomic to the cosmic, and the different levels also interact and influence each other. The challenge is to identify what is relevant for the particular investigation.” (Wong et al. 2017d, p. 1)

Besides the factors influencing the programme on the level of a particular Mechanism, two other “levels” of context factors emerged in our study: they were relevant in implementation practice and highlighted by consultees, but affect the programme either rather more generally as a whole – the “setting” factors; or, as they arise from the environment, pose concrete, practical “barriers” to the programme in more specific instances, such as regarding a single piece of information, or a single behavioural recommendation.

#### 5.4.1 Setting circumstances affecting the programme as a whole

The setting does perhaps not so much influence the programme, but rather shapes it: by way of its design, Gentest necessarily requires a number of context factors that facilitate consultees joining the programme, and succeeding in reaching positive outcomes. They arise from the space Gentest takes both in the society at large in which it is practiced, and in any individual consultee’s life circumstances wherever they are met, and affect whether and how the service it offers as an entirety takes place there.

**Intention** The factor most prominently discussed with both staff and consultees was the consultee’s intention. As pointed out above, intention is also a construct included in the I-Change model, as an element of motivation; however, the decision to join the Gentest programme, and thus forming an intention as to why and what to achieve by it, is mostly taken before, preceding the actual programme. A consultee’s intention is essential to become a Gentest consultee in the first place, and it strongly shapes the way they engage with the entire programme when they have. While for many consultees what they seek is largely coherent with the business model Gentest advertises and the market niche it serves – comparatively costly, but comprehensive health counselling with particular focus on chronic disease prevention and healthy aging – some clients are exclusively interested in particular elements. For example, some purchase the service to learn about their genetic background, and don’t engage with the long-term counselling follow-up. While the consultee’s intention may change while in the programme – perhaps based on the input gained from the programme – this is not the rule.

**Character** Closely linked to intention, and perhaps also a factor in developing it, many interviewees considered certain character traits to be important to succeed to change their lifestyle with the programme: being disciplined, future-oriented, risk-averse, responsible and diligent. Fear of being ill in the future was cited as a driver by some, but many mentioned fear

of a bad prognosis, aversion to “fortune-telling”, and a fatalistic attitude to be reasons for others to not join the programme. While for some consultees, this perception of fear could be turned into empowerment of knowing and taking responsibility of their own health, others avoided it by asking not to include risk trajectories or projections into the health assessment.

**Stability** Stability is another facilitating factor, both for choosing and joining the programme, but even more so for implementing Life Plan recommendations. On a personal level, an impending move or temporary living situation or employment, as well as frequent traveling could pose a barrier to trying to build a new routine. On a more systemic level, the Covid-19 pandemic specifically interrupted almost all interviewees’ lives in one way or another, and hindered their efforts to build healthier routines, for example for consultees who weren’t able to go out for exercise, follow-up appointments, or errands anymore (due to the curfew for those over 65 years implemented in Turkey), or didn’t feel safe to do so, or due to closed shops, malls and bazaars. Several interviewees also spoke of “opportunities” to work towards a healthier lifestyle, or “the right mindset” – when, perhaps after a while of pondering and intending, circumstances would align just right to take action.

**Age** The age of the consultee when joining the programme was suggested as a factor to overall effectiveness of the programme by many interviewees. They suggested it may be easier to change incumbent routine behaviours at a younger age; however, some also found older people with developing comorbidities and age-related health issues may benefit particularly from the comprehensive Gentest approach, adding a holistic perspective to the otherwise siloed healthcare offered by public providers. Gentest staff emphasised the stronger preventive effect for clients who join and implement a healthy lifestyle at a younger age.

**Social Influence** Many interviewees also found profound social influence on their experience with Gentest, beyond the fact that their social environment likely encourages the general notion of health as a valuable resource and disease prevention as a sensible investment. Some joined Gentest following recommendations from family or friends, many had recommended it to others, and some intended to gift it to family members. 9 out of 15 interviewees had joined the programme together with their partner, and several saw this as a positive influence, even when concrete recommendations would differ between them. Gentest staff pointed out that often, one partner would be more involved and ‘pull’ the other. Roles in the household, such as meal and shopping responsibilities, and gender roles, *e. g.* supporting each other by going to exercise together, were suggested to be a powerful factor in such constellations. Nonetheless, being ‘dragged’ into the programme, be it by a partner, parent or anybody else, without any own volition or interest will most certainly not do much good, consultees and implementers agree. Only one of the interviewees elaborated on herself being the only one to take part in the programme in her closer social environment, including the household she lives in with her parents and siblings. She noted that while it takes some strength to ‘deviate’ from her environment and stick to her new lifestyle, she does manage and find it rewarding. She not only

feels and sees (in check-up visits) her health status improving, but also feel she's now gaining autonomy as she's taking more responsibility for her health, and successfully so.

#### **5.4.2 Practical barriers overcome through responsive programme design**

Through the individualised and responsive programme design, context factors that would affect the practical implementation of recommendations by the consultees are often merely circumstantial barriers. They may arise as a result of larger circumstances, such as the setting described above, but, rather than shaping the entire programme, they pose simpler barriers and circumstances that can be addressed by adapting the programme. They can be overcome by the counsellor becoming aware of the issue and providing advice more applicable to the specific situation of the individual consultee, and tailored behavioural support. Importantly, the consultee's personal commitment is also determinant of how easily they overcome such barriers.

Even if a barrier can't be overcome *per se* to implement a specific behaviour, it may be circumvented: it is acknowledged and the programme re-focuses elsewhere, rather than wasting energy on a lost cause. This responsiveness (as described above as resource under mutual trust and responsibility) also avoids consultees getting frustrated with repeated but inappropriate and vain prompts, and highlights the comprehensive programme approach to building an overall healthier lifestyle rather than 'getting stuck' on singular behaviours (*e.g.* regular exercise) or routines (*e.g.* an exercise routine that the consultee doesn't enjoy or lacks equipment for). Examples for such barriers to specific behaviours are listed in (table 11).

### **5.5 Programme Outcomes and Feedback**

#### **5.5.1 Range of programme outcomes besides and beyond health behaviour change**

While awareness, motivation and agency for health behaviour change were defined as the primary programme outcomes for the purpose of this study, they represent only a fraction of the outcomes Gentest aims for, and consultees experience. The variety of outcomes interviewees reported illustrates the breadth of effects the programme brings, as well as the range of perceptions consultees draw on to define and describe their health:

While reported outcomes were overwhelmingly positive (as to be expected considering the sample and recall bias), a few negative effects were also raised. Namely, one interviewee reported unintended weight loss and resulting health concerns resulting from a strict initial diet phase; another reported insensitive and inappropriate communication with a heart attack survivor regarding their relapse risks. Both brought the issues to their counsellor's attention and were able to resolve them.

**Table 11:** Practical barriers arising from setting than can be addressed and overcome through individualised and responsive counselling

Target health behaviour	Barrier
Diet	<ul style="list-style-type: none"> <li>• Food and eating culture, taste and preference (<i>e. g.</i> sweet or savory dishes, going out to eat)</li> <li>• Household constellations of living (and eating) with others/family, responsibilities for groceries and cooking in the household (self, partner, housekeeper, delivery service, ...)</li> <li>• Work environment (or home office) and provided/available there</li> <li>• Structural environment: shopping options, gardening space</li> <li>• Skills like gardening or developing new recipes</li> <li>• Pregnancy, nursing</li> <li>• Conflicting medical issues, <i>e. g.</i> migraine</li> <li>• Cost and effort of grocery shopping and meal preparation (less so than for nutritional supplements)</li> </ul>
Nutritional supplements	<ul style="list-style-type: none"> <li>• Cost and availability</li> <li>• Ability to adhere to pills schedule (especially combined with medications)</li> </ul>
Exercise	<ul style="list-style-type: none"> <li>• Access to outdoors, parks, gyms, home equipment, walking destinations</li> <li>• Preference, <i>e. g.</i> for outdoors, gym; endurance, HIIT, yoga</li> </ul>
Medical check-ups	<ul style="list-style-type: none"> <li>• Cultural/social taboo of stool sample</li> </ul>
Time commitment and availability	<ul style="list-style-type: none"> <li>• Clients who live far away from the office may see other practices near them to get <i>e. g.</i> blood work or check-ups and then share results with Gentest for consideration</li> </ul>

**Table 12:** Range of outcomes reported by interviewees

---

Distinct changes in reasoning, <i>e. g.</i> knowledge and cognizance, self-efficacy perception, or behavioural skills, resulting in increased awareness, motivation or agency
Concrete maintained behaviour changes, <i>e. g.</i> more regular eating and sleeping patterns, regular exercise, diet changes
Improvements in risk factors like biomarkers from blood work ( <i>e. g.</i> blood cholesterol levels) or anthropometric measurements ( <i>e. g.</i> body-fat-ratio, body weight) through either behaviour change ( <i>e. g.</i> exercise, diet) or medication ( <i>e. g.</i> insulin resistance, vitamin D)
Detection of early/pre-pathological disease stages, <i>e. g.</i> precancerous colon polyps, insulin resistance, and referral to medical treatment, appropriate lifestyle recommendations and/or pharmacological treatment
Recognition of previously undiagnosed issues, <i>e. g.</i> factor V Leiden variant, lactose intolerance, oligomenorrhoe, malnutrition, and intervention (appropriate lifestyle recommendations and/or pharmacological treatment)
Improved management of previously diagnosed issues, <i>e. g.</i> migraine, hyper- or hypothyroidism, dermatological improvements of skin, nails
Improved rehabilitation from myocardial infarction, better mobility
Feeling more productive, effective at work
Feeling better, happier, more energetic, stronger, more self-confident; getting compliments from friends for looking young and healthy
Improved mental health through knowing about one's risks and acting to reduce them, rather than feeling fear of the unknown; lifting a "psychological burden" caused by overweight and self-imposed pressure to lose weight; improved emotional balance

---

### **5.5.2 Immediate effects create positive feedback for long-term engagement**

For many consultees, the or one of the main purpose of joining Gentest is the prevention of chronic disease later in life, and maintaining their health in higher age. However, this very distal outcome is complex to grasp, and even harder to monitor in the absence of an experimental control or measure. This applies in particular to younger participants, and those who are healthy when they enter the programme.

Many interviewees, however, reported much more immediate positive effects of the programme, often unexpected, that confirmed their trust in the programme, and strengthened their commitment. Perhaps associated with the changes in diet that are implemented early on after joining the programme, not only did some interviewees report intended weight loss, but the majority (9 out of 15) reported considerable improvements in their overall well-being within the first two to four months of their participation, like feeling better, or more energetic. The strength, or even the mere occurrence of this effect surprised many of the consultees who experienced it, independent from whether they had felt healthy when entering the programme or not. Importantly, this is not to evaluate the health benefits of the programme. However, in the absence of a reliable indicator for the long-term effects of the programme, or even experimental evidence for its effectiveness, this resulted in a positive feedback loop for consultees to stay engaged with the programme also long-term.

To note, not necessarily does the absence of such immediate effects result in a reverse, negative feedback, discouraging clients to further engage, at least among the interviewee sample in this study. However, the interviewees for whom this was the case seemed to be focused on the long-term prevention aspect of the programme, and expected as much: that they were healthy now, and had joined to programme to maintain their health as it is.

## **6 Discussion**

This study, together with a study developing an outcomes measurement framework for Gentest, is the first attempt to evaluate the Gentest programme, and provides first evidence of the nature and scope of outcomes it produces. By focusing the evaluative lens on behaviour change, we created an assessment framework that is intuitive in scope and applicable to implementation practice. The I-Change model, an integrated behavioural model, functions as a conceptual map to navigate the assessment of the behaviour change Gentest helps its consultees achieve. It helps to outline the way Gentest paves for its consultees, what barriers it can target, and what is beyond its scope.

The Gentest programme is singular in its design, but it is designed to counter challenges many health systems are meeting today and shares a vision of healthcare transition with other scholars and practitioners. This evaluation and programme theory of Gentest offers a first idea of what it can offer to solve these challenges, and how health systems may learn from its innovative model.

## 6.1 Applying the I-Change model for a realist evaluation of Gentest

The I-Change model was first formulated around 2003 in the context of smoking, but has since been continually developed and applied in a wide range of contexts (Vries et al. 2003). It is not the only integrated theory of behaviour change, but suits the purpose of this study well as it shares some basic characteristics with the framing of the Gentest programme by its designers, such as the procedural component on health behaviour change (Cesuroglu, Karaca, and Erge 2009; Vries 2017). Superimposing the model with elements of programme theory or theory of change inherent in programme documentation and implementation practice give an insightful leverage point to find overlaps and contrasts, towards developing a final programme theory. The I-Change model has been used for programme theory building before, but only featured less prominently to refine methodical elements (Stralen et al. 2008; Wagemakers et al. 2018).

