

THESES OF THE DOCTORAL (PhD) DISSERTATION

CONSUMER ACCEPTANCE OF GENETIC BASED PERSONALIZED NUTRITION

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1. BACKGROUND, OBJECTIVES AND PRESENTATION OF THE RESEARCH HYPOTHESES

Personalized nutrition has been a well-known concept since the 1970s (NIZEL, 1972), taking into account certain aspects and physiological characteristics, specialists have been putting together individual diets for a long time, but this practice has not yet spread widely. Today, nutritionists use various characteristics to personalize dietary advice, thereby trying to adapt the diet to individual needs as much as possible. The first level of personalized nutrition is based on lifestyle information (e.g. gender, age, BMI index), the second level uses phenotypic information (e.g. clinical parameters), and the third (highest) level is based on genetic information (i.e. genetic tests after completion, the individual diet is determined based on the results obtained), and with the help of which the dietary recommendation can be tailored to a significantly greater extent (RONTELTAP et al., 2007). Nutrition genomics includes nutrigenomics – i.e. the effect of nutrients on gene expression – and nutrigenetics, which means the response of genes to consumed nutrients (BOUWMAN et al., 2008).

The explosive technological development that has taken place in recent years has made it possible to use nutrigenomics to understand the effect of nutrition at the genome level (BORDONI and GABBIANELLI, 2019), which clearly put nutrition science on a new foundation. With the help of DNA-based nutrition, it is therefore possible to learn about the interactions between nutrients and genes, and with its help, we can create the possibility of mitigating or even preventing nutrition-related chronic diseases.

Despite the fact that genetic-based personalized nutrition is becoming more and more widely available, it is still considered an exception rather than a general, established practice (KISS and FARKAS, 2021). Nutritional genomics and its main field of application, personalized nutrition counseling, are therefore still fairly new concepts for many. While countless studies around the world have examined consumer attitudes related to genetic tests suitable for detecting various diseases, significantly fewer studies have dealt with consumer acceptance of genetic-based personalized nutrition and the exploration of the underlying psychological processes (see e.g. FALLAIZE et al., 2013; GIBNEY and WALSH, 2013; STEWART-KNOX et al., 2015), especially in relation to Hungary (SZAKÁLY et al., 2014;

SZAKÁLY et al., 2019; SZAKÁLY et al., 2021). Due to this problem, the objectives of my dissertation include the following:

***O1:** Assessing which factors and to what extent they affect the acceptance of genetic-based personalized nutrition among Hungarian consumers.*

***O2:** Exploring the relationships between the factors influencing the acceptance of genetic-based personalized nutrition and including it in a complex model among Hungarian consumers.*

***O3:** Segmentation of Hungarian consumers based on the factors influencing the acceptance of genetic-based personalized nutrition.*

***O4:** Demonstration of the usability of the results obtained during the research both on an individual and social level.*

SZAKÁLY et al. (2014), and SZAKÁLY et al. (2021)'s representative research clearly shows how divided domestic consumers are regarding the appeal of personalized nutrition. During the survey conducted in 2014, only 27% of the respondents said positively about the new technology, they would like to use the mentioned service in order to preserve their health. The largest segment is the undecided, their proportion is close to 45%. According to nearly 30% of the participants, genetic-based personalized nutrition is not an attractive option at all from the point of view of preserving their health, so they would not use it (SZAKÁLY et al., 2014). During the 2019 research, the results were less favorable than before. At that time, only 23.5% of respondents considered genetic-based personalized nutrition to be an attractive option, the proportion of those who were unsure increased to 45.9% and 30.6% declared that they would not use this technology at all (SZAKÁLY et al., 2021).

Based on the responses received during domestic research, it can be concluded that Hungarian consumers are uncertain and distrustful of the new technology, despite its obvious advantages. This not very positive attitude is probably due to a combination of several factors. The traditional way of thinking and the aversion to the new play a role in this as well as the lack of information and misconceptions and beliefs related to genetic tests. The technology is still so new among the surveyed consumers that significant differences between the socio-demographic consumer segments can only be observed in a few cases, so

consumer preferences cannot be sorted into homogeneous groups. As a result, the selection and targeting of target markets is a very difficult or almost impossible task (SZAKÁLY and POLERECZKI, 2017). Based on this, it can be assumed that:

H1: Due to the novel nature of genetic-based personalized nutrition, the preferences of domestic consumers are uniform, so their segmentation is not feasible based on the factors influencing acceptance.

In the domestic and international literature, we can find many theories and models that aim to better understand different forms of behavior, including the various elements of health behavior (KISS et al., 2020a). Part of these are social-cognitive behavioral models (TELEKI and TIRINGER, 2017), which provide a kind of theoretical framework to identify the beliefs behind consumer behavior, which can then become the basis of interventions aimed at behavioral change (ABRAHAM et al., 1998). According to Kiss et al. (2020a), perhaps the most common socio-cognitive behavioral models in the literature are the Theory of Reasoned Action (TRA) (AJZEN and FISHBEIN, 1980) and the Theory of Planned Behavior (TPB) (AJZEN, 1991). Other social-cognitive behavioral theories often found in the literature are the Social Cognitive Theory (SCT) (BANDURA, 1994; Bandura, 2006), the Theory of Interpersonal Behavior (TIB) (TRIANDIS, 1980) and the Health Belief Model (HBM) (BECKER, 1974; JANZ and BECKER, 1984).

In the models described above – in addition to their several different characteristics – there is an outstanding amount of correspondence, and based on these, there have been many efforts to create an integrated model by extending and adapting TRA and TPB (HEIMLICH and ARDOIN, 2008).

The integrated behavioral model (Integrated Behavioral Model – IBM) appears in the empirical research so far in a slightly different form and structure, and a validated, final application form has not yet been developed (KISS et al., 2020a). In their study, KASPRZYK and MONTAÑO (2007) describe that the questionnaire of the model must be designed taking into account the characteristics of the given population and the behavior under investigation. This obviously leads to some degree of different model variations, even if the basic relationships remain mostly valid (KISS et al., 2020a); in any case, it can be said that IBM provides an excellent framework for identifying, measuring and determining the

meaning of factors that determine behavior (MONTAÑO and KASPRZYK, 2008), since the rational approach to action assumes that people behave reasonably according to their beliefs (FISHBEIN, 2009). The integrated behavioral model integrates a number of previous models, therefore it includes a variety of factors from multiple perspectives, so it is possible to get a more complete picture – in this case, related to genetic-based personalized nutrition – of the factors influencing consumer acceptance. The version of the integrated behavioral model developed by MONTAÑO and KASPRZYK (2008) assumes, like the TRA/TPB models, that the main influencer of behavior is behavioral intention. Based on this, my second hypothesis:

H2: *Following genetic-based personalized nutrition is influenced by the intention to follow genetic-based personalized nutrition.*

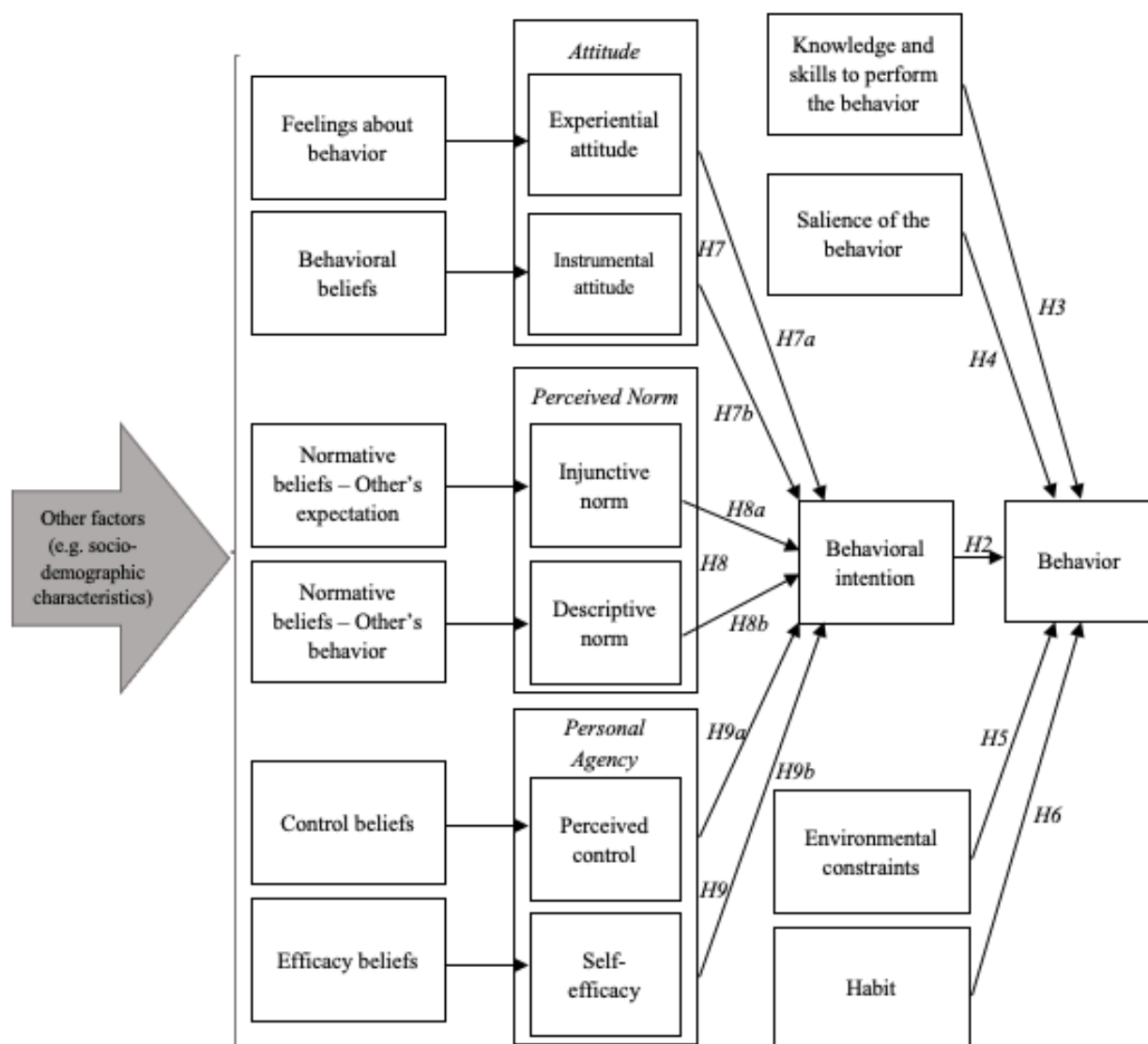


Figure 1: The integrated behavioral model (IBM) and research hypotheses

Source: Own editing based on MONTAÑO and KASPRZYK (2008)

In addition to the factors identified by the TRA/TPB (*Figure 1*), the IBM also includes four others that do not affect behavioral intention, but directly affect behavior (JACCARD et al., 2002). The first three of the four factors have an impact on whether or not the investigated behavior develops as a result of the behavioral intention. First of all, even if the individual has an effective intention to perform a specific behavior, he still needs knowledge and skills to be able to follow the given behavior (MONTAÑO and KASPRZYK, 2008). Secondly, as the TIB emphasizes, it is important that there are no or only few environmental constraints that make behavior difficult or impossible (TRIANDIS, 1980). Thirdly, based on the HBM, the behavior must be important and outstanding for the individual (BECKER, 1974). Finally, as the TIB also includes, with the regular continuation of the behavior, it becomes a habit, and then the intention becomes less important in determining the behavior (TRIANDIS, 1980). From these, the following hypotheses can be formulated:

H3: *Adherence to genetic-based personalized nutrition is influenced by the individual's knowledge and skills regarding genetic-based personalized nutrition.*

H4: *Following genetic-based personalized nutrition is influenced by the salience of genetic-based personalized nutrition.*

H5: *Following genetic-based personalized nutrition is influenced by the individual's environmental constraints.*

H6: *The following of genetic-based personalized nutrition is influenced by the fact that the given behavior has already become a habit of the individual.*

HARKIN et al. (2016), behavioral intention is determined by a triple structure: attitude, perceived norm and personal influence. Similar to TRA and TPB, attitude is the first direct influencer of behavioral intention in the integrated behavioral model of MONTAÑO and KASPRZYK (2008). The authors distinguish two types of attitude: one is the experiential attitude, the other is the instrumental attitude. An experiential or affective attitude is the response of an individual's emotions to the idea of following a given behavior (FISHBEIN, 2007). In contrast, the instrumental attitude is cognitively based and determined by beliefs about the outcomes of the behavior, just as in the case of TRA and TPB (BRAUN, 2012; KISS et al., 2020a). We can assume that even for a behavior such as following personalized

nutrition, attitude has a significant influence on intention. Therefore, the following hypothesis:

H7: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's attitude towards genetic-based personalized nutrition.*

H7a: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's experiential attitude toward genetic-based personalized nutrition.*

H7b: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's instrumental attitude toward genetic-based personalized nutrition.*

Similar to TRA and TPB, in MONTAÑO and KASPRZYK's (2008) integrated behavioral model, the perceived norm is the second directly influencing element of intention, which reflects the social pressure to follow a certain behavior or not (KISS et al., 2020a). According to FISHBEIN (2007), the subjective norm (normative beliefs regarding what others think an individual should do and the motivation to comply with them) does not fully capture the whole of normative influence. In addition to the prescriptive norm perceived in this way, an important part of normative influence is also the descriptive norm, i.e. the perception of the individual in terms of what others do in his social and personal network of relationships (MONTAÑO and KASPRZYK, 2008). So, the greater the probability that the individual will carry out a specific behavior, the more they assume that he should follow it according to the reference persons, and the more they want to comply with these people, and the more the reference persons themselves carry out the given behavior (BRAUN, 2012; FISHBEIN and CAPPELLA, 2006). Based on previous research results, consumer preferences for genetic-based personalized nutrition are influenced by subjective norms (RONTELTAP et al., 2009), so it can be assumed that subjective/prescriptive and descriptive norms also have a significant impact on the intention to follow genetic-based personalized nutrition can practice.

H8: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived norm regarding genetic-based personalized nutrition.*

***H8a:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived injunctive norm related to genetic-based personalized nutrition.*

***H8b:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived descriptive norm related to genetic-based personalized nutrition.*

In MONTAÑO and KASPRZYK's (2008) IBM, the third direct influencing factor of intention is the personal influence advocated by SCT (BANDURA, 2006), that is, the influence of the individual on the events of his environment and on his own functioning. Personal influence consists of two elements: perceived behavioral control and self-efficacy. The former is nothing more than the individual's perceived control over the behavior performed, which is determined by their perception of how difficult or easy the various environmental factors are to follow the given behavior (LA BARBERA and AJZEN, 2021). The RONTELTAP et al. (2009) – which examined the factors influencing consumer preferences related to genetic-based personalized nutrition – perceived control is affected by freedom of choice (that is, that no one forces the consumer to follow the given behavior), which (in part) determines the consumer's preferences for genetic-based personalized nutrition. And self-efficacy means how much the individual believes in being able to follow the behavior despite various obstacles and challenges (MONTAÑO and KASPRZYK, 2008). POÍNHOS et al. (2014) model (which examines the factors influencing the intention to accept genetic-based personalized nutrition), the more favorable the self-efficacy, the more positive the consumer's attitude towards the intention to accept genetic-based personalized nutrition. Perceived behavioral control is considered more external, and self-efficacy more internal control (BRAUN, 2012). Both perceived behavioral control and self-efficacy can appear as a factor in the acceptance of genetic-based personalized nutrition, which can significantly influence it. Thus the following hypothesis:

***H9:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's personal agency regarding genetic-based personalized nutrition.*

***H9a:** Behavioral intention to follow genetic-based personalized nutrition is influenced by an individual's perceived control related to genetic-based personalized nutrition.*

***H9b:** Behavioral intention to follow genetic-based personalized nutrition is influenced by an individual's perceived self-efficacy related to genetic-based personalized nutrition.*

Similar to the integrated behavioral model used in other researches, behind the directly influencing factors listed above in the model of MONTAÑO and KASPRZYK (2008) there are also beliefs: the instrumental attitude depends on the beliefs about the outcome of the behavior (the behavioral beliefs are weighted by the expected outcomes) (KASPRZYK and MONTAÑO, 2007; KENSKI et al., 2001; VON HAEFTEN et al., 2001; VON HAEFTEN and KENSKI, 2001). The more the individual believes that the behavior followed will have a positive outcome, the more positive his attitude will be towards it (KISS et al., 2020a).

The perceived norms factor is influenced by normative beliefs, similar to the TRA/TPB construct. The more pronounced the individual's beliefs that certain people or groups think they should follow the given behavior, and the more they want to conform to these persons (normative beliefs weighted by the motivation to conform), or the stronger their beliefs that these people or groups also follow the given behavior, the stronger will be the social pressure experienced by the individual to follow it herself/himself (KASPRZYK and MONTAÑO, 2007; KENSKI et al., 2001; MONTAÑO and KASPRZYK, 2008; VON HAEFTEN et al., 2001; VON HAEFTEN and KENSKI, 2001).

According to the TPB, perceived behavioral control is a function of control beliefs (which refer to the probability of the appearance of various favorable or restrictive conditions), weighted by the perceived effect of the conditions on facilitating or complicating the behavior (KASPRZYK and MONTAÑO, 2007; KENSKI et al., 2001; VON HAEFTEN et al., 2001; VON HAEFTEN and KENSKI, 2001). Finally, the stronger an individual's belief that he can continue the given behavior despite various limitations and obstacles, the greater his self-efficacy will be regarding following the behavior (MONTAÑO and KASPRZYK, 2008).

Similar to the other integrated behavioral models, this version of the model also contains additional variables relating to personality, attitude, demographics and other individual differences, but these factors in this case also exert their effect only indirectly, through the theoretical constructions, and can therefore be interpreted as external variables them (KISS et al., 2020a). Their importance lies in the fact that the population can be segmented by them, if clear differences can be found in the beliefs of the segments, so different intervention strategies can be developed for each segment (MONTAÑO and KASPRZYK, 2008). SZAKÁLY et al. (2019) study shows that domestic women rejected the new technology at a significantly lower rate than men (24.0% and 34.2%). Furthermore, more women (30.4%) than men (23.2%) consider the application of genetic-based personalized nutrition to be an attractive option. The domestic survey conducted two years later showed minimally different results: women reject the new technology at a significantly lower rate than men (26.3% and 35.5%, respectively); in addition, more women (27.6%) than men (18.9%) consider the use of personalized nutrition based on genetic testing to be an attractive option (SZAKÁLY et al., 2021). Regarding age, SZAKÁLY et al. (2014) research, younger people, i.e. those between 18 and 39 years of age, proved to be more receptive to new technology. Regarding the subjective income level, SZAKÁLY et al. (2021) results, it can be said that those domestic consumers who can live off their income and can save a little find this option attractive in a significantly higher proportion than expected (28.6%), and in a smaller proportion (25, 0%) are rejected. On the other hand, a smaller than expected rate (19.7%) finds it attractive for those whose income is just enough to live on, while a higher than expected rate (44.6%) rejects it for those struggling to make ends meet. These results support the fact that the higher the family's monthly income, the more likely it is that the individual finds the use of personalized nutrition attractive, and the less likely they are to reject it (SZAKÁLY et al., 2019). In terms of educational level, people with a lower educational level find personalized nutrition attractive in a significantly lower proportion than expected (general education: 14.7%, vocational training: 19.6%), and reject it in a significantly higher proportion (general education: 43.1%). On the other hand, people with a higher education find them attractive (36.8%) and reject them less often (16.5%) (SZAKÁLY et al., 2021). SZAKÁLY et al. (2014), and SZAKÁLY et al. (2019) research also shows that a significantly higher proportion of university graduates would undergo

genetic testing for the purpose of personalized nutrition counseling than those with a lower education. From what is described here, the following hypothesis emerges:

H10: *Certain socio-demographic characteristics significantly influence consumer acceptance of genetic-based personalized nutrition.*

H10a: *Gender significantly influences consumer acceptance of genetic-based personalized nutrition.*

H10b: *Age significantly influences consumer acceptance of genetic-based personalized nutrition.*

H10c: *Subjective income level significantly influences consumer acceptance of genetic-based personalized nutrition.*

H10d: *Education significantly influences consumer acceptance of genetically based personalized nutrition.*

In general, it can be stated that the constructs of the integrated behavioral model are a good predictor of the behavioral intention, as well as the behavior itself, where it was also the subject of the study. IBM is therefore well suited for generating proposals for specific interventions related to various aspects of health behavior (KISS et al., 2020b), and thus presumably also for supporting proposals for genetic-based personalized nutrition.

2. MATERIAL AND METHODS

In order to fulfill the objectives stated at the beginning of writing my dissertation, as well as to support the hypotheses, I used both secondary and primary (including qualitative and quantitative) research methods. The data collection and data analysis methods used are discussed in the following subsections.

2.1. Secondary data collection

The aim of the secondary data collection was to get as comprehensive a picture as possible of previously published research results on the topic. To this end, I used relevant domestic and (mostly due to the topic) international books, articles published in professional journals, studies and other related databases. During my research, the search interfaces of ResearchGate, Scopus, and Google Scholar helped me, and in addition to these, I accessed data and information relevant to my topic from the databases of the Central Statistical Office and Eurostat.

I conducted the search along the keywords „*non communicable diseases*”, „*civilizációs betegségek*”, „*health awareness*”, „*egészségtudatosság*”, „*health behavior*”, „*egészségmagatartás*”, „*personalised nutrition*”, „*personalized nutrition*”, „*személyre szabott táplálkozás*”, „*nutrition genomics*”, „*nutrigenomics*”, „*nutrigenetics*”, „*táplálkozásgenomika*”, „*nutritional genomics*”, „*genetic based personalised nutrition*”, „*genetic based personalized nutrition*”, „*genetikai alapú személyre szabott táplálkozás*”, „*integrated behavioral model*”, „*integrated behavioural model*”, „*integrált viselkedéses modell*”.