The I-Change model particularly adds to its progenitor models by elaborating on the procedural nature of behaviour change, and formulating premotivational and postmotivational factors. Eventually, however, it assumes, as many other behavioural models do, that behaviour change is basically driven by intention (Vries et al. 2006). The construct has been situated slightly differently in different versions of the model, but is concurrently central in the behaviour change process, as a direct outcome, or element of motivational factors, and a necessary condition to taking action (Vries 2017; Vries et al. 2003; Vries et al. 2006). Acknowledging intention as a context factor more than an internal element in the Gentest programme theory is perhaps the most interesting insight into what the Gentest programme cannot provide. Even though the programme generally seems to succeed to build awareness and motivation in consultees through the health assessment and Life Plan guidelines, this does not automatically result in intention, as the I-Change model would suggest. Instead, it rather seems that what consultees make of their raised awareness and boosted motivation depends on their intention. Staff counsellors concur that while consultees' intention is critical for behaviour change, it is particularly hard to build: Only in rare cases have they succeeded to engage consultees in the programme long-term and follow through with Life Plan recommendations, when this was not the consultee's initial intention. This notion resonates with earlier quantitative studies from other contexts that found that some, but not all variation in intention can be attributed to demographic, premotivational and motivational factors (Cheung et al. 2016; Hoving, Mudde, and Vries 2007). Further research into what might form or change intention could offer opportunities for Gentest to integrate this element more solidly into their programme theory, and potentially reduce their attrition of consultees for longer-term follow-up counselling.

Among the elements that are integral to the Gentest behaviour change process, we postulate that attitudes are the main determinant and leverage through which Life Plan recommendations are taken into consideration and towards implementation (and, given they have the necessary abilities and in the absence of barriers – both, again, possibly with the assistance of Gentest – implement them). They also seem to be the basis for some of the practical barriers, so that reshaping attitudes or adapting recommendations enables Gentest counsellors to provide more tailored and applicable guidance for consultees. The attitudes construct has received some attention in the literature, and has been adopted in the model as a complex, multi-faceted



element. Dimensions of expected advantages and disadvantages, or pros and cons of a certain behaviour, and of emotional or rational attitudes are distinguished and have different impact (Vries 2017). A study on cervical cancer screenings indicated emotional cons may sometimes be the most powerful predictor of behaviour (Knops-Dullens, Vries, and Vries 2007). A more detailed and explicit analysis of attitudes towards the different behaviours Gentest targets, and how premotivational factors may determine and change them could help Gentest counsellors provide even more tailored and effective guidance.

Finally, on a more abstract conceptual level, the I-Change model has not, to our knowledge, been combined so elaborately with realist evaluation. This combination for programme theory building allows interesting insights particularly for the notion of Context: it allows not only to identify elements that are external and disconnected to the programme, but, as elements integral to the original I-Change model, offers a perspective on how these external factors interact with and influence the programme. While the programme may not be designed to directly address them, they can be acknowledged, and their effect analysed to improve the programme by integrating or shaping around them. The complexity, multi-layeredness, and elasticity of Context factors we find in regard to the Gentest programme substantiates an advanced understanding of Context as explained for example by Dalkin et al. (2015) and Wong et al. (2017).

## **6.2 Perspectives towards effective prevention and management of complex chronic diseases in healthcare**

By asking for underlying causal patterns in a programme evaluation, realist evaluations aim for a better understanding of whether and how a programme is transferable from one environment to another. 7K Medicine was theoretical principle behind the Gentest programme and one of the stepping stones for the programme theory developed in this study, but in itself is a vision much more geared towards a public health system. Gentest as its implementation model offers insights into how a public health system could implement its principles, and how this implementation could offer to add value to it, in Turkey and beyond, but also the limits it encounters in practice when trying to transfer the programme to a broader, more publicly accessible scale.

Through our analysis, we show that the 7K Medicine theoretical principles are indeed reflected in the practical implementation of Gentest, and some of its principles even appear to be generative forces that drive the programme towards its Outcomes. The addition of mutual Trust and Responsibility as a Mechanism emphasises the role that providers and their conduct take. It may be somewhat telling that this particular component, even though so vital to the programme, wasn't part of the 7K Medicine principles, and it indicates the strong cultural embeddedness of the current implementation model.

In its current setting, nonetheless, the programme seems to be doing at least some things right. While no quantitative evaluation of proximal or distal health outcomes (health behaviour change or health benefit) is available, the existence of a steady client base, the continuous operation of the business, and the accounts of interviewees in this study – positively biased, as discussed,

but still part of the spectrum – indicate the successful provision of a health and lifestyle service that is in demand. Specifically, there seem to be two areas where interviewees, and consultees in general, draw particular benefit from Gentest over the public health system: individualised prevention of chronic disease and healthy aging, and coordination of care.

### **6.2.1 Individualised disease prevention**

Many of the interviewees pointed out, consultees feel that their national public health system fails to take sufficient measures for the prevention of complex chronic diseases, and they want to take individual action under professional guidance to stay healthy and active in higher age.

Leaving its unknown health effects out of consideration, the programme faces more practical limits to its scalability and transferability towards broader implementation: high individual cost was often cited as a barrier, and two of the most basic elements of the service – above-standard testing and high staff-client ratio – are the two main cost drivers of the programme. It has been suggested by programme designers that the cost of testing might decline in the near future with advancing technological means and increasing number of clients, but it is not clear when such a trend might be reflected in programme pricing.

On the other hand, a more differentiated understanding of what elements of the programme offer which benefit for clients – *e. g.* raising cognizance, or providing behavioural support – could open up possibilities for a more targeted delivery in a broader, lower-threshold client base, without entirely compromising its comprehensive approach. Further research on how each of these resources meets the needs of specific groups, those with specific risks, concerns or medical histories, or aid the management of specific conditions or comorbidities, perhaps based on the same or a similar behavioural model that we use here – including a quantitative evaluation of health behaviour change and health effects – could enhance this understanding. With a more targeted approach to delivering the services the programme offers – either within its current form as a coherent business, or beyond, by more strongly out-sourcing to independent practitioners – resources could be applied more efficiently. Arena and colleagues (2016) propose the profession of a “healthy lifestyle practitioner” specifically to take such a role, providing healthy lifestyle interventions within a healthcare system. For example, as mentioned earlier, some clients are keen to know their genetic background, perhaps based on medical histories in their families, but are not interested in long-term engagement with the program; for others, the results of the health assessment are not at all surprising, but they specifically want long-term behavioural support to gain agency to implement what they already know would be a healthier lifestyle for them. Behavioural interventions alone have been shown to effectively help prevent weight gain in healthy young adults, achieve weight loss in obese individuals, and prevent obesity-related morbidity and mortality – and they seem to do so particularly well when including some of the ‘Gentest virtues’: comprehensiveness across diet, exercise, and behavioural support; long-term follow-up; and intensive contact to the counsellor (Lv et al. 2017; Strong et al. 2008; US Preventive Services Task Force et al. 2018). The Gentest programme cannot force its ambitious intention upon potential clients, but it can include the intention construct into designing its services, and perhaps look for opportunities to stimulate

clients' intentions to follow a healthier lifestyle. Risk perceptions and cognizance, in particular, have been suggested to act as door-openers of sorts for intention, motivation and outcomes in behavioural interventions (Ferrer and Klein 2015; Kasten et al. 2019; Sheeran, Harris, and Epton 2014).

It is clear that Gentest offers something radically different from current public health services and structures, and the environment particularly in Turkey, where public health services are widely considered insufficient and met with a certain distrust, contributes to how the programme thrives. Nonetheless, it shows that the individualised measures to health promotion and chronic disease prevention it offers can add significant value to generalised and often rather sedate public efforts, in Turkey and elsewhere.

### 6.2.2 “Integration” of care

Particularly for those with comorbidities, chronic or complex health issues, Gentest aims to integrate or coordinate medical and care disciplines. Gentest practitioners and also some interviewees confirmed that in many such cases, Gentest succeeds to take part in, or build and manage a collaborative care network around the consultee. Such networks have been framed as a response to a fragmented delivery of health and social services, a problem observed in many health systems, to improve health service access, quality, user satisfaction and efficiency – to deliver, in short, “people-centred” health services (Gröne and Garcia-Barbero 2001; WHO Europe 2016).

Several efforts of national health systems or individual providers to formalise healthcare networks and “integrate” health services have developed over the past two decades, albeit with very different aims, scopes, and strategies, in very different contexts (Bardsley et al. 2013; *Repository of best practices*; Middleton et al. 2018; Pettigrew et al. 2019; Sheaff et al. 2018; Smith et al. 2020; WHO Europe 2016). Their evaluation, comparison, and formulating conclusive or transferable assessments is proving complex (Bardsley et al. 2013; Hughes 2019; Kelly et al. 2020). Even basic terminology is often confusing, as Sheaff et al. (2018) point out in their realist review of multispecialty community provider models: “We put the term ‘integration’ within quotation marks because research and policy documents often conflate three distinct concepts: (1) co-ordination – the deliberate combination, connecting and sequencing of separate but interdependent resources, above all, individuals’ care activities, into a single care process; (2) continuity – a term covering the cross-sectional, longitudinal, flexible, informational and relational continuities of care; the common element is the non-interruption of care co-ordination; and (3) integration – use of a single organisational structure to co-ordinate care.” (Sheaff et al. 2018, p. 5, citations from the original not included)

Gentest does all of these to a certain extent: under its own roof, it integrates several disciplines, as outlined in the Mechanism Comprehensiveness: mainly health promotion; general medicine in an broadened understanding including basics of internal medicine, mental health, endocrinology and laboratory medicine; genetics; nutrition; and lifestyle medicine. These are all integral to the Gentest service, and this breadth, and Gentest’s unique way of connecting them, is one of,

if not the main reason clients join the programme (and pick a specific service package with the components they are interested in).

Beyond that, Gentest may coordinate with other services and practitioners, including other primary, secondary, and community health services as well as others not traditionally considered part of the health system, such as social care and lifestyle services. There doesn't seem to be a consistent policy in place in the programme on how or when to build and organise such collaborations, except that when it is suggested to the consultee to do so, as discussed above, consultees differ in whether and how much they want Gentest to take such a coordinating role. Examples from our data include recommending a food delivery service to a consultee who doesn't cook, communicating with a physician in another city, where a consultee temporarily lives, to obtain biosamples and lab results, or referring to a specialist for diagnostic workup of suspected precancerous colorectal lesions or for routine screening appointments that a consultee was reluctant to take.

Continuity of care is also part of the programme through its long-term follow-up and regular check-ups, and the individually assigned counsellor, but again it is very much up to the client whether they choose to continue to engage – and pay for – the service. Some go on to continually work on their adherence to the Gentest recommendations, stay in touch with their counsellor and have regular check-up appointments for years, some even view the Gentest head physician as “their” family physician who acts as their primary care provider – while others are in for a one-off assessment and are never seen again.

The variety with which potential and actual Gentest consultees – among our interviewees as well as more generally according to the Gentest counsellors – accept and value these programme elements of integrating general practice with lifestyle medicine, of coordinating care across providers, and of continuous programme support indicates these are highly individual needs and demands, which depend on a plethora of context factors we could not disentangle in this study. In our programme theory, we have framed this as Mechanism Participation, emphasizing the option for consultees to opt in or out of these service aspects. Clearly, however, some clients do value them, and it is an important feature of Gentest for them that they are offered.

A more targeted study of what “integration” means in Gentest would help understand why these options are taken or declined, including which, how, and under what circumstances consultees benefit from these specific programme elements, and also mapping the actors being “integrated”. This could inform an explicit programme strategy on how and when to build care networks for its clients, and allow Gentest to become a unique case study for “integration” of care, health promotion and lifestyle medicine, and chronic disease prevention.

### **6.3 Limitations and further research**

We tried to answer the research questions that guided this project to the best of our abilities in the framework of this study, but of course our approach and methodology bears limitations, some questions remain unanswered and new ones emerge. This study is small in its conceptual

range, looking at one particular service model, and in its sample, with the small staff group and interviewee sample. However, we found good saturation in all our data.

The study is exploratory in approach and relies entirely on qualitative methods. With this approach, we have found a solid framework to build a programme theory for Gentest. However, this is open to refinement and expanding in its elements with further exploration, and to solidification with quantitative data. For example, quantitative assessment of behaviour change constructs, and of outcomes such as behaviour change via a questionnaire among Gentest consultees, and of long-term health outcomes via the existing Gentest consultee data could complement this study.