2.2. Primer data collection

During the primary information collection, I used the integrated behavioral model (IBM) to examine consumer acceptance of personalized nutrition among domestic consumers, and what psychological processes lead to a positive assessment or rejection of this new technology. In accordance with the methodology of the model, I first collected qualitative data in the form of focus group interviews, and then conducted quantitative research, which was carried out using an online questionnaire.

2.2.1. Application methodology of IBM

The primary research phase was carried out along the logic shown in *Figure 2*. In accordance with the objectives of the research, in the quantitative phase of the research, among the three levels of personalized nutrition, only consumer acceptance of genetic-based personalized nutrition was assessed.

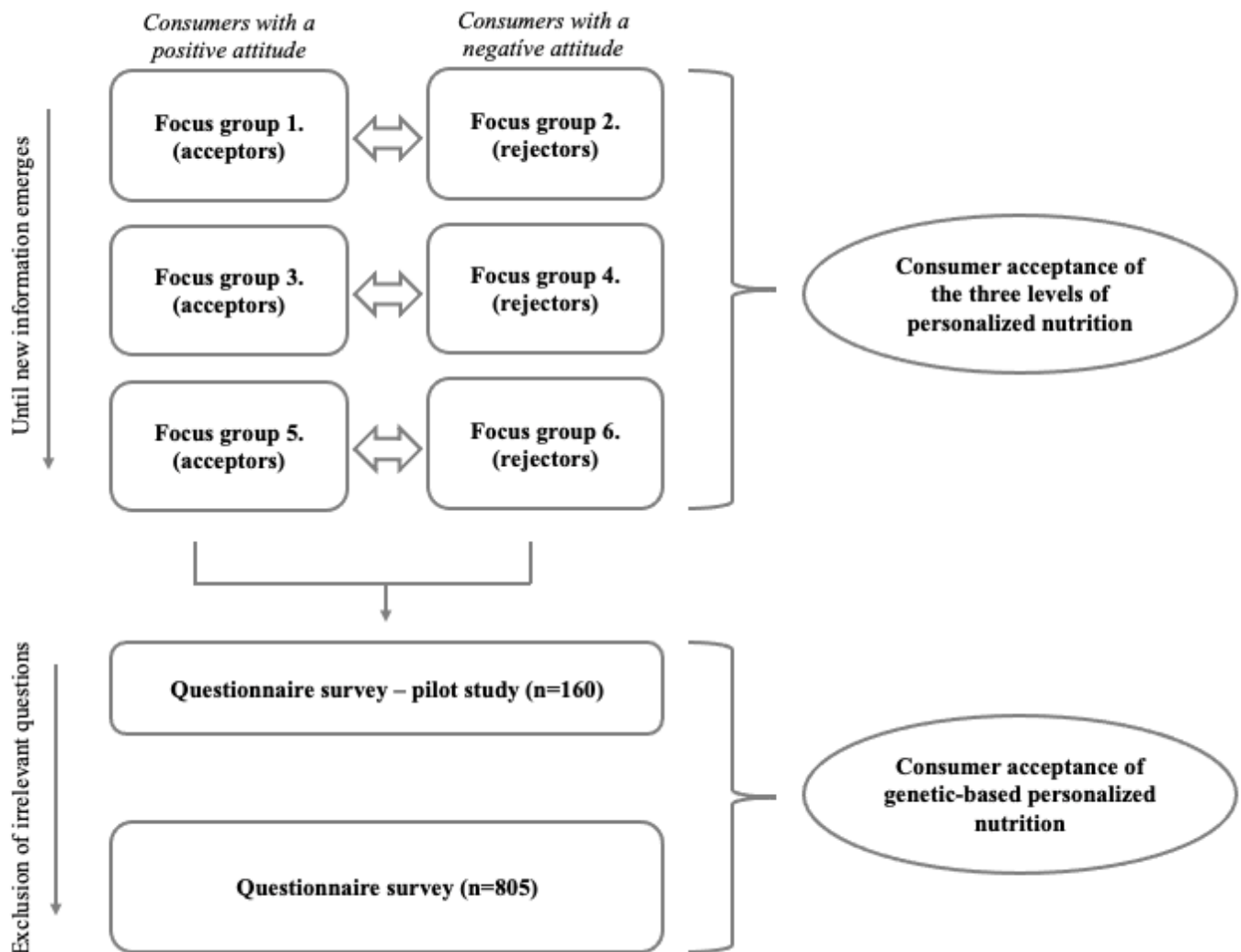


Figure 2: The logical structure of primary research based on the integrated behavioral model

Source: Own editing (2023)

2.2.1.1. Qualitative data collection - focus group interview

When applying IBM, the first step of empirical research is to conduct qualitative data collection with the stakeholders, in the form of focus group interviews (KASPRZYK and MONTAÑO, 2007) or open personal in-depth interviews (MONTAÑO and KASPRZYK, 2008) (KISS et al., 2020b). In the course of this research, I used focus group interviews on

an online platform in February and March 2021 due to the COVID-19 pandemic situation. The conversations were also recorded, which later served as the basis of the analysis (VICSEK, 2006). The script of the interviews can be read in *Appendix No. 1* of the dissertation.

According to the methodology of IBM's application, it is worth organizing the interviews so that half of those present are individuals who already follow the investigated behavior (or intend to follow it in the future), while the other half of the participants in the research are individuals who do not yet follow it. It is recommended to continue the interviews until "saturation", i.e. until the point when no new information emerges (KISS et al., 2020b). I also conducted the present research along these principles, the saturation point occurred at the 6th focus group interview and half (3) of the six groups were receptive to the concept of personalized nutrition, while the other half (3) rejected it. In order to classify them into two groups, I previously filled out a short screening questionnaire with the potential participants to assess their attitude towards the topic. During the compilation of the groups, I also tried to involve the consumers in the research in an equal distribution in terms of gender, and in terms of age, people between 20 and 65 took part in the interviews; each focus group consisted of 8 people. The distribution of participants by gender and age is presented in *Table 1*. The interviews lasted 50–60 minutes.

Table 1: Distribution of focus group participants by gender and age (n=48)

Distribution of participants by gender	Person
Male	24
Female	24
Distribution of participants by age groups	
Between 20-25 years	8
Between 26-35 years	12
Between 36-45 years	11
Between 46-55 years	10
Over 55 years	7

Source: Own editing (2023)

Each conversation started with a short introduction to set the mood. During the interviews, we progressed step by step with the questions regarding the three levels of personalized

nutrition (based on lifestyle, phenotypic, and genetic information), so when analyzing the answers, I was also able to examine whether there was a difference between the three levels in terms of consumer acceptance. Based on. In order to get really relevant answers, I briefly explained the essence of all three levels of counseling to the participants before the discussion about the given level.

I compiled the interview script based on the questions developed by MONTAÑO and KASPRZYK (2008), with some of my own additions. The questions were made up of five parts. In the first block, consumer feelings came into focus, either in a positive or negative sense (experiential attitude). Then, in relation to the instrumental attitude, I examined what advantages and disadvantages the participants could articulate regarding the continuation of the given behavior. After that, the task was to list the persons who support or possibly oppose the behavior (normative influence), as well as what aggravating and facilitating factors are present in the investigated situation (perceived behavioral control). Finally, I asked the participants of the interview what their self-efficacy was when performing the given behavior, i.e., how confident they were that they could continue the behavior under investigation, and what would help them to overcome the obstacles that might come their way.

The importance of the qualitative phase of the research lies in the fact that it can be used to empirically confirm the constructions of the integrated behavioral model, and based on the results of this phase, it is possible to compile a questionnaire that matches the cultural and other attributes of the target population (KISS et al., 2020b). As a first step, KISS et al. (2020b)'s guidance, I compiled lists describing the individual elements of the model by qualitative content analysis of the focus group interviews, then formulated the specific questions of the questionnaire based on these and MONTAÑO and KASPRZYK (2008).

2.2.1.2. Quantitative data collection - questionnaire survey

Among the quantitative data collection techniques, I used the questionnaire survey (in this case in online form), which is one of the most popular and widespread data collection methods in social science research and is particularly suitable for investigating consumers' attitudes (BABBIE, 2003). The questionnaire, supported in the right way and with qualitative data collection – thus adapted to the given population and behavior – can reliably

measure the IBM model constructions. It is worth using correlation calculations, multiple regression calculations, and structural equation modeling to learn about the relationships between them. These can be used to identify the beliefs that best explain the behavioral intention, so – if the lack of intention is the limit to performing the behavior – interventions aimed at behavioral change should be focused on these first (KISS et al., 2020b).

Before finalizing the questionnaire, I conducted a pilot test in the form of an online questionnaire using Google Forms (n=160) in January and February 2022. The importance of the pilot test is that it helps to clarify the formulated questions, to make the scales reliable, and to adapt them to the given culture, in addition, it is possible to exclude redundant questions with low variance (KISS et al., 2020b). After the pilot survey, confirmatory factor analysis (CFA) was applied, during which I examined whether the data obtained during the survey fit the empirical (integrated behavioral) model (PREEDY and WATSON, 2009) and the final questionnaire was created. The original (pilot) questionnaire contained 71 questions/statements, but thanks to the CFA, 17 of them had to be excluded from different constructs. 1 item was removed from the experiential attitude, 2 items from the statements related to the instrumental attitude, 10 items from those measuring perceived behavioral control, and 4 items from the statements examining self-efficacy.

The quantitative data collection with the final (narrowed) questionnaire took place between October 2022 and February 2023, in the form of an online survey (also using Google Forms). Due to the limitation of the research budget, the questionnaire was shared several times on the Facebook social media platform, so the sampling was convenient. The basic population was the domestic population and finally 805 evaluable responses were received. The sample is representative in terms of gender ($\chi^2=0.790$; $p=0.374$) - 53.66% of the respondents were women (432 people) and 46.33% were men (373 people) – so its structure perfectly matches the Hungarian of the distribution of population reported by KSH (2023). The distribution of the survey sample according to socio-demographic background variables can be seen in *Table 2*.

Table 2: Socio-demographic distribution of the questionnaire sample (n=805)

Distribution of participants by gender	Person	%
Male	373	46,33
Female	432	53,66

Distribution of participants by age groups		
Between 18-25 years	390	48,44
Between 26-35 years	168	20,87
Between 36-45 years	165	20,50
Between 46-55 years	59	7,33
Over 55 years	23	2,86
Distribution of respondents by place of residence (type of settlement).		
Capital	42	5,20
County seat	337	41,90
City	343	42,60
Village	83	10,30
Distribution of respondents by place of residence (region).		
Northern Hungary	116	14,41
North Great Plain	606	75,28
South Great Plain	20	2,48
Budapest	48	5,97
Central Transdanubia	4	0,50
Western Transdanubia	3	0,37
South Transdanubia	8	0,99
Distribution of respondents by educational level		
A maximum of 8 primary school classes	0	0
Vocational training, vocational school	35	4,30
Graduation	411	51,10
University Degree	359	44,60
Distribution of respondents according to legal status/main activity		
White-collar worker/Blue-collar worker	375	46,60
Student	385	47,80
Housewife/househusband	10	1,20
On maternity leave	19	2,40
Pensioner	12	1,50
Other NEET	4	0,50
Other dependents	0	0

Unemployed	0	0
Distribution of respondents according to subjective feeling of income		
They make a very good living from it and have a good disposable income	211	26,20
They make a living from it, but have a small disposable income	436	54,20
It's just enough to make a living, but have no disposable income	110	13,70
Sometimes it's not even enough to make a living	7	0,90
You regularly have daily living problems	0	0
I don't know/I don't answer	40	5,00

Source: Own editing (2023)

The questionnaire consisted of 54 questions/statements (including questions about demographic data), which included short-answer, multiple-choice and, in most cases, 7-point Likert scale questions – ranging from -3 to +3 - different endpoints – with names according to the IBM model constructions (MONTAÑO and KASPRZYK, 2008). The questions of the questionnaire can be found in the dissertation's annexes No. 2. Due to the better analysability of the data, the Likert scale values ranging from -3 to +3 were recoded to 1–7, so this must be taken into account when interpreting the obtained results.

During the assessment of the knowledge and skills required for the behavior, the interviewees had to describe the definition/meaning of genetic-based personalized nutrition. In order to be able to quantify (and then statistically analyze) the results obtained here, I coded the professionally acceptable formulations with 1 and the inappropriate ones with 0. The measurement of environmental constraints was incorporated into another construct of the model (personal impact). In the case of examining the habit, the respondents had to answer whether they had already used genetic-based personalized nutrition, as well as how many times they had done so. Based on the answers to the latter question, however, very few respondents used the service more than once (3 people, 0.37%), so it was not taken into account in the analysis.

The data obtained during the quantitative research was first recoded using the Microsoft Excel program, and then evaluated using R and IBM SPSS mathematical-statistical analysis software.

I started the analyzes with descriptive statistical methods, where I calculated the average, median, and standard deviation. During the analyses, I included gender, age, subjective income status, and education among the socio-demographic background variables in order to explore possible differences in the factors influencing the acceptance of genetic-based personalized nutrition. In the analysis of differences based on hypothesis testing – which were primarily parametric procedures – in the case of gender, I used an independent two-sample t-test, and in the case of age, subjective income status, educational level, and behavioral intention, I used an analysis of variance, at a 5% significance level (α) (KÖVÉR et al., 2022). During the analysis of variance (ANOVA), where I found a significant difference, I also ran a Bonferroni Post Hoc test. Furthermore, I also perform cross-tab analyzes for the ordinal measurement level variables (when examining the significant relationships between the knowledge and abilities required for the behavior, as well as the socio-demographic background variables and the behavioral intention), including the Pearson's χ^2 (Chi-square) test, then I determined the strength of the relationship using the association coefficient (Cramer V), and the specific source of the significant relationship by examining the corrected residuals ($|z| <$). I set a significance level of 5% during these analyzes as well.

During the analysis of the obtained data, I used structural equation modeling (SEM) to explore the complex relationships between the IBM variables. SEM is always based on an empirical model (in this case it is IBM) (MÜNNICH and HIDEKGUTI, 2012). Structural equation modeling is a multivariate analysis method that combines, among other things, linear regression and factor analysis to show the extent of interdependent relationships, taking into account separate but closely related multivariate regression equations (HAIR et al., 2010).

After that, I also carried out a two-stage cluster analysis – which has many advantages compared to traditional methods, including the fact that it can be used effectively for analyzing databases with a large number of elements, and provides users with an efficient cluster number search algorithm (CHIU et al., 2001) – in order to I can segment consumers according to certain factors of the model – identified by SEM. To examine the characteristics of the clusters, I used analysis of variance (ANOVA) and Pearson's Chi-square test, with a significance level of 5%.

3. MAIN FINDING OF THE THESIS

Among the main findings of the dissertation, the conclusions drawn on the basis of the first and second objectives of the research (*O1*, *O2*) and the related hypotheses (*H2-H10*) will be explained, then the third objective (*O3*) and the related hypothesis (*H1*), and finally conclusions related to the fourth objective (*O4*) are also presented.

O1: Assessing which factors and to what extent affect the acceptance of genetic-based personalized nutrition among Hungarian consumers.

During the writing of my dissertation, one of my most important objectives was to identify which factors affect the acceptance of the domestic consumers regarding individualized nutrition based on nutrigenomics, and to what extent the revealed factors determine the individual's intention to continue the investigated behavior. I believed that the application of a complex model examining health behavior would be the most suitable for this, so I chose the integrated behavioral model as a means of achieving my goal. During my research, I used both qualitative and quantitative methods, in the form of focus group interviews and questionnaires. Structural equation modeling was used to explore the factors that directly influence acceptance and the extent of their influence. In order to learn about the relationships between additional factors and behavioral intention, as well as demographic characteristics, I performed cross-tabulation studies and variance analyses. Where it was relevant, I also took into account the results obtained during the focus group discussions. As a conclusion, it can be said that out of the six direct factors affecting behavioral intention in the model – which are affected by many indirect factors – the experiential attitude determines the behavioral intention the most (36.4%). Subjective norm is in second place with 20.8%, followed by instrumental attitude with 18.4%, self-efficacy with 11.3%, and perceived behavioral control has the smallest (8%) explanatory power. In the case of attitude, it can be said that the vast majority of respondents associated positive thoughts with genetic-based personalized nutrition counseling (pleasant, useful, worth the price). The majority of them believe that by using counseling they can achieve their goals, be healthier/live a healthier life, map their future health risks, reach their desired body weight and prevent future diseases (just like BEREZOWSKA et al., 2014; NIELSEN and EL-SOHEMY, 2012; POÍNHOS et al., 2017; RONTELTAP et al., 2007). Moreover, these

outputs are also very desirable for the majority. Regarding the perceived norm, the conclusion can be drawn that a significant part of the respondents considered it improbable that they would have to use this kind of service according to most of the people important to them (family, friends). Here it was also revealed that their primary goal is not to fulfill their ideas - which is somewhat contrary to the results of SZAKÁLY et al. (2021), who found that the immediate environment plays a prominent role in the judgment of genetic-based personalized nutrition, as well as, that these people do not use nutrigenomics-based nutrition either. Examining the personal impact, it can be stated that the continuation of genetic-based personalized nutrition is rather easy for consumers, but there are also some complicating circumstances. The narrow range of information available on service providers and counseling was thought to be a likely limiting factor. When evaluating the "severity" of each obstacle, expensive raw materials came first (the fear of high costs has appeared in many previous studies (cf. CHERKAS et al., 2010; GUDDE, 2009; MAKEEVA et al., 2009; MORIN, 2009; OLIVER, 2005; STEWART-KNOX et al., 2013)). Finally, two-thirds of the respondents thought that they would be able to complete the counseling if they used it, but it is also clear that the various challenges would make it very difficult for the majority. Among the other factors examined, the knowledge and abilities required for the behavior, the outstanding nature of the behavior, and the environmental constraints significantly influence the intention (as well as certain demographic characteristics), and consequently the acceptance of genetic-based personalized nutrition. I discuss the detailed results for hypotheses **H2-H10**.

O2: *Exploring the relationships between factors influencing the acceptance of genetic-based personalized nutrition and including it in a complex model among Hungarian consumers.*

The integrated behavioral model, which is the framework of my research, is well suited to identify the factors determining the investigated behavior, and to reveal and explain the relationships between them. Behavioral intention – in this case, whether the consumer intends to follow genetic-based personalized advice – and ultimately the behavior itself (use of advice) are influenced by direct and indirect factors, the explanatory power of which can be an important step in changing the behavior of consumers, so I based the methodology of my dissertation on this. In the first step of my primary research, I conducted focus group

interviews, and based on this (and the literature) I compiled the questionnaire measuring the individual constructs. Thanks to this, it was possible to create the complex model (Figure 3), which shows the relationships between the factors influencing consumer acceptance of genetic-based personalized nutrition. Based on structural equation modeling, it can be said that five of the six directly acting factors explain the individual's intention to follow the behavior. In the case of experiential attitude, all three indirect factors (TAI1, TAI2, TAI3) have explanatory power for the direct factor, and consequently, depending on the consumer's feelings about the idea of using advice, the intention to follow the behavior will be as strong or as weak. For the instrumental attitude, only three of the four indirect factors (IAI1, IAI3, IAI4) explain the direct variable, but overall, it can be said that the perceived chances of achieving the predetermined (and attainable during counseling) goal determine the individual's intention to continue the behavior. When examining the subjective (prescriptive) norm, it was found that its indirect factors (SZNI1, SZNI2, SZNI3) have an influence on the direct factor, i.e. they determine whether consumers feel social pressure to continue the behavior in question, which in turn will affect whether how much the individual intends to follow the advice. The next factor with explanatory power is the perceived control, where in addition to one indirect factor, the other three (ÉMI1, ÉMI2, ÉMI4) have an effect on the direct factor. The individual's perceived control over the performance of the behavior influences their intention to continue counseling. In the case of self-efficacy, all indirect factors included in the construct (ÉHI1, ÉHI2, ÉHI3, ÉHI4, ÉHI5) have an effect on the direct factor. The individual's internal control ultimately determines how strong the intention will be regarding the use of counseling.