It is important to acknowledge the multiple bias in our sample of consultee interviewees. The sample is strongly skewed towards positive expectations, experiences and outcomes. Firstly, among the general population, they represent the group of Gentest consultees, who put significant consideration and effort in their health; Gentest consultees tend to be of high socio-economic status and highly educated compared to the general population. Secondly, even among this group, many interviewees were in the small group of clients who had been continuing to engage with the programme for a long time, while the majority of consultees do not stick around for follow-up consultation and check-ups after receiving their Life Plan. This suggests that the interviewee sample is biased in their higher intention, motivation, or awareness regarding their health behaviour in general, and also towards having positive experiences and trajectories within the programme. Specifically when formulating a programme theory, where we aim to reflect how the programme “really” works, this means walking a thin line between how it really does work, and how it can ideally work. A remedy to this considerable limitation could be the inclusion of the voices of interviewees who have left the programme, or studying a cohort of Gentest consultees following a prospective sampling approach.

Additionally, the sample of consultee interviewees was hand-picked by Gentest staff. While this approach was chosen to represent both genders, a range of age groups, and as broad a variety of experiences also in regard to the length of engagement with the programme, as possible within such a small sample, it is well possible that there was some bias towards a friendly relationship with Gentest staff, or high engagement.

While we aimed for strong involvement of the Gentest staff in all phases of the research, we had to adapt our format to video conferences rather than in-person workshops after the first workshop, due to the Covid-19 pandemic. We still succeeded to engage the staff in productive sessions and gather valuable input, however in-person workshops and meetings would have allowed for more various methods for collaborative conceptual development and would certainly have been the preferable format.

Lastly, it must be clear that this realist evaluation focuses on the behavioural patterns within a healthcare service experience. We did not evaluate this healthcare service in regard to its health effects. The Gentest health and behavioural assessment, health status report compilation including risk calculation, and its respective recommendations and counselling guidelines are all proprietary to the company and not verifiable. In no way has this study aimed to assess

them in regard to their evidence-base, their adherence to clinical or healthcare standards, and their diagnostic and preventive validity.

## 6.4 Conclusion

Gentest is a unique health programme, tackling the burden of NCDs and chronic complex diseases with an innovative approach: with highly personalised health assessment and counselling, covering nutrigenetics, lifestyle medicine, and broad general practice, it aims to help its clients adopt healthier behaviours, for, in the long-term, prevention or better management of chronic complex diseases and healthy aging.

With qualitative data from the implementation environment of the programme, its practitioners, and its consultees, and with a transdisciplinary collaboration with implementing staff in data collection and analysis, we built an understanding of how Gentest works towards which outcomes, for whom it works, and what circumstances affect its success. Starting from the realist CMOC as first guiding framework, we found that the Gentest programme centers around an individual consultee's behaviour change, and adopted the I-Change model of behaviour change into our programme theory. It relies on five Mechanisms: Personalisation; Precision, Prediction, Prevention; Comprehensiveness, Participation; and mutual Trust and Responsibility, to work through stages of this change, namely building awareness, motivation, and agency.

Embedded in its setting as a private health service in Istanbul, the programme attracts a specific target population with high socioeconomic status and above-average motivation to adopt a healthier lifestyle. A number of context factors affect each of the Mechanisms to achieve this, ranging from a client's own or family medical history, to cultural factors, and company staffing. Other context factors affect how the programme is delivered, but not its Outcomes: With its highly personalised design, the practitioners can adapt programme delivery and components responsively, for example to a client's tastes and preferences, to certain lifestyle circumstances like work and living environments, and to the cost and availability of food items, nutritional supplements, cooking or exercise equipment.

Results on programme Mechanisms, Outcomes, Context factors, and including other main findings on programme scope, design, and setting, come together to a programme theory, summarizing what is done in the programme and how it is expected to work.

Beyond its applicability to the Gentest programme itself, our study offers new conceptual insights by combining the realist evaluation approach with a behavioural model, specifically the I-Change model, towards an integrated conceptual framework. It also offers a perspective on the implications of our findings towards larger-scale health challenges: While no quantitative evaluation of the Gentest programme has yet shown its efficacy in promoting healthier behaviours and preventing chronic disease, we suggest that its approach to individualised disease prevention holds considerable promise for a broader, public implementation, opening up a professional space in between lifestyle, health promotion, and general medicine. Gentest also holds potential as a case study for "integration" of care, with its comprehensive, multi-professional approach and networking capacities.

This study is the first attempt to evaluate the Gentest programme. Further research to conceptually and quantitatively build on and advance these first findings will enhance our understanding of how the programme works, and what it has to offer – to its clients, and to health systems and populations more generally, contributing to a better response to the complex health challenges we face.

## References

- Arena, Ross, Carl J Lavie, Marie-France Hivert, Mark A Williams, Paige D Briggs, and Marco Guazzi (Jan. 2, 2016). "Who will deliver comprehensive healthy lifestyle interventions to combat non-communicable disease? Introducing the healthy lifestyle practitioner discipline". In: *Expert Review of Cardiovascular Therapy* 14.1, pp. 15–22. ISSN: 1477-9072, 1744-8344. DOI: [10.1586/14779072.2016.1107477](https://doi.org/10.1586/14779072.2016.1107477). URL: <http://www.tandfonline.com/doi/full/10.1586/14779072.2016.1107477> (visited on 01/01/2021).
- Arnold, Mary E and Brooke D Nott (2010). "What's going on? Developing program theory for evaluation". In: *Journal of Youth Development* 5.2, pp. 71–82. ISSN: 2325-4017.
- Atkinson, Paul and Amanda Coffey (2004). "Analysing documentary realities". In: *Qualitative research: Theory, method and practice* 2. Publisher: Sage London, pp. 56–75.
- Bardsley, Martin, Adam Steventon, Judith A. Smith, and Jennifer Dixon (2013). *Evaluating integrated and community-based care: how do we know what works?* Research Report. Nuffield Trust. URL: <https://www.nuffieldtrust.org.uk/research/evaluating-integrated-and-community-based-care-how-do-we-know-what-works>.
- Beaglehole, Robert et al. (Apr. 2011). "Priority actions for the non-communicable disease crisis". In: *The Lancet* 377.9775, pp. 1438–1447. ISSN: 01406736. DOI: [10.1016/S0140-6736\(11\)60393-0](https://doi.org/10.1016/S0140-6736(11)60393-0). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0140673611603930> (visited on 02/27/2020).
- Bennett, James E et al. (Sept. 2018). "NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4". In: *The Lancet* 392.10152, pp. 1072–1088. ISSN: 01406736. DOI: [10.1016/S0140-6736\(18\)31992-5](https://doi.org/10.1016/S0140-6736(18)31992-5). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0140673618319925> (visited on 03/02/2020).
- Bowen, Glenn A. (Aug. 3, 2009). "Document Analysis as a Qualitative Research Method". In: *Qualitative Research Journal* 9.2, pp. 27–40. ISSN: 1443-9883. DOI: [10.3316/QRJ0902027](https://doi.org/10.3316/QRJ0902027). URL: <https://www.emerald.com/insight/content/doi/10.3316/QRJ0902027/full/html> (visited on 02/06/2020).
- Brannan, Matthew J. and Teresa Oultram (2012). "Participant Observation". In: *Qualitative organizational research: core methods and current challenges*. 2nd Ed. London: SAGE Publications, pp. 296–313. ISBN: 978-0-85702-410-7.
- Breda, João et al. (Dec. 6, 2019). "One size does not fit all: implementation of interventions for non-communicable diseases". In: *BMJ*, p. l6434. ISSN: 0959-8138, 1756-1833. DOI: [10.1136/bmj.l6434](https://doi.org/10.1136/bmj.l6434). URL: <http://www.bmj.com/lookup/doi/10.1136/bmj.l6434> (visited on 03/05/2020).
- Bryson, John M., Michael Quinn Patton, and Ruth A. Bowman (Feb. 2011). "Working with evaluation stakeholders: A rationale, step-wise approach and toolkit". In: *Evaluation and Program Planning* 34.1, pp. 1–12. ISSN: 01497189. DOI: [10.1016/j.evalprogplan.2010.07.001](https://doi.org/10.1016/j.evalprogplan.2010.07.001). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0149718910000637> (visited on 03/25/2020).



- Cassell, Catherine and Gillian Symon, eds. (1994). *Qualitative methods in organizational research: a practical guide*. London ; Thousand Oaks, CA: Sage Publications. 253 pp. ISBN: 978-0-8039-8769-2 978-0-8039-8770-8.
- eds. (2004). *Essential guide to qualitative methods in organizational research*. OCLC: ocm55234455. London ; Thousand Oaks, CA: SAGE Publications. 388 pp. ISBN: 978-0-7619-4887-2 978-0-7619-4888-9.
- Cesuroglu, Tomris (2016). *Integration of a personalized health care model into health systems and policies in Europe*. OCLC: 6893314493. Maastricht University. ISBN: 978-94-6233-221-8. URL: <https://www.narcis.nl/publication/RecordID/oai:cris.maastrichtuniversity.nl:publications%2Fe44d8b8c-336e-456b-a00e-9968dd2f68bd>.
- Cesuroglu, Tomris, Sefayet Karaca, and Sema Erge (Sept. 2009). “A practice model for personalized healthcare with a public health genomics perspective”. In: *Personalized Medicine* 6.5, pp. 567–577. ISSN: 1741-0541, 1744-828X. DOI: [10.2217/pme.09.37](https://doi.org/10.2217/pme.09.37). URL: <https://www.futuremedicine.com/doi/10.2217/pme.09.37> (visited on 02/26/2020).
- Cheung, Kei Long, Silvia M.A.A. Evers, Mickaël Hiligsmann, Zoltán Vokó, Subhash Pokhrel, Teresa Jones, Celia Muñoz, Silke B. Wolfenstetter, Judit Józwiak-Hagymásy, and Hein de Vries (Jan. 2016). “Understanding the stakeholders’ intention to use economic decision-support tools: A cross-sectional study with the tobacco return on investment tool”. In: *Health Policy* 120.1, pp. 46–54. ISSN: 01688510. DOI: [10.1016/j.healthpol.2015.11.004](https://doi.org/10.1016/j.healthpol.2015.11.004). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0168851015002997> (visited on 01/01/2021).
- Clancey, William J. (2006). “Observation of Work Practices in Natural Settings”. In: *Cambridge Handbook on Expertise and Expert Performance*. 1st Edition. Cambridge ; New York: Cambridge University Press, pp. 127–145. URL: <https://billclancey.name/WJCWorkPracticeObsCUP.pdf>.
- ClinRisk Ltd. *QRISK*. QRISK3-2018. URL: <https://qrisk.org/three/>.
- Connelly, James B. (Dec. 7, 2007). “Evaluating complex public health interventions: theory, methods and scope of realist enquiry: Evaluating complexity in public health interventions”. In: *Journal of Evaluation in Clinical Practice* 13.6, pp. 935–941. ISSN: 13561294. DOI: [10.1111/j.1365-2753.2006.00790.x](https://doi.org/10.1111/j.1365-2753.2006.00790.x). URL: <http://doi.wiley.com/10.1111/j.1365-2753.2006.00790.x> (visited on 02/06/2020).
- Craig, Peter, Paul Dieppe, Sally Macintyre, Susan Michie, Irwin Nazareth, and Mark Petticrew (Sept. 29, 2008). “Developing and evaluating complex interventions: the new Medical Research Council guidance”. In: *BMJ*, a1655. ISSN: 1756-1833. DOI: [10.1136/bmj.a1655](https://doi.org/10.1136/bmj.a1655). URL: <http://www.bmj.com/lookup/doi/10.1136/bmj.a1655> (visited on 03/02/2020).
- Dalkin, Sonia Michelle, Joanne Greenhalgh, Diana Jones, Bill Cunningham, and Monique Lhussier (Dec. 2015). “What’s in a mechanism? Development of a key concept in realist evaluation”. In: *Implementation Science* 10.1, p. 49. ISSN: 1748-5908. DOI: [10.1186/s13012-015-0237-x](https://doi.org/10.1186/s13012-015-0237-x). URL: <http://implementationscience.biomedcentral.com/articles/10.1186/s13012-015-0237-x> (visited on 11/03/2020).