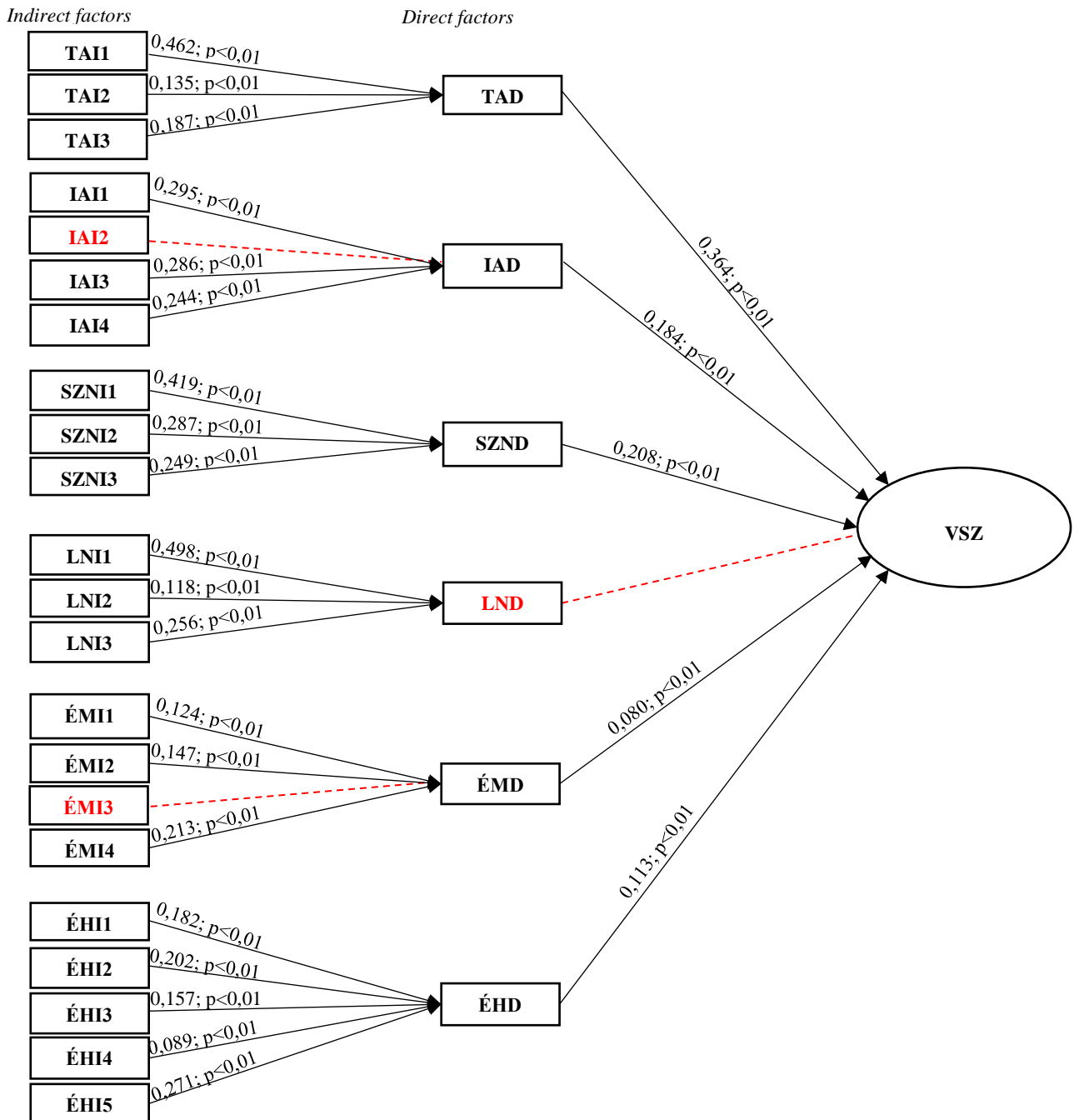


Figure 3: The effect of individual factors on behavioral intention based on SEM

Note: VSZ=behavioral intention; TAD=direct measure of experiential attitude; TAI=indirect measure of experiential attitude (behavior-related emotions); IAD=direct measure of instrumental attitude; IAI=indirect measure of instrumental attitude (behavioral belief); SZND=direct measure of subjective (prescriptive) norm; SZNI=indirect measure of subjective (prescriptive) norm: normative belief (expectations of others); LND=direct measure of descriptive norm; LNI=indirect measure of descriptive norm: normative belief (behavior of others); ÉMD=direct measure of perceived behavioral control; ÉMI=indirect measure of perceived behavioral control (control belief); ÉHD=direct measure of self-efficacy; ÉHI=indirect measure of self-efficacy (self-efficacy belief). Source own editing (2023)

Among the additional factors included in the model, regarding the knowledge and abilities required for the behavior, it can be said that those who have not yet heard about genetic-

based individualized nutrition have a significantly weaker intention, while those who have already heard about it, have a significantly stronger intention to follow the behavior. In the case of another aspect of knowledge and abilities – that is, the formulation of what genetic-based personalized nutrition means – it was found that those who wrote an incorrect definition had a significantly weaker intention than those who formulated it correctly, but they had a significantly stronger intention to follow the advice. If the behavior is outstanding, it can be discovered that the more health-conscious the respondents are, the stronger the behavioral intention to use the service. Finally, environmental constraints also affect the intention: the individual's perceived (internal and external) control over the performance of the behavior influences his intention to continue counseling: the more control he feels, the stronger the intention is to genetically-based personalized to follow nutritional advice. The detailed results related to the individual constructions are explained in the hypotheses **H2-H10**.

In the following, the results of the examination of the hypotheses related to objectives **O1** and **O2** will be explained.

H2: *Following genetic-based personalized nutrition is influenced by the intention to follow genetic-based personalized nutrition.*

Due to its novelty, the technology is so narrowly known that it is still considered an exception rather than a general, established practice. Only 116 people (14.41%) of those who participated in the research said that they had already used genetic-based personalized nutrition counseling. However, when I asked them about the number of occasions, 0 was marked in several cases and there were only 14 of them who - according to their own admission - seem to have really used this kind of service 1 or 2 times (the reason for the conflicting answers is probably it could be that the first question did not take into account that it was specifically about the use of "genetically based" personalized nutrition, which was realized in the later question), so the answers to this question were not suitable for further analysis, I could not measure the behavior itself with them. Thus – although it could be assumed based on the model developed by MONTAÑO and KASPRZYK (2008) that intention is the main influencer of behavior – based on the limited amount of data at my disposal, it was not possible to examine whether the intention to follow genetic-based personalized nutrition significantly influences the use.

*In light of this, I cannot judge the **H2** hypothesis based on my primary results.*

H3: *Adherence to genetic-based personalized nutrition is influenced by the individual's knowledge and skills regarding genetic-based personalized nutrition.*

Since I could not measure the behavior itself – for the reasons described above – I cannot draw specific conclusions about it, *I cannot judge the **H3** hypothesis.*

Instead of behavior, however, I examined whether knowledge and skills influence behavioral intention, as was done in previous studies (AISYAH and SHIHAB, 2023; LESHI and AMOO, 2023). I examined the knowledge and abilities regarding genetic-based personalized nutrition from two aspects. Based on the cross-tabulation analysis with behavioral intention, it can be said that those who have not yet heard about genetic-based individualized nutrition have a significantly weaker intention, but those who have already heard about it, their intention to follow the behavior is significantly stronger. In the case of the other dimension of knowledge and abilities – that is, the formulation of what genetic-based personalized nutrition means – it can be said that those who gave an inadequate definition had a significantly weaker intention, while those who formulated it correctly had a significantly stronger intention to perform the service regarding.

H4: *Following genetic-based personalized nutrition is influenced by the salience of genetic-based personalized nutrition.*

Due to the failure to measure the behavior, it was not possible to explore the relationship included in the hypothesis this time either, *and I cannot judge the **H4** hypothesis.*

Instead, here too, I examined the relationship with behavioral intention, as was the case in ANKER et al. (2010) as well as in the research of SHAPIRO (2016). When examining the difference between the outstanding nature of the behavior (how important health is to consumers, how health-conscious they consider themselves according to their own judgment), I found that its relationship with behavioral intention is significant: the more health-conscious the respondents consider themselves to be, the stronger the behavioral intention to follow the advice. Furthermore, a trend emerges nicely even in the case of the three clusters formed during the segmentation of domestic consumers. There were significantly more consumers in the segment of skeptics who considered themselves to be the least health conscious, among those who were unsure were those who judged it to be

medium, and in the cluster of potential users there were typically significantly more people who filled in who considered themselves to be health conscious than statistically expected.

***H5:** Following genetic-based personalized nutrition is influenced by the individual's environmental constraints.*

The measurement of environmental constraints was included in another construction of the model (personal impact), so the conclusion can be drawn based on this (see hypothesis **H9**). In connection with this, it can serve as additional important information that the fear of high costs (high price of the service, the need for expensive raw materials) in the focus group interviews (both with those who accepted and those who refused) and in several previous researches – POÍNHOS et al. (2014), RONTELTAP (2008), RONTELTAP et al. (2009), WENDEL et al. (2013) – were also published, where the costs and benefits of personalized nutrition were of primary importance in consumer judgments.

However, the very small number of people following genetic-based personalized nutrition in the sample did not allow me to examine the effect of the environmental constraints that appear as a direct influencing factor in the integrated behavioral model of MONTAÑO and KASPRZYK (2008) on the behavior. *Therefore, I cannot judge the **H5** hypothesis either.*

***H6:** The following of genetic-based personalized nutrition is influenced by the fact that the given behavior has already become a habit of the individual.*

Genetic-based personalized counseling is such a new and little-spread practice that behavior did not provide relevant data from the point of view of the research, just like habit as a construct (because even fewer respondents can talk about habit than behavior), so the relationship between the two variables no concrete conclusion can be drawn regarding. As a result, *I cannot judge hypothesis **H6** either.*

Since several studies have previously dealt with the effect of habit on intention regarding some form of health behavior (DI MAIO et al., 2020; GARDNER and LALLY, 2020; GARDNER and MCGOWAN, 2015; HONKANEN et al., 2005; KIM, 2021), I believed that examining this relationship could also provide useful information for my research, however, due to the low incidence of the custom, it was not possible to explore it either.

***H7:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's attitude towards genetic-based personalized nutrition.*

In the integrated behavioral model of MONTAÑO and KASPRZYK (2008), attitude is a direct influencer of behavioral intention. The authors distinguish between two types of attitude: experiential attitude – which is the response of the individual's emotions to the idea of following the given behavior (FISHBEIN, 2007) – and instrumental attitude – which is determined by beliefs about the outcomes of the behavior (BRAUN, 2012; KISS et al., 2020a). As a result, we can assume that the attitude has a significant influence on the intention, even for a behavior such as following genetic-based personalized nutrition.

***H7a:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's experiential attitude toward genetic-based personalized nutrition.*

In relation to the questions of the focus group interviews about attitude to experience, the accepting and rejecting groups had diametrically opposed views on the subject. Unsurprisingly, the adopters associated positive emotions, they approached the topic with optimistic expectation and confidence, the scientific basis of counseling provides them with a sense of security (mainly compared to the other two – lifestyle and phenotypic – levels), which is in line with ARDINI and BARDOSONO (2019) and BOUWMAN et al. (2008) finding. All of them would like to use such a service, which in their view would result in a healthier future where many serious diseases could be prevented – FROSCH et al. (2005), HUNTER et al. (2008) and JOOST et al. (2007) also classified the prevention available through counseling as one of the factors that induce the acceptance of counseling – so if they use genetic-based personalized nutritional counseling, they are investing in a healthy future. According to those who refused, this service was scary and based on too much personal information, they felt a sense of fear of the unknown, and also had doubts about data protection issues. This confirms AHLGREN et al. (2013), BEREZOWSKA et al. (2014), CATZ et al. (2005), DE ROOS (2013), FALLAIZE et al. (2013), RONTELTAP et al. (2009) and WENDEL et al. (2013) research results, where consumers expressed their concerns that the person might learn genetic information (e.g. inherited predisposition to cancer) as a result of the tests used as a basis for counseling, which – if it falls into the wrong hands – could negatively affect him in life in some field (e.g. insurance, employment). The rejecters were especially skeptical of the topic and stated that they would not be happy to use genetic-based personalized nutrition.