- Darnton-Hill, I, C Nishida, and Wpt James (Feb. 2004). “A life course approach to diet, nutrition and the prevention of chronic diseases”. In: *Public Health Nutrition* 7.1, pp. 101–121. ISSN: 1368-9800, 1475-2727. DOI: [10.1079/PHN2003584](https://doi.org/10.1079/PHN2003584). URL: [https://www.cambridge.org/core/product/identifier/S1368980004000163/type/journal\\_article](https://www.cambridge.org/core/product/identifier/S1368980004000163/type/journal_article) (visited on 03/10/2020).
- Erdoğan, Cansu (2020). *Expanding Supplementary Voluntary Private Health Insurance in Turkey: How and Why?* Working Paper No. 5. Universität Bielefeld. URL: <https://www.uni-bielefeld.de/soz/massit/Working-Paper-V.pdf>.
- European Commission DG Health & Food Safety. *Repository of best practices*. URL: [https://webgate.ec.europa.eu/dyna/bp-portal/index\\_search.cfm?action=search&q9=Integration+of+treatment%2C+management+and+care&keywords=](https://webgate.ec.europa.eu/dyna/bp-portal/index_search.cfm?action=search&q9=Integration+of+treatment%2C+management+and+care&keywords=).
- Ferrer, Rebecca A and William MP Klein (Oct. 2015). “Risk perceptions and health behavior”. In: *Current Opinion in Psychology* 5, pp. 85–89. ISSN: 2352250X. DOI: [10.1016/j.copsyc.2015.03.012](https://doi.org/10.1016/j.copsyc.2015.03.012). URL: <https://linkinghub.elsevier.com/retrieve/pii/S2352250X15001177> (visited on 05/07/2021).
- Gabbay, J. and Andrée Le May (2011). *Practice-based evidence for healthcare: clinical mindlines*. OCLC: ocn612188853. London ; New York: Routledge. 269 pp. ISBN: 978-0-415-48668-2 978-0-415-48669-9 978-0-203-83997-3.
- Gohlke, Julia M, Reuben Thomas, Yonqing Zhang, Michael C Rosenstein, Allan P Davis, Cynthia Murphy, Kevin G Becker, Carolyn J Mattingly, and Christopher J Portier (2009). “Genetic and environmental pathways to complex diseases”. In: *BMC Systems Biology* 3.1, p. 46. ISSN: 1752-0509. DOI: [10.1186/1752-0509-3-46](https://doi.org/10.1186/1752-0509-3-46). URL: <http://bmcsystbiol.biomedcentral.com/articles/10.1186/1752-0509-3-46> (visited on 02/28/2020).
- Grundy, Scott M. (May 2016). “Metabolic syndrome update”. In: *Trends in Cardiovascular Medicine* 26.4, pp. 364–373. ISSN: 10501738. DOI: [10.1016/j.tcm.2015.10.004](https://doi.org/10.1016/j.tcm.2015.10.004). URL: <https://linkinghub.elsevier.com/retrieve/pii/S1050173815002492> (visited on 03/10/2020).
- Gröne, Oliver and Mila Garcia-Barbero (June 1, 2001). “Integrated care”. In: *International Journal of Integrated Care* 1.2. ISSN: 1568-4156. DOI: [10.5334/ijic.28](https://doi.org/10.5334/ijic.28). URL: <http://www.ijic.org/article/10.5334/ijic.28/> (visited on 05/13/2021).
- Gugiu, P. Cristian and Liliana Rodríguez-Campos (Nov. 2007). “Semi-structured interview protocol for constructing logic models”. In: *Evaluation and Program Planning* 30.4, pp. 339–350. ISSN: 01497189. DOI: [10.1016/j.evalprogplan.2007.08.004](https://doi.org/10.1016/j.evalprogplan.2007.08.004). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0149718907000717> (visited on 03/26/2020).
- Habib, Samira Humaira and Soma Saha (Jan. 2010). “Burden of non-communicable disease: Global overview”. In: *Diabetes & Metabolic Syndrome: Clinical Research & Reviews* 4.1, pp. 41–47. ISSN: 18714021. DOI: [10.1016/j.dsx.2008.04.005](https://doi.org/10.1016/j.dsx.2008.04.005). URL: <https://linkinghub.elsevier.com/retrieve/pii/S1871402108000489> (visited on 03/02/2020).
- Hoving, Ciska, Aart N. Mudde, and Hein de Vries (Apr. 24, 2007). “Intention to implement a smoking cessation intervention in Dutch general practice”. In: *Health Education* 107.3, pp. 307–

315. ISSN: 0965-4283. DOI: [10.1108/09654280710742591](https://doi.org/10.1108/09654280710742591). URL: <https://www.emerald.com/insight/content/doi/10.1108/09654280710742591/full/html> (visited on 01/01/2021).
- Hughes, Gemma (Jan. 2, 2019). “Experiences of integrated care: reflections on tensions of size, scale and perspective between ethnography and evaluation”. In: *Anthropology & Medicine* 26.1, pp. 33–47. ISSN: 1364-8470, 1469-2910. DOI: [10.1080/13648470.2018.1507105](https://doi.org/10.1080/13648470.2018.1507105). URL: <https://www.tandfonline.com/doi/full/10.1080/13648470.2018.1507105> (visited on 05/13/2021).
- IHME. *GBD 2017*. GBD Compare | Viz Hub. URL: <https://vizhub.healthdata.org/gbd-compare/>.
- Isaranuwatthai, Wannudee, Rachel A. Archer, Yot Teerawattananon, and Anthony J. Culyer, eds. (2019). *Non-Communicable Disease Prevention: Best Buys, Wasted Buys and Contestable Buys*. OCLC: 1134446152. S.I.: Open Book Publishers. ISBN: 978-1-78374-863-1. URL: <https://www.openbookpublishers.com/product/1113>.
- Kasten, Stefanie, Liesbeth van Osch, Math Candel, and Hein de Vries (Feb. 20, 2019). “The influence of pre-motivational factors on behavior via motivational factors: a test of the I-Change model”. In: *BMC Psychology* 7.1, p. 7. ISSN: 2050-7283. DOI: [10.1186/s40359-019-0283-2](https://doi.org/10.1186/s40359-019-0283-2). URL: <https://doi.org/10.1186/s40359-019-0283-2>.
- Kelly, Laura, Jenny Harlock, Michele Peters, Ray Fitzpatrick, and Helen Crocker (Dec. 2020). “Measures for the integration of health and social care services for long-term health conditions: a systematic review of reviews”. In: *BMC Health Services Research* 20.1, p. 358. ISSN: 1472-6963. DOI: [10.1186/s12913-020-05206-5](https://doi.org/10.1186/s12913-020-05206-5). URL: <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-020-05206-5> (visited on 05/13/2021).
- Knops-Dullens, Theresia, Nanne de Vries, and Hein de Vries (Oct. 2007). “Reasons for non-attendance in cervical cancer screening programmes: an application of the Integrated Model for Behavioural Change.” in: *European Journal of Cancer Prevention* 16.5, pp. 436–445. ISSN: 0959-8278. DOI: [10.1097/01.cej.0000236250.71113.7c](https://doi.org/10.1097/01.cej.0000236250.71113.7c). URL: <http://journals.lww.com/00008469-200710000-00009> (visited on 01/01/2021).
- Kontseyava, Anna, Jill Farrington, Mehmet Balcilar, and Toker Ergüder (2018). *Prevention and control of noncommunicable diseases in Turkey. The case for investment*. Copenhagen: WHO Regional Office for Europe. URL: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0009/387162/bizzcase-tur-eng.pdf](http://www.euro.who.int/__data/assets/pdf_file/0009/387162/bizzcase-tur-eng.pdf).
- LeCompte, Margaret Diane and Jean J. Schensul (2010). “Data Analysis: How Ethnographers Make Sense of Their Data”. In: *Designing & conducting ethnographic research: an introduction*. 2nd ed. The ethnographer’s toolkit 1. OCLC: ocn613645667. Lanham, Md: AltaMira Press, pp. 158–180. ISBN: 978-0-7591-1869-0 978-0-7591-1870-6.
- Lv, Nan, Kristen M.J. Azar, Lisa Goldman Rosas, Sharon Wulfovich, Lan Xiao, and Jun Ma (July 2017). “Behavioral lifestyle interventions for moderate and severe obesity: A systematic review”. In: *Preventive Medicine* 100, pp. 180–193. ISSN: 00917435. DOI: [10.1016/j.ypmed.2017.04.022](https://doi.org/10.1016/j.ypmed.2017.04.022). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0091743517301421> (visited on 05/07/2021).

- Middleton, Lesley, Phoebe Dunn, Claire O’Loughlin, and Jacqueline Cumming (2018). *Taking Stock: Primary Care Innovation. A report for the New Zealand Productivity Commission*. Wellington: Faculty of Health. URL: <https://www.wgtn.ac.nz/health/centres/health-services-research-centre/our-publications-archived/reports>.
- Nugent, Rachel, Melanie Y Bertram, Stephen Jan, Louis W Niessen, Franco Sassi, Dean T Jamison, Eduardo González Pier, and Robert Beaglehole (May 2018). “Investing in non-communicable disease prevention and management to advance the Sustainable Development Goals”. In: *The Lancet* 391.10134, pp. 2029–2035. ISSN: 01406736. DOI: [10.1016/S0140-6736\(18\)30667-6](https://doi.org/10.1016/S0140-6736(18)30667-6). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0140673618306676> (visited on 03/02/2020).
- Nurius, Paula S. and Susan P. Kemp (Sept. 2014). “Transdisciplinarity and Translation: Preparing Social Work Doctoral Students for High Impact Research”. In: *Research on Social Work Practice* 24.5, pp. 625–635. ISSN: 1049-7315, 1552-7581. DOI: [10.1177/1049731513512375](https://doi.org/10.1177/1049731513512375). URL: <http://journals.sagepub.com/doi/10.1177/1049731513512375> (visited on 03/25/2020).
- OECD (2019). *Health at a Glance 2019: OECD indicators*. OCLC: 1134792275. Paris: OECD Publishing. ISBN: 978-92-64-80766-2 978-92-64-38208-4. URL: <http://www.oecd.org/health/health-systems/health-at-a-glance-19991312.htm> (visited on 03/25/2020).
- (2020a). *Doctors (indicator)*. type: dataset. OECD. DOI: [10.1787/4355e1ec-en](https://doi.org/10.1787/4355e1ec-en). URL: [doi.org/10.1787/4355e1ec-en](https://doi.org/10.1787/4355e1ec-en) (visited on 03/24/2020).
  - (2020b). *Health spending (indicator)*. URL: <https://doi.org/10.1787/8643de7e-en>.
  - (2020c). *Nurses (indicator)*. URL: [doi.org/10.1787/283e64de-en](https://doi.org/10.1787/283e64de-en).
  - (2021). *Household disposable income (indicator)*. type: dataset. OECD. DOI: [10.1787/dd50eddd-en](https://doi.org/10.1787/dd50eddd-en). URL: [https://www.oecd-ilibrary.org/economics/household-disposable-income/indicator/english\\_dd50eddd-en](https://www.oecd-ilibrary.org/economics/household-disposable-income/indicator/english_dd50eddd-en) (visited on 04/09/2021).
- Pawson, Ray and Nick Tilley (1997). *Realistic evaluation*. OCLC: 646026852. London; Thousand Oaks, CA: Sage. ISBN: 978-1-4739-2485-7 978-1-4462-3388-7. URL: <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1099424> (visited on 01/31/2020).
- Pawson, Ray, Trisha Greenhalgh, Gill Harvey, and Kieran Walshe (July 2005). “Realist review - a new method of systematic review designed for complex policy interventions”. In: *Journal of Health Services Research & Policy* 10.1, pp. 21–34. ISSN: 1355-8196, 1758-1060. DOI: [10.1258/1355819054308530](https://doi.org/10.1258/1355819054308530). URL: <http://journals.sagepub.com/doi/10.1258/1355819054308530> (visited on 02/26/2020).
- Peters, David H, Michael A Peters, Kremlin Wickramasinghe, Patrick L Osewe, and Patricia M Davidson (May 20, 2019). “Asking the right question: implementation research to accelerate national non-communicable disease responses”. In: *BMJ*, p. 11868. ISSN: 0959-8138, 1756-1833. DOI: [10.1136/bmj.11868](https://doi.org/10.1136/bmj.11868). URL: <http://www.bmj.com/lookup/doi/10.1136/bmj.11868> (visited on 03/05/2020).

- Pettigrew, Luisa M., Stephanie Kumpunen, Rebecca Rosen, Rachel Posaner, and Nicholas Mays (Jan. 2019). “Lessons for ‘large-scale’ general practice provider organisations in England from other inter-organisational healthcare collaborations”. In: *Health Policy* 123.1, pp. 51–61. ISSN: 01688510. DOI: [10.1016/j.healthpol.2018.10.017](https://doi.org/10.1016/j.healthpol.2018.10.017). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0168851018306365> (visited on 05/11/2021).
- Schensul, Jean J. and Margaret Diane LeCompte (2012). *Essential ethnographic methods: a mixed methods approach*. 2nd ed. Ethnographer’s toolkit Book 3. Lanham, MD: AltaMira Press. 366 pp. ISBN: 978-0-7591-2203-1 978-0-7591-2204-8.
- Sheaff, Rod, Sarah L Brand, Helen Lloyd, Amanda Wanner, Mauro Fornasiero, Simon Briscoe, Jose M Valderas, Richard Byng, and Mark Pearson (June 2018). “From programme theory to logic models for multispecialty community providers: a realist evidence synthesis”. In: *Health Services and Delivery Research* 6.24, pp. 1–210. ISSN: 2050-4349, 2050-4357. DOI: [10.3310/hsdr06240](https://doi.org/10.3310/hsdr06240). URL: <https://www.journalslibrary.nihr.ac.uk/hsdr/hsdr06240> (visited on 05/11/2021).
- Sheeran, Paschal, Peter R. Harris, and Tracy Epton (Mar. 2014). “Does heightening risk appraisals change people’s intentions and behavior? A meta-analysis of experimental studies.” In: *Psychological Bulletin* 140.2, pp. 511–543. ISSN: 1939-1455, 0033-2909. DOI: [10.1037/a0033065](https://doi.org/10.1037/a0033065). URL: <http://doi.apa.org/getdoi.cfm?doi=10.1037/a0033065> (visited on 05/07/2021).
- Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine. *Your Disease Risk*. Your Disease Risk. URL: <https://siteman.wustl.edu/prevention/ydr/>.
- Smith, Judith A., Sarah Parkinson, Amelia Harshfield, and Manbinder Sidhu (Oct. 2020). *Early evidence of the development of primary care networks in England: a rapid evaluation study*. NIHR. DOI: [10.3310/hsdr-tr-129678](https://doi.org/10.3310/hsdr-tr-129678). URL: <https://www.fundingawards.nihr.ac.uk/award/NIHR129678> (visited on 05/11/2021).
- Steyaert, Chris and René Bouwert (2004). “Group Methods of Organizational Analysis”. In: *Essential Guide to Qualitative Methods in Organizational Research*. London: SAGE Publications, pp. 140–153. ISBN: 0 7619 4887 2.
- Stralen, Maartje M van, Gerjo Kok, Hein de Vries, Aart N Mudde, Catherine Bolman, and Lilian Lechner (Dec. 2008). “The Active plus protocol: systematic development of two theory- and evidence-based tailored physical activity interventions for the over-fifties”. In: *BMC Public Health* 8.1, p. 399. ISSN: 1471-2458. DOI: [10.1186/1471-2458-8-399](https://doi.org/10.1186/1471-2458-8-399). URL: <https://bmcpublikealth.biomedcentral.com/articles/10.1186/1471-2458-8-399> (visited on 11/16/2020).
- Strong, Kathryn A., Serena L. Parks, Eileen Anderson, Richard Winett, and Brenda M. Davy (Oct. 2008). “Weight Gain Prevention: Identifying Theory-Based Targets for Health Behavior Change in Young Adults”. In: *Journal of the American Dietetic Association* 108.10, 1708–1715.e3. ISSN: 00028223. DOI: [10.1016/j.jada.2008.07.007](https://doi.org/10.1016/j.jada.2008.07.007). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0002822308014028> (visited on 05/07/2021).



- Symon, Gillian and Catherine Cassell (2012). *Qualitative organizational research: core methods and current challenges*. 2nd Ed. OCLC: ocn760290875. London: SAGE Publications. 523 pp. ISBN: 978-0-85702-411-4 978-0-85702-410-7.
- Tatar, M, S Mollahaliloğlu, S Şahin, S Aydın, A Maresso, and C Hernández Quevedo (2011). *Turkey: Health system review*. Copenhagen: European Observatory for Health Systems and Policies. URL: <http://www.euro.who.int/en/about-us/partners/observatory/publications/health-system-reviews-hits/full-list-of-country-hits/turkey-hit-2011>.
- Thompson Klein, Julie, ed. (2001). *Transdisciplinarity: joint problem solving among science, technology, and society: an effective way for managing complexity*. Synthesebücher. Basel ; Boston: Birkhäuser. 332 pp. ISBN: 978-3-7643-6248-5.
- UNGA (Oct. 10, 2018). *Political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. Time to deliver: accelerating our response to address non-communicable diseases for the health and well-being of present and future generations*. A/RES/73/2. New York: UN. URL: <https://www.who.int/ncds/governance/third-un-meeting/en/>.
- US Preventive Services Task Force et al. (Sept. 18, 2018). “Behavioral Weight Loss Interventions to Prevent Obesity-Related Morbidity and Mortality in Adults: US Preventive Services Task Force Recommendation Statement”. In: *JAMA* 320.11, p. 1163. ISSN: 0098-7484. DOI: [10.1001/jama.2018.13022](https://doi.org/10.1001/jama.2018.13022). URL: <http://jama.jamanetwork.com/article.aspx?doi=10.1001/jama.2018.13022> (visited on 05/07/2021).
- Vries, Hein de (Mar. 9, 2017). “An Integrated Approach for Understanding Health Behavior; The I-Change Model as an Example”. In: *Psychology and Behavioral Science International Journal* 2.2. ISSN: 24747688. DOI: [10.19080/PBSIJ.2017.02.555585](https://doi.org/10.19080/PBSIJ.2017.02.555585). URL: <https://juniperpublishers.com/pbsij/PBSIJ.MS.ID.555585.php> (visited on 10/14/2020).
- Vries, Hein de et al. (Oct. 1, 2003). “The European Smoking prevention Framework Approach (EFSA): an example of integral prevention”. In: *Health Education Research* 18.5, pp. 611–626. ISSN: 1465-3648. DOI: [10.1093/her/cyg031](https://doi.org/10.1093/her/cyg031). URL: <https://academic.oup.com/her/article-lookup/doi/10.1093/her/cyg031> (visited on 08/11/2020).
- Vries, Hein de, Ilse Mesters, Jonathan van’t Riet, Karen Willems, and Astrid Reubsaet (July 1, 2006). “Motives of Belgian Adolescents for Using Sunscreen: The Role of Action Plans”. In: *Cancer Epidemiology Biomarkers & Prevention* 15.7, pp. 1360–1366. ISSN: 1055-9965, 1538-7755. DOI: [10.1158/1055-9965.EPI-05-0877](https://doi.org/10.1158/1055-9965.EPI-05-0877). URL: <http://cebp.aacrjournals.org/cgi/doi/10.1158/1055-9965.EPI-05-0877> (visited on 08/13/2020).
- Wagemakers, Annemarie, Lisanne S. Mulderij, Kirsten T. Verkooijen, Stef Groenewoud, and Maria A. Koelen (Dec. 2018). “Care–physical activity initiatives in the neighbourhood: study protocol for mixed-methods research on participation, effective elements, impact, and funding methods”. In: *BMC Public Health* 18.1, p. 812. ISSN: 1471-2458. DOI: [10.1186/s12889-018-5715-z](https://doi.org/10.1186/s12889-018-5715-z). URL: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5715-z> (visited on 11/16/2020).

- Walter, Alexander I., Sebastian Helgenberger, Arnim Wiek, and Roland W. Scholz (Nov. 2007). “Measuring societal effects of transdisciplinary research projects: Design and application of an evaluation method”. In: *Evaluation and Program Planning* 30.4, pp. 325–338. ISSN: 01497189. DOI: [10.1016/j.evalprogplan.2007.08.002](https://doi.org/10.1016/j.evalprogplan.2007.08.002). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0149718907000754> (visited on 03/26/2020).
- WHO (Sept. 19, 2011). *United Nations high-level meeting on noncommunicable disease prevention and control*. URL: [https://www.who.int/nmh/events/un\\_ncd\\_summit2011/en/](https://www.who.int/nmh/events/un_ncd_summit2011/en/).
- (2013). *Global action plan for the prevention and control of noncommunicable diseases: 2013–2020*. OCLC: 960910741. ISBN: 978-92-4-150623-6. URL: [http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf) (visited on 02/27/2020).
  - ed. (2015). *Health in 2015: from MDGs, Millennium Development Goals to SDGs, Sustainable Development Goals*. OCLC: 1007661216. Geneva: WHO. 204 pp. ISBN: 978-92-4-156511-0.
  - (2017a). *NCD Global Monitoring Framework*. URL: [https://www.who.int/nmh/global\\_monitoring\\_framework/en/](https://www.who.int/nmh/global_monitoring_framework/en/).
  - (2017b). *Tackling NCDs “Best buys” and other recommended interventions for the prevention and control of noncommunicable diseases*. WHO/NMH/NVI/17.9. Geneva: WHO. URL: <https://apps.who.int/iris/handle/10665/259232>.
  - (June 18, 2018a). *Noncommunicable diseases Factsheet*. URL: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>.
  - (Apr. 19, 2018b). *Preparation for the third High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases, to be held in 2018*. Report by the Director-General WHA71/14. Geneva: WHO. URL: [http://apps.who.int/gb/e/e\\_wha71.html](http://apps.who.int/gb/e/e_wha71.html).
  - (2018c). *Time to deliver: report of the WHO Independent High-level Commission on Noncommunicable Diseases*. Geneva: WHO. URL: <https://www.who.int/ncds/management/time-to-deliver/en/>.
- WHO and UN (Sept. 2018). *Third UN General Assembly High-level Meeting on NCDs brochure*. URL: <https://www.who.int/ncds/governance/third-un-meeting/en/>.
- WHO Europe (2016). *Integrated care models: an overview*. Working document. Copenhagen: WHO Regional Office for Europe. URL: <https://www.euro.who.int/en/health-topics/Health-systems/health-services-delivery/publications/2016/integrated-care-models-an-overview-2016>.
- Wolfram Cox, Julie (2012). “Action Research”. In: *Qualitative organizational research: core methods and current challenges*. 2nd Ed. London: SAGE Publications, pp. 371–388. ISBN: 978-0-85702-410-7.
- Wong, Geoff, Trish Greenhalgh, Ray Pawson, Joanne Greenhalgh, Ana Manzano, Justin Jagosh, and Gill Westhorp (2017a). *Developing Realist Programme Theories*. URL: [http://ramesesproject.org/Standards\\_and\\_Training\\_materials.php](http://ramesesproject.org/Standards_and_Training_materials.php).
- (2017b). *Philosophies and Evaluation Design*. URL: [http://ramesesproject.org/Standards\\_and\\_Training\\_materials.php](http://ramesesproject.org/Standards_and_Training_materials.php).

- Wong, Geoff, Trish Greenhalgh, Ray Pawson, Joanne Greenhalgh, Ana Manzano, Justin Jagosh, and Gill Westhorp (2017c). *Retrodution in realist evaluation*. URL: [http://ramesesproject.org/Standards\\_and\\_Training\\_materials.php](http://ramesesproject.org/Standards_and_Training_materials.php).
- (2017d). *What realists mean by context*. URL: [http://ramesesproject.org/Standards\\_and\\_Training\\_materials.php](http://ramesesproject.org/Standards_and_Training_materials.php).
  - (2017e). *“Theory” in realist evaluation*. URL: [http://ramesesproject.org/Standards\\_and\\_Training\\_materials.php](http://ramesesproject.org/Standards_and_Training_materials.php).
- World Bank. *World Bank Open Data*. URL: <https://data.worldbank.org/>.
- Yardim, Mahmut Saadi, Nesrin Cilingiroglu, and Nazan Yardim (Jan. 2010). “Catastrophic health expenditure and impoverishment in Turkey”. In: *Health Policy* 94.1, pp. 26–33. ISSN: 01688510. DOI: [10.1016/j.healthpol.2009.08.006](https://doi.org/10.1016/j.healthpol.2009.08.006). URL: <https://linkinghub.elsevier.com/retrieve/pii/S0168851009002127> (visited on 04/09/2021).
- Üner, S, M Balcılar, and T Ergüder (2018). *National Household Health Survey – Prevalence of Noncommunicable Disease Risk Factors in Turkey 2017 (STEPS)*. Ankara: WHO Country Office Turkey. URL: <http://www.euro.who.int/en/countries/turkey/publications/national-household-health-survey-prevalence-of-noncommunicable-disease-risk-factors-in-turkey-2017-2018>.