Based on the results obtained during the structural equation modeling, it can be said that in the case of experiential attitude – which determines the behavioral intention the most (36.4%) of all factors – all three indirect factors have explanatory power for the direct factor. So, how pleasant (TAI1) – which ranks first among the indirect factors in terms of its indirect effect (16.8%) –, how useful (TAI2) the service is, or how much it is worth its price in their opinion the genetic-based personalized nutrition counseling (TAI3=6.8%, which is the third strongest indirect factor affecting the intention) will lead to what kind of feelings/thoughts (positive or negative) the continuation of the counseling creates in them (TAD). And depending on the individual's feelings about the idea of using counseling, the intention to follow the behavior will be so strong or so weak. In other words, based on the examination of the relationship between behavioral intention and experiential attitude, the conclusion can be drawn that the more positive feelings/thoughts genetic-based personalized nutrition counseling creates in consumers (use of it), the stronger the consumer's intention to follow the behavior will be. *Based on the results, I accept hypothesis H7a.*

H7b: The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's instrumental attitude toward genetic-based personalized nutrition.

During the focus group discussions, the differences in the construction of the instrumental attitude among the groups with different attitudes were evident. The adopters (those who would be happy to use such a service) mentioned a number of advantages, including: mapping of future risks, conscious disease prevention, presence of medical help – which appeared in many other studies as a factor promoting acceptance (BEREZOWSKA et al., 2014; NIELSEN and EL- SOHEMY, 2012; POÍNHOS et al., 2017; RONTELTAP et al., 2007) –, achieving mental balance, improving well-being, creating awareness and a healthy lifestyle. According to some participants, the positives include a broad insight into the health profile, better blood counts, improved health, and a reduction in the risk of chronic diseases – just like CATZ et al. (2005) and FALLAIZE et al. (2013) in their research – or better metabolism. The disadvantages were said to be the high price, and that preparing for future diseases requires a lot of awareness and self-discipline. BOUWMAN et al. (2008) and CATZ et al. (2005)'s findings, the appearance of the stress effect in the presence of a serious illness was also among the mentioned negatives. However, according to many participants, this service has no disadvantages at all. On the other hand, the advantage-disadvantage ratio

was overwhelming for those who refused. It was mentioned as a positive that it is based on more accurate data (scientifically supported), in addition, medical presence, continuous control, awareness formation, a fitter figure, a more structured agenda, and learning discipline were also included in this category. Disadvantages include the high price, difficult availability, hard-to-understand results, and the issue of handling confidential information. Several people are afraid that the individual may learn genetic information (e.g. inherited tendency to cancer) as a result of the tests used as the basis for counseling, which may negatively affect some area of life (e.g. insurance, employment). The majority of the group members considered both the examinations and the waiting to be particularly stressful. They also pointed out that the range of information available about consultants is very narrow, which makes it even more difficult to use the service, since this is a new and unknown area for them. Furthermore, constant preparation and cooking require a lot of time and energy – especially when family members have to prepare something other than themselves, which STEWART-KNOX et al. (2013) conclusions. It is clear that the fear of high costs is also present as a general disadvantage for consumers with any attitude, confirming the results of several previous researches (CHERKAS et al., 2010; GUDDE, 2009; MAKEEVA et al., 2009; MORIN, 2009; OLIVER , 2005; STEWART-KNOX et al., 2013).

The results of the SEM show that only three of the four indirect factors explain the direct variable for the instrumental attitude (which has an explanatory power of 18.4% regarding the intention). The possibility of a healthier life (IAI1), the chance of reaching the desired body weight (IAI3), and the potential disease prevention (IAI4) determine what the individual's instrumental attitude will be, that is, how confident he is that he will achieve his goal by using the service. The possibility that the interviewees can map their future health risks (IAI2) with the help of counseling has no effect on how confident they are that they will achieve their set goal (IAD). As two domestic studies (HOFMEISTER-TÓTH, 2016; TÖRÖCSIK, 2016) also explain, nowadays health is a buzzword that can be used to generate demand in many cases, since it is an outstanding value for everyone. According to the studies, however, it should also be taken into account that the attitude of consumers is quite ambivalent: that is, even though they consider their health important, they do not do anything about it, so it cannot become a lasting purchase motive. The results of this research are perfectly consistent with this statement.

Overall, however, the chances of achieving the predetermined goal (and to be achieved during counseling) determine the individual's intention to continue the behavior: the more favorable the individual's instrumental attitude – that is, the more confident he is that he will achieve his goal by using the service – the stronger the your intention to follow the advice. *In light of the results, I accept hypothesis **H7b**.*

My research shows that both the experiential attitude (**H7a**) and the instrumental attitude (**H7b**) have an effect (namely, a positive effect) on the individual's behavioral intention. *Based on this, I therefore accept hypothesis **H7**.*

H8: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived norm regarding genetic-based personalized nutrition.*

In the integrated behavioral model of MONTAÑO and KASPRZYK (2008), the perceived norm is the second directly influencing element of intention, which reflects the social pressure on whether to follow a certain behavior or not (KISS et al., 2020a), and which is two consists of: the injunctive (subjective) and the descriptive norm. The greater the probability that the individual will engage in a specific behavior, the more they assume that they should follow it according to the reference persons, or the more they want to conform to these people (prescriptive norm), and the more the reference persons themselves adopt the given behavior they continue (descriptive norm) (BRAUN, 2012; FISHBEIN and CAPPELLA, 2006). Based on these, the subjective/prescriptive and descriptive norm can also have a significant impact on the intention to follow genetic-based personalized nutrition.

H8a: *The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived injunctive norm related to genetic-based personalized nutrition.*

RONTELTAPO et al. (2009) emphasized that family support is an important aspect in the acceptance process of genetic-based personalized nutrition. During my focus group interviews, it became clear that everyone would support the members of the accepting group (in their opinion). Additional help would be the constant presence of a doctor and constant contact with a consultant. RONTELTAPO et al. (2009) emphasized that family support is an important aspect in the acceptance process of genetic-based personalized nutrition. During

my focus group interviews, it became clear that everyone would support the members of the accepting group (in their opinion). Additional help would be the constant presence of a doctor and constant contact with a consultant.

Based on the exploration of the relationships between the factors (with the help of SEM), it can be said in the case of the subjective (injunctive) norm (which determines 20.8% of the behavioral intention, which thus has the second strongest explanatory power among the direct factors) that the indirect factors have an influence on the direct factor. The perceived expectations of others (SZNI1=the individual's partner, SZNI2=the individual's friends/best friend, SZNI=the individual's family) determine whether consumers feel social pressure to continue the investigated behavior (SZND), which will affect whether how much the individual intends to continue counseling. For the subjective (injunctive) norm, the consumer's perception of whether their partner should follow the advice (SZNI1=8.7%) will most determine (indirectly) the intention among the indirect factors (and among all the beliefs, the ranks second in this regard). According to my results, the more consumers feel that they should use genetic-based personalized nutrition counseling according to the most important person for them and the more they want to comply with them – that is, the greater social pressure they perceive – the stronger the behavioral intention of the examined in relation to following behavior. *Thus, I accept hypothesis H8a.*

H8b: The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's perceived descriptive norm related to genetic-based personalized nutrition.

Based on structural equation modeling, it can be stated that the descriptive norm is the behavior of the people in the individual's personal network (LNI1=the individual's family, LNI2=the individual's partner, LNI3=the individual's friends/best friend) (that is, whether the individual follows genetic-based personalized nutrition) influences the perception of whether the most important person uses genetic-based personalized nutrition (LND), however, this latter direct measure has no effect on the intention to continue counseling. *Based on the obtained results, I reject hypothesis H8b.*

Based on the above conclusions, I only partially accept hypothesis H8.

***H9:** The behavioral intention to follow genetic-based personalized nutrition is influenced by the individual's personal agency regarding genetic-based personalized nutrition.*

In the IBM of MONTAÑO and KASPRZYK (2008), the third direct influencing factor of intention is the personal influence advocated by SCT (BANDURA, 2006), i.e. the influence of the consumer on the events of his environment and on his own functioning. Personal agency consists of two elements: perceived behavioral control (which is more of an external control) and self-efficacy (which is more of an internal control). According to my assumption, both perceived control and self-efficacy can appear as a factor in the acceptance of genetic-based personalized nutrition, which can significantly influence it.

***H9a:** Behavioral intention to follow genetic-based personalized nutrition is influenced by an individual's perceived control related to genetic-based personalized nutrition.*

During the focus group discussions, in relation to the construct of perceived control, it would be helpful for the adopters if the tests were carried out by professionals and their results were kept confidential, if they were more widely available, if all tests could be carried out in one place, or if they could also be completed at home It could be. Looking at the financial side, it would be easier for everyone if it were affordable and if the employer or the state provided support (in the form of health insurance), if they could participate in a free preliminary consultation, or if it were possible to pay in installments. Several participants noted the need for detailed and accessible information about the service, and repeated (control) examinations and short waiting times were also listed here. The high price, lack of information, lack of prevalence, and lack of time are a burden for all members of the accepting groups. The organization of continuous contact – and here especially personal consultations would be preferred, due to the confidentiality of the information, which was published by BEREZOWSKA et al. (2014), MORIN (2009), POÍNHOS et al. (2017), STEWART-KNOX et al. (2013) study – the feeling of fear resulting from the misuse of data (which also appeared in previous research results, see for example AHLGREN et al., 2013; BEREZOWSKA et al., 2014; CATZ et al., 2005; DE ROOS, 2013 ; FALLAIZE et al., 2013; RONTELTAPE et al., 2009; WENDEL et al., 2013), as well as the stressful situation that occurs in the case of bad results or the long wait were all mentioned as potential aggravating factors. It would be a relief for the naysayers if they themselves were not so distrustful and skeptical, if the costs were not so high, if they could be convinced that the method is really

successful (e.g. through previous tangible results) and if they were assured that their data they are not abused. Continuous contact and thorough information about every step was also mentioned. Unaffordable prices, procurement of healthy ingredients, lack of trust, previous bad experiences, and lack of information were mentioned as complicating factors. A lack of will, an unsupportive environment, a long wait for the results, or getting into a stressful situation in the event of a bad result – as BERGMANN et al. (2008), BOUWMAN et al. (2008), CATZ et al. (2005), DE ROOS (2013), and MORIN (2009) research. One group member pointed out that a possible negative result obtained during the genetic tests would adversely affect his motivation (which was also published in the study by HUNTER et al., 2008).