## Supplements

## Program Theory Development Workshop

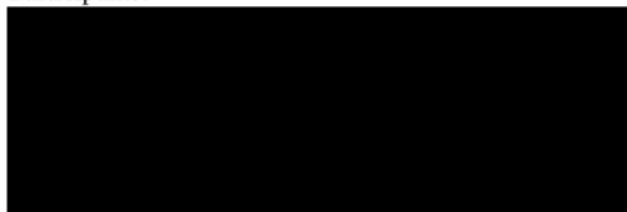
Friday, 13 March 2020

Attending

Facilitator: Jasmin Ackermann

Observing, Notes: Elise Garton

Participants:



Yellow indicates participants who will require translation from English to Turkish. Translation buddies out of the other participants will be assigned individually.

### Introduction

The research project aims to develop a program theory of Gentest, in particular its company architecture and how it works towards client health outcomes. From internal staff meetings and corporate documents, a draft design has been developed, which now needs to be revised to reflect actual working practices.

### Objective

Learn about staff members' work tasks, and how they work with clients and with each other, through a collaborative visualization of work processes

### Methodology

Methods: brainstorming, clustering and mapping, discussion

Participants: all Gentest staff, except logistic and cleaning personnel

Setting: office room at Gentest

### Necessities

- flipchart/paper wall
- post-its
- markers
- room with chairs

Documentation: Notes and audio-recording (for transcript)

Prepare on flipchart papered wall:

Timeline of one patient with meeting points

- Client calls in to ask for service
- Need analysis
- VTF
- MDR (Report incl. life plan)
- RAK

- RAY
- TTK
- TTG

and parallel line starts for each staff

Workshop objective:

- 
- for staff to indicate one own lines their involvement in patient line through meetings or contributions to deliveries (concrete, punctual or overarching)
  - may put groups of professions together (DSD, scientists)
- possible discussion points:
  - end point or continuous recurring follow-up meetings?
  -

Instructions:

Encounters

Deliveries

Other (research, prep, compiling, ...)

## Script

### Preparation

- Flipchart/paper wall
- have post-its and markers ready
- chairs and

### Introduction

- Welcome
- Informed consent
- Introduction
  - objective
  - overview: who's here – staff
  - what: work together to tell a story of what you all make happen at Gentest
  - why: to understand the dynamics of you as a team, your roles and tasks, and the story you are creating

### Activities

- Brainstorm and write down on post-its
  - Encounters / meeting points with client
  - Deliveries (items, intangibles, e.g. report, information, suggestions, forms)
  - Anything else/any other task you do that has to do with the client (research, report compiling, data readout or analysis)

Tip: Think for example about your daily list of activities and tasks; daily work routine; also anything that has disrupted your work routine lately?

- Mapping and clustering
  - Place post-its on paper in respective place (your personal line, and timewise), and explain
  - Add, discuss or ask if you find anything unclear, incomplete or missing
  - Is the linear timeline design appropriate?
  - Are there groupings among staff? E.g. with similar activities, timing, relations
  - Maybe touch on problems/frictions in working processes, but not too much (BSS is there, maybe better address in individual interviews – when mentioned, say we are aiming to depict a well-functioning realistic case scenario)
- What does it mean for the client? What do they receive, how, and how can/should/do they use these resources?

### Wrap-up

- How did this go for everyone? E.g. was translation working well, did everyone get their say? Were the issues discussed interesting, or redundant/boring, or too abstract? Be honest! We will do something like this again, and it should be constructive and enjoyable for everyone, and for this I need to go how you found it, and where/what should change/improve

## Post hoc brief protocol

13/03/2020, 13:45-16:10, incl. break 15:00-15:20

Participants:

[REDACTED]

Observing:

[REDACTED]

Facilitator:

[REDACTED]

- Introduction
- Assignment of translation buddies
- Patient timeline
- Exercise 1
  - Distribute markers and post-its
    - Pink post-its: Encounters, meetings w/ clients
    - Blue: Things, items, information you give to or receive from client
    - Yellow: Other things affecting the practice with patients
    - ca. 5min to brainstorm, write one per post-it, as many as you can think of
  - Make a personal timeline, map/position/cluster post-its on timeline, and explain
  - Round starting with [REDACTED] adding line; [REDACTED] adds a bracket overarching the timeline for her research (people add lines first towards top, then below, then on extra sheet)
- Break
- Exercise 2
  - Connect items/post-its that depend on each other – instruction: discuss in pairs for 2 minutes, then explain to the group; was unclear; people talk, but off topic, or about it being unclear; [REDACTED] asks for clarification: “ think about your timeline, and how the items on it affect other timelines, or are affected by them” - this seems to make it clearer
  - break up, ask for questions; all say it’s unclear; [REDACTED] gives an example; [REDACTED] asks, “It’s about how your lines connects with other lines” - that seems to make it clearer, and people come up to add things while suggesting and discussing in the entire group
  - things die down, at 15:50 time is up
- we break for a brief clarification of backgammon tournament scheduling
- Wrap-up: matrix of “easy/difficult/like/dislike”, one sheet per person, anonymous, asked to fill in at least one thing per category: [REDACTED] “About the work, or about the workshop?” - “Workshop, as feedback”

---

## BİLGİLENDİRİLMİŞ GÖNÜLLÜ OLUR FORMU ÖRNEĞİ (BGOF)

**ÇALIŞMANIN ADI:** 7K Tıbbi Yaklaşımı ile Geliştirilmiş olan Gentest Kişiyeye Özel Sağlık Hizmet Modelinin Değerlendirilmesi

---

Aşağıda bilgileri yer almakta olan bir araştırma çalışmasına katılmanız istenmektedir. Çalışmaya katılıp katılmama kararı tamamen size aittir. Katılmak isteyip istemediğinize karar vermeden önce araştırmanın neden yapıldığını, bilgilerinizin nasıl kullanılacağını, çalışmanın neleri içerdiğini, olası yararları ve risklerini ya da rahatsızlık verebilecek yönlerini anlamanız önemlidir. Lütfen aşağıdaki bilgileri dikkatlice okumak için zaman ayırınız. Eğer çalışmaya katılma kararı verirsiniz, **Çalışmaya Katılma Onam Formu**'nu imzalayınız. Çalışmadan herhangi bir zamanda ayrılmakta özgürsünüz. Çalışmaya katıldığınız için size herhangi bir ödeme yapılmayacak ya da sizden herhangi bir maddi katkı/malzeme katkısı istenmeyecektir.

### **ÇALIŞMANIN KONUSU VE AMACI :**

Bu araştırma 7K Tıbbi yaklaşımı ile uygulanan Gentest modelinin kronik hastalıkları önleme ve/veya ilerlemesini engelleme açısından nasıl etki ettiğini incelemeyi amaçlamaktadır. Elde edilen bulgular ile Gentest'in kimler üzerinde, hangi bağlamda, hangi mekanizmalar ile fayda gösterdiğini ortaya koyan bir 'program teorisi' geliştirilecektir. Ayrıca, 7K Tıbbi'nin dünyanın farklı ülkelerinde kamu sağlık hizmetlerine, özellikle birinci basamak sağlık hizmetlerine nasıl uygulanabileceği konusunda bir araştırma ve geliştirme gündemi geliştirilmesi hedeflenmektedir.

Araştırmanın sizin davet edildiğiniz kısmı daha önce Gentest yaptırmış danışanların 7K Tıbbi ve Gentest'teki deneyimleri ile kendi sağlık algıları ve davranışlarının değerlendirilmesi hedeflenmektedir.

Bu araştırma Vrije Universiteit Amsterdam (VU Amsterdam üniversitesi) Athena Enstitüsü ve Gentest Enstitüsü iş birliği ile yapılmaktadır.

### **ÇALIŞMA İŞLEMLERİ:**

Araştırmaya katılan Gentest danışanları ile yaklaşık 1 saat süren yarı yapılandırılmış bir mülakat yapılacaktır. Mülakat VU Amsterdam üniversitesinde Küresel Sağlık master'ı yapan master öğrencileri tarafından İngilizce yapılacaktır. Danışanın isteğine göre mülakat İngilizce ya da bir tercüman aracılığı ile Türkçe gerçekleşecektir.

Mülakat sesli olarak kaydedilecek ve daha sonra İngilizce olarak yazıya dökülecektir. Bu metinler anonimize edilecektir; yani isim ve diğer kişisel belirleyicilerden arındırılarak analiz edilecek ve araştırma süresince saklanacaktır. Metne dönüştürmeden sonra ses kayıtları imha edilecektir.

### **ÇALIŞMAYA KATILMAMIN OLASI YARARLARI NELERDİR?**

Bu çalışmaya katılarak ülkemizde ve dünyada kişiyeye özel sağlık hizmetlerinin yaygınlaşması için önemli sonuçlar elde etmemize katkıda bulunmuş olacaksınız.

### **KİŞİSEL BİLGİLERİM NASIL KULLANILACAK?**

Çalışmaya katılım gönüllülük esasına dayanmaktadır. Bu çalışmada kişisel bilgileriniz kesinlikle bir başka kişi ya da kurumlarla paylaşılmayacak ve araştırma sınırları içerisinde tutulacaktır.

### **SORU VE PROBLEMLER İÇİN BAŞVURULACAK KİŞİLER :**

1. Dr. Tomris Cesuroğlu (VU Amsterdam Üniversitesi öğretim üyesi ve Gentest Enstitüsü Ar-Ge Danışmanı)

2. Dr. Serdar Savaş (Gentest Enstitüsü Direktörü)

3. Sn. Elise Garton (VU Amsterdam Üniversitesi, Küresel Sağlık master öğrencisi)

4. Sn. Jasmin Ackermann (VU Amsterdam Üniversitesi, Küresel Sağlık master öğrencisi)

### **Çalışmaya Katılma Onayı**

Yukarıdaki bilgileri ilgili araştırmacı ile ayrıntılı olarak tartıştım ve kendisi bütün sorularımı cevapladı. Bu bilgilendirilmiş olur belgesini okudum ve anladım. Bu araştırmaya katılmayı kabul ediyorum ve bu onay belgesini kendi hür irademle imzalıyorum. Bu onay, ilgili hiçbir kanun ve yönetmeliği geçersiz kılmaz. Araştırmacı, saklamam için bu belgenin bir kopyasını çalışma sırasında dikkat edeceğim noktaları da içerecek şekilde bana teslim etmiştir.

Gönüllü Adı Soyadı:	May 3, 2020	Tarih ve İmza:
Telefon:		

Araştırmacı <sup>2</sup> Adı Soyadı:	Jasmin Ackermann	Tarih ve İmza: 3 May 2020
Adres ve Telefon:		

2: Gönüllüyü araştırma hakkında bilgilendiren kişi

## **Towards healthy behaviours for disease prevention and healthy aging with a personalised health assessment and counselling programme**

Supplement 3: Table of Mechanisms, Resources, Changes in Reasoning, and Outcomes of Gentest, with original quotes from consultee interviews. Verbatim quotes included in this overview are all from interviews in English. Some of the paraphrased statements are from interviews in Turkish/German.



## Personalisation

“Personalisation” in medicine usually refers to pharmacological profiling, but is meant differently here: Personalisation at Gentest covers healthcare provision more generally than pharmacogenomics or algorithmic risk stratification. Gentest tends to each of its clients individually: Each consultee undergoes extensive individual assessment of their health status and behaviours; receives recommendations individually compiled based on this assessment; and is offered implementation support that meets each consultee in their individual current behaviours, situation and environment.

**Table 1:** Overview of the Mechanism Personalisation with its Resources, corresponding Changes in Reasoning, and Outcomes, and quotes from consultee interviewees to illustrate their experiences

Resource	Change in reasoning	Interviewees’ experiences	Outcome
Individual health, risk & behaviour assessment	Knowledge of own health status	<p>“I was expecting to be in the right way, the yellow or green part. But I was in the red part. So I was, what? All in red? I didn’t expect to see so many red colors in my results. So, afterwards I said, wow. When I come back home, I said, we need to do lots of things, and we will change lots of things. That’s what I was saying to them. But luckily yes, we looked through this, and we changed lots of things.” (F, &lt; 40)</p> <p>“In order to get to know their body I definitely recommend it. Because they’re searching all of your, I mean, values, all of your tests. So you get better knowledge about your body, which is helpful.” (F, 40 - 60)</p> <p>“I learned quite a lot about my body, quite a lot.” (F, 40 - 60)</p> <p>“The way I’m just doing my life is exactly proof that I’m just really doing good. Because they said, you might have some high blood pressure in your eighties when you’re using salt. I’m not using salt. You might be one hundred years club – I don’t wanna just be that, because I say, then you lose all your friends. [laughs] You have to be fine, physically and mentally. Anyway, that’s a good thing to know what I’m doing is right, on target.” (M, &gt; 60)</p> <p>“[A]fter eating yogurt or milk, I had always this big tummy. And Serdar said this is due to lactose.” (F, 40 - 60)</p>	Awareness
	Knowledge about health and healthy behaviours, about significance of nutrition and diet for well-being (general knowledge, not personalised recommendations)	<p>“I recognise how nutrition is a determinant factor for every part of your life.” (M, &lt; 40)</p> <p>“I wasn’t a fan of avocado, I really always said that I hated it. But later, when they told me every week I have to eat at least half an avocado, I researched and I found out that I didn’t know when is the right time to eat it. Because it needs to be waited at home and get softer, and I didn’t know that. So that’s why when I tried to eat it in the past, it was bitter for me, and I didn’t like it. But today I learned when I need to eat it, so it’s a big step for me, in my life.” (F, &lt; 40)</p> <p>“I discovered different shelves in the supermarket. So far I didn’t know this kind of organic things, or buckwheat, or flour, all corps flour or some other kinds of flours. So many things. And it was a big step for me, I didn’t even know we have these kinds of foods around me.” (F, &lt; 40)</p>	

Cognizance: recognition and reflection of own health behaviours

“In the past, without noticing I was eating wrongly. Now, I eat smaller portions, because I know I should reduce, so that’s correct, and this is totally encrusted in my mind now.” (F, > 60)

“I believe that it is in my hand, whatever I do, that I am, whatever I eat, it’s me. So I am more conscious about health issues.” (F, > 60)

“My dietitian asked me, almost every food and vegetable, how many do you consume of this annually? This is a difficult, very difficult question, but still it pushes you to think, what do I consume?” (M, < 40)

“All these results and scientific outcomes, and led me to think about my health system. And this raises an awareness of myself. I mean, because during the lifestyle, all this business, family, and social life triangle, you don’t have – you don’t find any time to think about yourself, your health, your future. So, this Gentest programme gave me the chance of thinking of myself. My health, my future, and the basic and very significant question of how long am I gonna live.” (M, < 40)

“Potatoes, yes. My husband is very fond of potatoes, but... bread, potatoes... he did consume huge amounts every day but now he feels bad when he consumes that. He still consumes that but he feels bad about it, so... [laughs]” (F, 40 - 60)

“Now cooking is something meaningful for me, it’s not just something I do on autopilot, I enjoy it.” (F, 40 - 60)

“If you give the right answers, if you’re honest, and say yes, I eat all this big whole plate of pasta, if you can say that, then later they have some results about you and your wrongdoings [laughs], maybe. And later, after the Gentest, you will not be able to eat this kind of foods anymore, or at least less.” (F, < 40)

“I wasn’t doing any sport. Not even five minutes.” (F, < 40)

“I was quite surprised, because I never thought something like that. It was always my high cholesterol, like good and bad cholesterol, and I had my bad one always high, when I go to check-ups, and I was like, why is it so high, because I’m not eating any fast food, not like barbecues, not potato chips or anything like that. But then he found out that you have this specific genes and your blood is likely to be – how do you say – close up in the future easily. [...] He said, if you don’t control your weight, within two to three months you can put on ten kilos easily. Because I asked him, when I don’t go to the gym, or when I eat more than I usually eat, I put on three kilos in one month, so fast. I asked him, why am I like that. And he told me, look at your genes, you have this and that. So it’s easily. And you always have to have sport in your life, you always have to have to take care of your food, you can’t eat rubbish, you can’t eat fast food. You don’t have a body like, I can eat whatever I like, I don’t put on any weight – you don’t have that body. I know some people can eat whatever they like and they don’t put on any weight, but I’m not one of them [laughs].” (F, 40 - 60)

---

Individualised Life Plan based on health, risk & behaviour assessment	Change of attitude towards the recommended behaviour: response-efficacy expectation and emotional and rational pro-con- lists	<p>“I was running in the treadmill, I’m not running anymore because he told me, rather than running, I should be doing intervals, like walk in certain speed, then high and lower speed, so rising your raising and lowering your blood pressure.” (F, 40 - 60)</p> <p>“I used to make lots of cake, I baked lots of things at home. And at the moment, I do not do anything. I used to watch lots of recipes about cakes and desserts and other things. But at the moment I don’t. Instead, I look for more healthy recipes, like quinoa, or oat flour, or so, without adding sugar or white flour. So it’s not easy, it’s not easy to find good recipes for this. So that’s why Gentest gave us some recipes, it really works well, so I’m happy.” (F, &lt; 40)</p> <p>“After that, we started taking the supplements they offered us – not all of the brands, but whatever we’re taking we’re sending them the ingredients and they’re checking it.” (M, &gt; 60)</p>	Motivation
Improving perceived self-efficacy by step-wise change		<p>“He told us that you can’t have barbecues – like, you can, but not very frequent, maybe once a month. I’m having alcohol, my husband, too. So he told us, not too much, maybe one or two bottles, but don’t make it too many. Like, peanuts, for example, is not allowed, cashew is not allowed. And Turkish people eat sunflower seeds – you give it to birds usually, but we eat it [laughs] – and he said, it’s not good, too. So he gave a quite a big list – I don’t know, a hundred and fifty pages – [and said] read what you can do, and what you mustn’t do, so keep that for yourself. And in this list he gave us some vegetables and fruits we should have as a dish once a week. Like, avocado, mango, broccoli, or cabbage stuff, and some other stuff.” (F, 40 - 60)</p>	
Implementation guidance of action plan is anchored in individual living circumstances	From intention towards action through clear action plans and behavioural support	<p>M, &gt; 60, has a housekeeper who prepares food for the family, and who was personally instructed by Gentest about their diet recommendations for the consultee and his family, and how to follow them.</p> <p>M, &gt; 60, stays in another city over the summer each year, and Gentest has shown logistical flexibility by collaborating with local physicians there to collect biosamples and medical test results.</p> <p>M, &gt; 60, has a stationary bike and a treadmill at home, which are integrated in his exercise plan.</p> <p>F, &lt; 40, reports about a relative, who is also a Gentest consultee: He doesn’t cook his own food, so that Gentest recommended him a food delivery service who is able to comply with their diet guidelines for him.</p> <p>“For example, I didn’t want to walk. I was too lazy to walk, to go out to walk. I’m a kind of person, I need some aim in what I am doing. And going to a park and walking there like it goes was not attractive to me. Like, being progressing is good. But one day, Dr. Savaş and his assistant sat down with me for one and a half hours. He spent one and a half complete hours to convince me that it was the most for my health, to maintain my health. After that speech I started walking. Because I thought that he was thinking of me more that I was thinking of myself. And I found a way that, while I should be walking in the park, as other people, then I start, because my house is near the sea, near historical places, then I turned it into fun just by walking in different places, exploring those places. Then I walk so much! Because just walking in the park, going round and round in the same place, was really stupid for me. I was a folk dancer also in university when I was in the States in the Turkish club, it is good to move like that – but otherwise just walk, go and go walk, it didn’t make any sense to me. But after talking it was really – I was very much touched with the approach they did to me. Thinking about it so much, and doing so much for me. Then I was able to feel motivated. Then I started walking.” (F, &gt; 60)</p>	Agency

Supporting transition from trial towards maintenance by offering follow-up contact, meetings and check-up physicals and labs

“Most dietitians, I believe, have sessions with their clients, and after these sessions, they cut the communication with the clients, and they didn’t follow how things are going on. But in this programme you have a constant relationship with Gentest. [...] This is really what I feel, Gentest is with you all the course of your life.” (M, < 40)  
F, 40 - 60, has been a Gentest consultee for over five years, and has been staying in touch with the physician and dietitian over all this time; she keeps working on implementing recommendations, finding new ways to follow recommendations she hadn’t implemented yet, and adapting to changing circumstances.

---

## Precision, Prediction, Prevention

Rather than a generic population-based estimate for chronic disease risk, the consultee is given an individual, precise assessment of their health status, risks and outlook. Based on the personalised assessment, specifically genetic and biomarkers, Gentest calculates risk scores for a range of diseases, and illustrates risk trajectories, using publicly available tools such as QRISK (*QRISK*) and the Siteman Cancer Center risk assessment (*Your Disease Risk*) combined with its own proprietary calculations. It offers its consultees an individually applicable, clearly comprehensible picture of their risks and outlooks. Through illustrations and explanations, it also aims to build an understanding in consultees of lifetime risk and the accumulative long-term effect of their health behaviours, promoting healthy behaviours to prevent or delay disease development.

**Table 2:** *Overview of the Mechanism Precision, Prediction, Prevention with its Resources, corresponding Changes in Reasoning, and Outcomes, and quotes from consultee interviewees to illustrate their experiences*

Resource	Change in reasoning	Interviewees' experiences	Outcome
Numerical and graphical (precise, easily interpretable) risk trajectories and timelines show long-term accumulative development of chronic disease risk, clearly illustrated and explained, and make individual risk explicit	Risk perception: Quantification of individual risk, and explanation of risk quantification	<p>"I learned that maybe there's some liability in my health regarding my heart in, for example, like ten years. So I have to take some precautions, take some measures from now on. And this is important for me." (M, &lt; 40)</p> <p>F, 40 - 60, reports about her husband, who is also a Gentest consultee: "So he had this genetical testing and it very much relieved us because he didn't see any cancer risk for him. Because from the father's side, he's ok, his grandfather lived to one hundred for example, but not from his mother's side, so we were very much relieved to see that he's ok. But we also learned that he has a tendency for diabetes, just like his father has."</p> <p>"At least – my father suffered from Alzheimer's, at least I learned that I don't have the genetic with me." (M, &gt; 60)</p>	Awareness
Clear definition of expected individual health benefit, also for long-term prevention of chronic diseases, through graphic risk trajectories and explanations	Attitude: Response efficacy expectation: quantification of prevention and immediate effect and benefit	"In Gentest results, they told you which illnesses you're in the risk group. They give information about this. But if you obey what they told you, then the risk will be lower always." (F, < 40)	Motivation

Graphical risk trajectories show long-term accumulative development of chronic disease risk, and relate current day-to-day behaviours with long-term health outcomes

Emphasising maintenance of the behaviour change and long-term follow-up consultation, aiming for sustainable change towards a new, healthy and enjoyable routine as part of a lifelong action plan for health

Agency

“I can say, not about only what to eat and what not to eat, it gives us – it enlightens your life, like, you shouldn’t do this, you mustn’t have this, you mustn’t eat that – I know it’s not easy to apply, it doesn’t happen like that, but at least I know, I have these issues with my genes, and I know, I’m forty now, I don’t have any issues, but I know in the future can have issues.” (F, 40 - 60)

“Serdar gave us a clear picture. Look, it is not good for you, you have to stop it. That was kind of, ok, I said ok, I won’t have anymore.” (F, 40 - 60)

“When Serdar told the issues with my – not the issues, but when he told me these are the things you have, and you can easily put on weight, and the issues with my veins, so if you keep eating these sweets, and also – how can I say, unhealthy stuff, you can react to this sort of things differently than other people, who don’t have this sort of issues with their body. So you’re having a kind of happy hours with the sweets, but you’ll get pay back in the future. So it was a very clear picture. You shouldn’t eat that, it’s not good for you. Clear cut.” (F, 40 - 60)

“I found out, it’s not like, you’re being naughty after dinner, I can spoil myself. No, I see that if I keep spoiling myself with this sort of sweets, in the end I can end up with different illnesses. So I said, ok, I didn’t know that I have such issues. It was a great experience. I was so happy that I learned it.” (F, 40 - 60)

“I learned that maybe there’s some liability in my health regarding my heart in, for example, like ten years. So I have to take some precautions, take some measures from now on. And this is important for me.” (M, < 40)

F, 40 - 60 says, understanding risk and risk factors for diabetes helps her husband, who is also a Gentest consultee, maintain lower sugar intake: “Actually he’s fine, his sugar level was encouraging him to consume more sugar, but Serdar bey was explaining him that, at the point in which, you know, your blood sugar is too high, it’s already too late for you. So this is why it helped him be more disciplined.”

## Comprehensiveness

The assessment of health and behaviour, as well as the resulting recommendations take a broad, inclusive approach to general practice including basics of several other medical disciplines, and go beyond that to bridge existing silos of medical, prevention, lifestyle, and behavioural expertise. Under the label of a healthcare service, Gentest includes not only the consultee’s medical history and clinical issues, but is also open to subclinical and unexplained conditions that may affect them. Its service branches out into diet, exercise, and sleep, covering broader areas of life relevant for health. Besides this topical breadth, the programme also offers a range of perspectives and stimuli, from long-term outlooks and considerations on aging to step-by-step implementation guidance applicable in daily routine.