Based on the SEM – after the subjective norm – the factor with the next strongest explanatory power is the perceived control (which explains 8% of the behavioral intention), where, with the exception of one indirect factor (ÉMI3=lack of time due to work and other occupations), the other three six to the direct factor. The various obstacles that occur, i.e. expensive raw materials (ÉMI1), complicated/complex recipes (ÉMI2), and the narrow range of information available about service providers and consultants (ÉMI4) have a significant explanatory power for the direct factor, i.e. how much consumers consider it easy or difficult to use the service (ÉMD). The individual's perceived control over the performance of the behavior influence their intention to continue counseling: the more control they feel, the stronger their intention to follow genetic-based personalized nutrition. *Based on these, I accept hypothesis H9a.*

H9b: *Behavioral intention to follow genetic-based personalized nutrition is influenced by an individual's perceived self-efficacy related to genetic-based personalized nutrition.*

During the focus group interviews, all of the accepting participants were quite sure that they would be able to follow the instructions, and the supportive environment, their own motivation, proper time management, the support of a credible professional, and the fear of future illnesses would play an important role in this. Accepting groups are characterized by continuing a healthy lifestyle and diet, so preventive behavior is a motivational factor for everyone during counseling. For a person, a serious illness in their family is the biggest driving force in their self-efficacy. On the other hand, the refusers were not at all sure that they would be able to follow the diet and could not really say a specific factor that would

help them to follow the nutritional recommendations. According to the majority, their self-efficacy would be impaired by the following things: excuses, lack of time, high prices, apathy. Regarding diseases, the positions differed somewhat: some stated that the possibility of possible prevention was not sufficiently motivating, others said that a serious illness occurring in the family would increase self-efficacy for them – similar results were reported for some consumers by AHLGREN et al. (2013), DE VRIEZE et al. (2009), FALLAIZE et al. (2013), JOOST et al. (2017), PIN (2009), ROOSEN et al. (2008) and STEWART-KNOX et al. (2009). The majority agreed that the existence of a specific disease (and its treatment) can be a greater driving force than prevention itself.

From the results of the structural equation modeling, it follows that in the case of self-efficacy, all the indirect variables included in the construct (self-efficacy beliefs) have an effect on the direct factor. Beliefs regarding the high price of the service (ÉHI1), the complexity of the recipes (ÉHI2), the lack of time due to work and other activities (ÉHI3), the narrow range of information available about the service (ÉHI4), and the confidentiality of data/results (ÉHI5) are all influence the individual's self-efficacy, i.e. whether they can continue the behavior despite the obstacles that come their way (ÉHD). And the individual's internal control ultimately determines (explains in 11.3%) how strong their intention will be regarding the use of counseling, i.e. the more they feel that they are able to follow the counseling, the stronger their intention to perform the behavior will be. POÍNHOS et al. (2014) model (which examines factors influencing the intention to accept genetic-based personalized nutrition) also states that the more favorable the self-efficacy, the more positive the consumer's attitude towards the intention to accept genetic-based personalized nutrition. Based on the analyses, the conclusion can be drawn that the greater the individual's perceived self-efficacy, the stronger his intention to follow genetic-based personalized nutrition counseling. *Thus, I accept hypothesis H9b.*

Confirming my preliminary assumption, it follows from the research results that perceived behavioral control (**H9a**) and self-efficacy (**H9b**) also explain the individual's intention to continue the behavior. *I therefore accept hypothesis H9.*

H10: *Certain demographic characteristics significantly influence consumer acceptance of genetically based personalized nutrition.*

SZAKÁLY et al. (2014), SZAKÁLY et al. (2019) and SZAKÁLY et al. (2021), I also included four demographic characteristics (gender, age, subjective income status, educational level) in the analysis.

H10a: Gender significantly influences consumer acceptance of genetic-based personalized nutrition.

Several previous international studies have shown that women are primarily willing to use genetic-based personalized nutrition (see e.g. ROOSEN et al., 2008; STEWART-KNOX et al., 2009). Surveys conducted among domestic consumers (SZAKÁLY et al., 2014; SZAKÁLY et al., 2019; SZAKÁLY et al., 2021) also concluded that women reject new technology to a significantly lower degree, and in fact, more women considers the use of genetic-based personalized nutrition as an attractive option as a man. This fact was confirmed again during the present research.

Examining the relationship between behavioral intention and gender, it can be said that women's intention to follow the behavior is significantly stronger than that of men. In this context, I found that the women judged their own health awareness to be better on average, which in turn influences the behavioral intention, since the more health conscious the interviewees consider themselves to be, the stronger their intention is to follow the advice. The same conclusion can be drawn in the case of self-efficacy (ÉHD). Women's self-efficacy is on average higher than men's, which has an impact on intention: the higher an individual's self-efficacy, the stronger their intention to use genetic-based personalized nutrition counseling. Furthermore, the three groups formed during the segmentation of consumers showed clear differences along the examined factors. Those belonging to the third cluster (potential users) showed the greatest willingness to continue the behavior, which, considering its members, consisted of significantly more women than would be expected statistically. *Based on the results, I accept my hypothesis H10a.*

H10b: Age significantly influences consumer acceptance of genetic-based personalized nutrition.

Regarding age, the research results are very mixed. STEWART-KNOX et al. (2009), people over 65 showed a more positive attitude towards the acceptance of genetic-based personalized nutrition, while AHLGREN et al. (2013) found that young people (between

the ages of 16 and 45) were the most accepting. In Hungary, according to the 2014 survey, it can be said that the younger the individual, the greater the willingness to follow individualized dietary advice based on nutrigenomics (SZAKÁLY et al., 2014; SZAKÁLY et al., 2019), which is in contrast to STEWART -KNOX et al. (2009) with their results. After five years (at the domestic level), it turned out quite differently: middle-aged people (between 40 and 49 years old) rejected the new technology the least, while older people the most (SZAKÁLY et al., 2021).

The results obtained during my research also showed some duality. Among those between the ages of 26 and 35, the intention to follow the behavior was significantly highest, followed by the age group over 55. Regarding the outstanding nature of the behavior, the 26-35-year-olds finished in first place, they declared themselves to be the most health-conscious, which is related to the previously described, since the more health-conscious the individual, the stronger their behavioral intention to use the service. Examining the individual factors, I found a significant correlation with age in several cases. Genetically-based personalized nutrition mostly felt the positive thoughts/feelings (TAD) and social pressure (SZND) created by people over 55 years of age to continue counseling - and both indicators showed a linear correlation with the intention, i.e. the higher the value up, the greater the individual's intention to follow the behavior (in addition, these two factors have the greatest explanatory power for behavioral intention). When examining perceived control (ÉMD) and self-efficacy (ÉHD), the average values of those aged 18–25 were the highest (which factors are also significantly and positively related to behavioral intention). These results are also confirmed by the segmentation results. The 26-35 age group included significantly more respondents in the undecided cluster – created as a result of segmentation – and the potential users segment included significantly more people 18-25 and over 55 than statistically expected. Overall, therefore, consumers over the age of 55 and between the ages of 18 and 25 are the most likely to accept the new technology. However, the 26–35-year-old age group also shows a measurable intention to follow the counseling, although in their case there is even more uncertainty regarding the continuation of the behavior, along the lines of individual factors influencing acceptance. *Based on the obtained results, I accept hypothesis H10b.*

H10c: *The subjective income situation significantly affects consumer acceptance of genetic-based personalized nutrition.*

In terms of income level, previous studies reached the same result. The better the individual's financial situation, the more favorable the use of genetic-based personalized nutritional counseling (COHEN et al., 2013 SZAKÁLY et al., 2014; SZAKÁLY et al., 2019; SZAKÁLY et al., 2021). This conclusion also holds true in this case.

Those living in the best income situation have the strongest intention to use counseling, and they also declared themselves to be the most health-conscious (which also positively affects the intention to follow the behavior). Examining the experiential attitude (TAD), it can be said that respondents in a better financial situation had, on average, more positive feelings about the eventual use of the examined service, compared to those belonging to other income categories (which has significant explanatory power for behavioral intention). It is interesting, however, that the instrumental attitude (IAD) was on average the most favorable for those interviewed in the worst financial situation. In the case of both constructions of personal influence (ÉMD, ÉHD), the tendency emerges that the better the financial situation of the consumer, the stronger will be their intention to follow the behavior. Based on the segmentation, it can be established that in the cluster of skeptics there are significantly fewer respondents in a very favorable income situation, while there are significantly more respondents who are just living off their salary than statistically expected. *In light of all this, I accept my hypothesis H10c.*

H10d: *Education significantly influences consumer acceptance of genetically based personalized nutrition.*

SZAKÁLY et al. (2014), SZAKÁLY et al. (2019), and SZAKÁLY et al. (2021) in their surveys showed a significant correlation between the level of education and the acceptance or rejection of the new technology: people with a higher level of education accept it more often and reject it the least, and vice versa. In my current research, I cannot fully confirm this, since such a clear trend cannot be discovered based on the results obtained.

In the case of behavioral intention, it can be said that respondents with a diploma had the strongest opinion, but those who graduated from vocational training/vocational school came second, and those who graduated from high school took third place. The order was the same

for the assessment of health awareness, instrumental attitude (IAD) and self-efficacy (ÉHD). When examining the subjective norm (SZND) – which is the second strongest explanation of behavioral intention among the direct factors – and the perceived behavioral control (ÉMD), however, the averages of those with vocational training/vocational school qualifications were the highest, followed by graduates and then those with high school diplomas. As a result of the segmentation of consumers, it can be said that in the cluster of skeptics there were significantly more people with high school diplomas, while there were significantly fewer graduates. In the group of those who are unsure, there were significantly more graduates, and significantly fewer people with a high school diploma or vocational training/vocational school education than statistically expected. So, although it is not possible to find a linear relationship between education and the intention to follow genetic-based personalized nutrition, a non-linear, significant relationship between the two variables was demonstrated.

*Based on the conclusions drawn, I accept my hypothesis **H10d**.*

Overall, therefore, significant differences can be established in the case of gender (**H10a**), age (**H10b**), subjective income situation (**H10c**), and education (**H10d**) in the intention to follow genetic-based personalized nutrition, so I accept the **H10** hypothesis.

The third objective of the research:

O3: *Segmentation of Hungarian consumers based on factors influencing the acceptance of genetic-based personalized nutrition.*

So far, few studies have dealt with the consumer acceptance of genetic-based personalized nutrition and the psychological processes behind the decisions (FALLAIZE et al., 2013; GIBNEY and WALSH, 2013; STEWART-KNOX et al., 2015). In Hungary, in this regard - but in a completely different approach - SZAKÁLY et al. (2014), SZAKÁLY et al. (2019), and SZAKÁLY et al. (2021) conducted a survey. However, segmentation of consumers was not included in any of these studies, so one of my objectives was to carry out this in a domestic context based on the factors influencing the acceptance of individualized nutrition based on nutrigenomics. Hypothesis related to the objective:

H1: Due to the novel nature of genetic-based personalized nutrition, the preferences of domestic consumers are uniform, so their segmentation is not feasible based on the factors influencing acceptance.