**Table 3** Overview of the Mechanism Comprehensiveness with its Resources, corresponding Changes in Reasoning, and Outcomes, and quotes from consultee interviewees to illustrate their experiences

Resource	Change in reasoning	Interviewees’ experiences	Outcome
Inclusive understanding of well-being across areas of life, overcoming medical/prevention silos	Knowledge, cognizance: perceptions of being healthy as holistic	<p>“I understand that [...] losing weight is not my only aim, and I’m not obsessed with it, if my purpose is a long-term goal, like a healthier and balanced life.” (M, &lt; 40)</p> <p>“I went straight to Serdar. I mean, my skin issue related to my immune system. I went to the doctor first, and he recommended me the same thing basically at first: your immune system must be weakened, so, have the same vitamins, you may have some vitamins missing in your body. So I thought ok, it’s time, I should go and see Serdar.” (F, 40 - 60)</p> <p>“Up to age sixty all pilots go for an annual medical, after age sixty its returning every six months. So annually, I have to see a cardiologist exam, eye exam, medical exam, and when you get sixty, also here in Dubai, they put you to mandatory Alzheimer’s test. So with a psych[iatrist], you just have two days, you have to pass certain exams to continue the job. So I did it at age sixty. Then every year before August, and I have to do my annual and every six months. And together with that, not only those two, then I go to the emirates clinic, and they check-up again for everything. But that doesn’t mean it is not – because they’re looking at your reactions, and the blood results, that’s all. It’s not as we had it in Gentest.” (M, &gt; 60)</p>	Awareness
Coordinated and harmonised (non-conflicting) whole-lifestyle-counseling	Self-efficacy expectations, attitudes: no conflicting advice	<p>“His recommendations also are getting popular in general, but since I already also had a report of Serdar bey with us, it’s more easy for me to spot what’s credible, what’s not credible. My father keeps forwarding me health advice from different doctors who are popular, and I say, I’m not listening to what comes from the internet. I have a doctor and I stick to his recommendations and I don’t want my stuff to be confused with other recommendations.” (F, 40 - 60)</p>	Motivation

Perspective and informative depth, from abstract reflection on own health, behaviours, and goals, to concrete exercises, meal plans, and practical, step-wise guidance for daily routine

behavioural support to build necessary ability factors

“It is applicable, like, can you have that in your life, for a long time – or some doctors give food recipes, and after a while you stop doing it because it’s not practical. But Serdar’s is not like that, it’s quite practical, people can apply it in their life. He even gives us some treats. Like, you can do this sometimes, you can do that. He’s not like a dietitian, who’s like, [imitates grim voice] you mustn’t eat this, you must eat that, this is your life. I think anyone, anyone can apply this to their life. This is kind of a second life, if you understand the value of this test.” (F, 40 - 60)

Agency



## Participation

The consultee doesn't necessarily receive a fixed service package, but can be a proactive decision maker about the purpose and weight of the programme for themselves. They are involved in formulating their goals when joining the programme, and their priorities, preferences and decisions are acknowledged and supported in programme delivery.

**Table 4** Overview of the Mechanism Participation with its Resources, corresponding Changes in Reasoning, and Outcomes, and quotes from consultee interviewees to illustrate their experiences

Resource	Change in reasoning	Interviewees' experiences	Outcome
Discussing and choosing programme focus based on different service packages offered	Knowledge and reflection about what is feasible, achievable, and desirable for one's own health with (by joining) the programme	<p>One consultee (F, &lt; 40) says she knows the head physician a work context, and he offered her the basic programme package at a reduced rate, so she took it out of curiosity; she knows there are more comprehensive and expensive packages, for obesity, stress management, special medical needs etc., but didn't really look into it.</p> <p>One consultee (M, &gt; 60) joined the programme after long unsuccessful efforts lose weight sustainably, and received a programme package that has eventually helped him do so, including detailed diet assessment, stress assessment, close follow-up monitoring, and long-term engagement.</p> <p>One previously overweight consultee (M, &lt; 40) wanted to live more healthily and focused on losing weight by running; when this didn't work out, he turned to Gentest to figure out why: "[Specifically losing weight] was my initial aim [when joining the programme]. But Serdar Savaş and my dietitian told me that having extra weight is an indication of a bad situation in your health, but it shouldn't be the sole aim of this programme. The aim is to have a healthier life. And longer life. So, I gave up – I mean, I didn't give up my aim of losing weight, but I understand that losing weight is just a part of a grand plan. You have to eat, you have to drink you have to sleep, you have to live a life in accordance with your genes, with your genetics."</p>	Awareness

<p>Negotiability to set priorities within programme, and between programme and lifestyle, e.g. beliefs, preferences</p>	<p>Fitting the programme and the effort it requires into the consultee's intention, preceding and environmental factors, attitudes, social norms, and own self-efficacy – attitudes</p>	<p>“Serdar Savaş specifically told me not to run. [...] But I really love running, and we didn't have any consensus about running, because I feel, running gives me a psychological relief, and not a burden to my health system. So I continue to run, but I decrease kilometers I run in a month. And for example, I swim more. Yea, I was about to go to a tennis course, if this pandemic didn't start. Yea, so this is my relationship with Gentest, and it's a democratic one. I didn't obey everything they tell, I tried to create my own personal area of decision, and I apply it for example in running.” (M, &lt; 40)</p> <p>“They said that I might start to take pills, and I said, no, I don't want to start taking pills at the moment. Also I said that I that I'll look after what I'm doing, eating, I'll do more sports, and later in the end I didn't use any pills for the you know, blood sugar. So, the result was very good.” (F, &lt; 40)</p> <p>“The hardest thing is, you can't apply it like this, you need some time. For us, I would say, it would require another six months. By the end of this year I would say, ok, this is at my fridge, I'm going to read what I'm going to do, this and that. But Serdar and his team also say this. They're not saying anything like, these are the rules, you have to do this and that. They're like, this is the good stuff for you, and what you should do, this would be good for you. Of course when you say have some baklava. Of course he doesn't say, oh, but you mustn't. But I know that this is not good for myself.” (F, 40 - 60)</p>	<p>Motivation</p>
<p>Accessibility for check-ups (meetings and/or labs, as preferred)</p>	<p>Long-term follow-up with the programme, with extent and depth of the engagement adaptive to client's priorities and perceptions of health</p>	<p>“When I have a question in my mind, I can write to my WhatsApp group and I get the reply. This is really important, being in constant contact. I know that somebody is there taking care, looking after.” (F, &gt; 60)</p> <p>“They compare the results. For example, four months ago my test blood was this, this, this and this, but today, four months later, my results show this, this and that. So, at Gentest they compare them from today and from four months ago. So that's why if something, some results, increase or decrease dramatically, they can say that, ok, hold on, there's something going on. So that's why I'm feeling better. At least I trust myself. I know what's going on inside me, at least, and I feel at ease, because I don't have any serious illness at the moment. And, you know, I can sleep freely, because I know that I'm okay at least for now. So it's a good thing. And if something went wrong, if I had a problem, I hope, I expect, that we'll find it out as soon as possible, or at least within four months. If you think of, for example a very bad illness, cancer, it's really very important to find out if it's in the first stage. So that's why I really want to know if there's something, this kind of thing. If it's in the first stage it will be easier to do whatever we need to do.” (F, &lt; 40)</p> <p>“A very good way to be active would be to go for a chat to talk to his dietitians. We haven't been doing it because of my pregnancy again, but... ahm, it gives us a sense of discipline when you see these guys, and, you know, you have to report our misbehaviour to someone [laughs] and they tell you to go back to your routine.” (F, 40 - 60)</p> <p>“Most of the time they recommend me to take an appointment and make another call with them. Sometimes I find out something good for your body I'm asking them, they say that – like [incomprehensible] product. They said, you have inflammatory bowel disease, you shouldn't take it, it may not be good for your body. I mean, some short question I'm asking, but most of the time they recommend me to take an appointment and go there and make the blood test again. So, I didn't prefer to do it, because I know my body already, so I know what works for me, and I don't want to visit doctors all the time, like I'm sick all the time. I'm not that kind of person, I don't like to make it an obsession in my life. But from time to time, I have a question that I ask in the WhatsApp group.” (F, 40 - 60)</p>	<p>Agency</p>

## Mutual Trust and Responsibility

The programme (r)evolves around the relationship and communication between counsellors and consultees, and these are characterised by mutual trust and responsibility: Counsellors are trusted by clients to responsibly deliver the programme, adapted to the client’s individual needs and wishes, using their professional expertise and skills, and with the client’s well-being as central goal; clients are trusted by their counsellors to be active, responsible participants, taking charge of their own lifestyle and sharing feedback about successes and barriers with their counsellors. This manifests threefold: the terms on which the communication between counsellors and consultees is organised to build this trustful relationship; the way counsellors, based on their knowledge and expertise on each of their consultees, can responsively tailor the programme and its components to their needs; and the presentation of the programme as scientifically sound and transparent, which consultees can trust and confide in. It results not in awareness, motivation, or agency specifically, but more fundamentally shapes the platform on which the Gentest service takes place throughout.

**Table 5** *Overview of the Mechanism mutual Trust and Responsibility with its Resources, corresponding Changes in Reasoning, and Outcomes, and quotes from consultee interviewees to illustrate their experiences*

Resource	Change in reasoning	Interviewees’ experiences	Outcome
Communication Organisation	Client feels safe and personally cared for in the programme	<p>“I could feel that anytime I need help with my health issues, I could get in contact with him. Which I do, [...] via our WhatsApp group we always get in contact with each other.” (F, &gt; 60)</p> <p>“You can feel you understand it, you can rely on him. [...] the way he approaches, and his staff approaches people is very important for me. If I don’t have good contact with my doctor, the treatment most probably will not be successful. And I think Gentest as a programme itself may not work if the people involved in it cannot have good communication with the clients. You know, more communication, trustful communication. It wouldn’t work. [...] Emotional security.” (F, &gt; 60)</p> <p>“You feel you’re being taken care of, it’s a very good feeling, don’t you think? Like somebody is looking after you.” (F, &gt; 60)</p> <p>“Our communication style, and her promptness is something that makes me feel much comfortable with Gentest.” (M, &lt; 40)</p> <p>“We got the book, you now, with the results. It’s a little bit of scientific explanation, it took four hours to understand what’s going on, almost one and a half with Serdar and the nutritionist. They explained three hours forty-five minutes, four hours what’s going on, feedback.” (M, &gt; 60)</p> <p>“If you don’t apply these to your life it’s meaningless, so there’s no point to go there. Then you’re not only wasting your money, but also other people’s time. These people study quite a lot, they make an effort, and they try to emphasise what we should and shouldn’t do. I think from Serdar and Serdar’s side, it would be the hardest thing if people don’t apply this to their life. I think, they would be – not heartbroken, but it would be sad for them.” (F, 40 - 60)</p>	Personal and trustful relationship and communication between counsellors and clients

Responsiveness	Counsellors are knowledgeable about each client so they can respond to implicit or explicit feedback accordingly	<p>“I lost ten kilograms, and for example for a period of time, I gained some weight again and I directly connected to my dietitian, and they re-worked through the programme, and what kind of changes we can make. We talked, and there will be other recommendations, and I again lost weight.” (M, &lt; 40)</p> <p>F, 40 - 60, reports unintended negative side effects of very strict diet, which she brings to the attention of the head physician and her counsellor, and which are then fixed.</p>	Tailoring of programme components responsive to the client’s needs, performance, and feedback
Strategic Communication	Confidence-inspiring presentation of the programme as scientifically sound, trustworthy and reliable	<p>F, &gt; 60, says, Gentest is more trustworthy than “snap diets or whatever magician [chuckles]”</p> <p>“Dr. Savaş was talking, and I was really impressed by what he said, and I thought it was useful for me. [...] When we [...] met with Dr. Serdar Savaş, the way he explained was very impressive. He can make you understand that this thing will help you, that’s very important.” (F, &gt; 60)</p> <p>“And you know, what they do is scientific. And you know that they’re doing something really – what they’re doing is correct. That’s also important. If anybody comes and just talks and talks, you don’t believe. This is something based on facts.” (F, &gt; 60)</p> <p>“I didn’t look for the other genetic programme, because Serdar Savaş was explaining everything with details.” (F, &lt; 40)</p> <p>“For me, I have to trust what he says. He says, if you were a smoker, and not exercising, not following the nutrition, genetically you may not see above your sixties. That’s what he said. But you have to trust his words, because he’s the doctor.” (M, &gt; 60)</p>	Clients trust the programme as a source of healthcare provision, offering assessment and advice beyond general (primary) care