I segmented domestic consumers using the factors identified during structural equation modeling. In the first step of my cluster analysis, I selected the optimal number of classes. To do this, I analyzed the information criteria of solutions with different numbers of clusters (as well as keeping in mind the interpretability of the results), based on which I was finally able to create three segments. The three formed clusters showed a significant difference in behavioral intention: the average of the skeptics was 2.38, the undecideds 4.15, and the potential users 4.98, on a 7-point scale. Therefore, it can be concluded that the behavioral intention of skeptics is the weakest, while that of potential users is the strongest, in terms of following genetic-based personalized nutrition counseling.

Examining the feelings related to the performance of the behavior, the skeptics attached the most negative thoughts to this level of counseling, the uncertain had a more favorable opinion of it, and the experiential attitude of the potential users was overall the most positive. In the case of the direct and indirect measures of the instrumental attitude - the latter of which represent beliefs about the outcome of the behavior - the tendency was similar to the previous case, i.e. the skeptics mostly doubted that they would achieve their goals by using the service, the uncertain were much more they were more optimistic in this regard, and those belonging to the cluster of potential users were very confident that by following the behavior they would be able to achieve what they had envisioned. However, in the case of judging the outcome of counseling – that is, how bad or good the result is from the individual's point of view – the values were slightly different. The skeptics were invariably the most pessimistic, but the order of the second and third clusters was reversed: the undecided found each potential outcome the most attractive on average.

When analyzing the subjective norm, the skeptics considered it most improbable, on average, that according to the people in their social network, they should use genetic-based personalized nutrition. Uncertain people considered this to be more likely, but potential users were the ones who most felt social pressure to follow the behavior. Examining the motivation for compliance, the averages developed similarly, that is, the potential users would most like to meet the expectations of their family, partner, and friends.

In the case of the first variable of personal agency, the variables of perceived control, the results were different in the three clusters. Looking at the direct measure, skeptics typically found it difficult to use genetic-based personalized nutrition counseling, while it would be easiest for potential users to continue the service. The perceived appearance of different potential obstacles, on the other hand, established a different order for the clusters. The use of expensive raw materials was considered the least likely by the skeptics, and the most likely by the potential users. The preparation of complicated recipes, on the other hand, was considered the most likely by the skeptics, and the least likely by the uncertain. The narrow range of available information was mostly thought of by consumers in the uncertain cluster as a likely aggravating factor. Examining the perceived effect (that is, how difficult or easy are the factors listed above to use the service according to the respondents), the average values of the cluster of skeptics were the lowest, while those of the potential users were the highest. For the last examined factor – self-efficacy – it can be said that the lowest average values were obtained for skeptics, and the highest for potential users, i.e. they believed that if they used genetic-based personalized nutrition counseling, they would be able to continue it despite the obstacles that might come their way.

Further strengthening the noticeable difference between the behavioral intention of the clusters, I also examined the perception of health awareness compared to the clusters. In this case, there were significantly more consumers in the cluster of skeptics who considered themselves to be less health-conscious, among those who were unsure were respondents who judged this to be moderate, and among potential users there were typically significantly more health-conscious fillers than statistically expected.

When examining the socio-demographic characteristics, there were significant differences in the individual clusters in several cases. Skeptics include significantly fewer female and significantly more male respondents. The number of respondents belonging to the youngest age group (between 18 and 25 years) was significantly higher than the statistically expected number of potential users. There were significantly more people between the ages of 26 and 35 among the undecided, and fewer among the potential users; there were significantly fewer people over the age of 55 among the undecided, while there were more among the potential users than statistically expected. In the case of the subjective income situation, among the skeptics, there were significantly fewer respondents than statistically expected

who live in very good financial conditions, and significantly more respondents who are just living on their salary. Respondents with vocational training/vocational school certificates appear among the uncertain with a significantly lower frequency than statistically expected. There are significantly more high school graduates among the skeptics, and fewer among the undecided; there are fewer graduates among the skeptics, and significantly more people in the cluster of undecideds than is statistically expected. *Based on what is described here, I therefore reject hypothesis H1.*

O4: *Demonstration of the usability of the results obtained during the research both on an individual and social level.*

Today, we live in an era of nutrition-related public diseases, where deaths occur on a daily basis as a consequence, some of which could be avoided by improving the diet (or lifestyle). The widespread use of personalized nutrition – and its highest level based on genetic information – could be part of the solution to this global problem. However, in order to be able to target the population more effectively, it is important to explore which factors and to what extent affect consumer acceptance.

The results obtained during my research can help us to make recommendations regarding specific behavioral change interventions aimed at segments that can be defined by different demographic and psychographic attributes (the ideal target groups are potential users and those who are unsure), as IBM is well suited to help experts should develop preventive programs aimed at solving public health problems (FOREYT and GOODRICK, 1993). Reforming health behavior and creating health awareness can play a role in increasing the popularity of personalized nutrition based on nutrigenomics. However, in order for consumers to really prefer preventive health behavior (prevention appeared as a potential advantage in my results several times), it is worth starting education at a young age. In health education, the school – as a place of secondary socialization – has a special role, since during the time spent there it is possible to shape the attitude of young people regarding their health and nutrition (BEREGI, 2021).

As a result of the "routine" of genetic-based personalized nutrition, healthy nutrition could experience a heyday, one of the long-term effects of which could be the development of preventive (and conscious) behavior, which would induce a reduction in public health

expenditures. The large amount of data collected for medical purposes – and handled ethically – would enable the development of additional new, supportive technologies (e.g. personalized nutritional support applications) that would provide assistance to wider segments of society in maintaining their health at a (more) affordable price.

As it turned out from my research – and from previous studies – in addition to maintaining health, external appearance is also an important consideration for many, so for service companies offering weight loss programs (mainly based on lifestyle and phenotypic information) it can be a new opportunity for consumers' genotypic data reaching which more effective nutritional advice can be compiled (GIBNEY and WALSH, 2013; SZAKÁLY et al., 2019).

In his study, GHOSH (2014) concludes that new food technologies – such as genetic personalization – enable innovations in the food sector. However, consumer acceptance is also a determining factor in the development of successful food products, as consumers do not accept all new technologies equally. Consequently, the attitude of consumers towards new food technologies must be taken into account already in the early stages of product development (FARKAS, 2023).

Although at the beginning of the 2000s, some researchers predicted that nutrition based on nutrigenomics would be practiced by broad segments of the population within a few years (BOLAND, 2008), however, this is still waiting to happen and has not yet brought a major breakthrough in the food industry (DE ROOS, 2013). This can even lead to a wavering of trust in consumers (GUDDE, 2009), the narrow range of available information is a problem in acceptance. However, with the continuous development of science, we know more and more about the subject, which can open new doors. But in order to dispel the doubts that arise, the expertise and cooperation of all interested parties (research institutes, food industry, consumer patient rights organizations and decision-makers) is needed (GHOSH, 2014; HURLIMANN et al., 2014; NIELSEN and EL-SOHEMY, 2012; RONTELTAP et al., 2007).

4. MAIN FINDINGS OF THE DISSERTATION, NEW AND NOVEL RESULTS

- (1) The application and validation of the integrated behavioral model (IBM) to investigate consumer acceptance of genetic-based personalized nutrition among domestic consumers, which, as far as I know, has been realized for the first time both domestically and internationally.
- (2) Identification of direct and indirect factors influencing the acceptance of genetic-based personalized nutrition counseling, determination of the degree of their effect, exploration of the relationships between them and inclusion in a complex model. Among the five direct factors included in the model, experiential attitude has the greatest influence on behavioral intention. Subjective norm is in second place, followed by instrumental attitude and self-efficacy, and perceived behavioral control has the least explanatory power.
- (3) Segmentation of domestic consumers along the factors influencing the acceptance of genetic-based personalized nutrition. As a result of the clustering, three groups with well-definable differences were identified – regarding the intention and the directly influencing factors affecting it – and based on their characteristics, they were named the skeptics, the uncertain, and the potential users.
- (4) Development of proposals for interventions aimed at behavioral change based on the underlying beliefs that have the greatest effect on the intention.

5. PRACTICAL APPLICABILITY OF THE RESULTS

(1) The results obtained during my research can be helpful in determining which of the segments that can be defined by different demographic and psychographic attributes may represent the number one target group for providers dealing with nutrition counseling based on genetic information:

- In terms of gender, women can be the primary target group for interventions aimed at changing health behavior, not only from their own point of view, but also from their family's point of view, since in many cases they make the decision on important issues affecting their family - such as health preservation or the expenses intended for it.
- In terms of age, the age group between 18-25 years and over 55 years belongs to the segment who can be potential users of personalized nutritional advice based on nutrigenomics (who, however, may have different preferences due to their age characteristics, so this must also be taken into account).
- Furthermore, it seems to be clearly emerging that consumers belonging to a higher (higher) income category can become the target group of genetic-based personalized nutrition counseling.

(2) Thanks to the segmentation of domestic consumers, it became clear that consumers who are basically health-conscious (and have a positive attitude) can be the potential users of genetic-based personalized nutrition, thus reaching them requires the least effort (however, they are the most important target group).

(3) Using structural equation modeling, I identified the factors influencing the acceptance of genetic-based personalized nutrition and the relationships between them, which can be the subject of interventions aimed at behavioral change:

- When the individual has the intention – but does not continue the behavior – it is important to expand their knowledge in relation to the details of genetic-based personalized nutrition counseling – and the service providers themselves – and to reduce (changeable and more flexible) environmental constraints, such as affordable raw materials, dishes to be prepared based on simple recipes.
- One of the essential elements of behavioral change can be guaranteeing the consumers' sense of comfort, i.e. assuring them that using counseling can be a pleasant process for them. Looking at the beliefs about the outcome of the behavior,

the possibility of a healthier life can become the potential buzzword, however, in this regard, it should not be forgotten that the attitude of consumers towards their health is quite contradictory.

- An individual's normative beliefs are mostly influenced by their partner, so in some cases it is not only the potential user himself, but also his wife/girlfriend/husband/boyfriend who has to be convinced of the benefits and possibilities of maintaining/restoring health by using the service. in order to
- Among the self-efficacy beliefs, it is worth focusing on the issue of confidentiality of data/results requested during counseling and obtained during examinations: consumers must be assured that their personal information will not fall into unauthorized hands when using the service. Approaching the resolution of doubts related to data protection from the other side, the intervention of the public administration sector is indispensable: an integrated, reliable and transparent regulatory framework must be created, the focus of which is the protection of consumers.

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7. LIST OF PUBLICATIONS RELATED TO THE DISSERTATION



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Candidate: Noémi Dóra Farkas

Doctoral School: Károly Ihrig Doctoral School of Management and Business

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List of publications related to the dissertation

Articles, studies (7)

1. Farkas, N. D.: Milyen jövője van a személyre szabott élelmiszereknek?
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9. Apáti, F., Balsa-Budai, N., Fehér, A., Kontor, E., Szakály, Z., Kurmai, V., Balogh-Vida, V., Farkas, N. D., Kiss, M., Kamai, L., Szöllősi, L.: Élelmiszer-fogyasztói szokások, trendek várható változása. Debreceni Egyetem Gazdaságtudományi Kar, Debrecen, 142 p., 2022.
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