Self-Tests for Health: Extent of Use, User Experience, and Predictors of Use of Various Types of Self-Tests

Study program: Psychology

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Abstract

Background

Self-testing has become increasingly prevalent in recent years, particularly as a result of the Covid pandemic. Although self-tests are being used more and more frequently, there is only a limited amount of research on the use of and experience with different types of self-tests. Also, there is little research on which factors are associated with the use of self-tests.

Aims

This study aimed to examine the use of and experiences with five different self-test types (risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests, and saliva self-tests). Next to that, it was analyzed what disadvantages and advantages users saw in self-tests. We also aimed to investigate the correlations between the use of self-tests and personal background variables, personality traits, and well-being.

Methods

A cross-sectional questionnaire was conducted with 111 participants to measure the use of and experience with self-tests. The same questionnaire was used to investigate participants' perceived disadvantages and advantages of self-testing using content analysis of open questions. The correlation of well-being and personality traits with self-test use was tested using Pearson correlation coefficients. The correlation of personal background variables with self-test use was tested using Kendall rank correlation coefficients.

Results

The one-time use of self-tests was rather high at 75% but the average number of the self-tests was rather low (M=2.5, SD=2.1, min=0 max=15). The most commonly used self-tests was saliva self-tests in this study. Self-test use was correlated with higher reported health scores (*r= .19, p= .042)* and older age (*r= .26, p= .002*). Self-test use also correlated with both higher conscientiousness (*r= .17,*

p= .046) and neuroticism (*r= .22, p=.021*) scores. No correlation was found between the total scale score and well-being. The experience with self-tests was rather negative.

Conclusion

One-time use of self-tests was high although the total use was rather low as well as the overall experience with self-tests. Older participants and participants who consider their state of health to be good are more likely to use self-tests. More conscious and neurotic participants are also more inclined to use self-tests.

Introduction

During the Covid pandemic, when direct contact with a doctor was restricted in many parts of the world, self-testing for Covid became an irreplaceable part of everyday life (Woloshin et al., 2022). This led to many people who would not normally use self-tests to being exposed to self-testing on a regular basis. Although there are no longer regulations enforcing self-testing, studies have found evidence that people are using self-tests more now than before the pandemic, simply because they have become accustomed to them (Smith et al., 2023). As self-testing has proven to be important in times of crisis and as a result of increasing pressure on the healthcare system, it is important to understand the factors that determine the use of self-testing.

Self-testing is defined by the WHO as "the ability of individuals, families and communities to promote their own health, prevent disease, maintain health, and to cope with illness with or without the support of a health or care worker" (World Health Organization, 2024). A self-test refers to a test that a person can perform at home for a medical purpose without the presence of a healthcare professional (Rabionet, 2021). In general, self-tests can be categorized into two groups: bodily self-tests and (online) questionnaires. Bodily self-tests include those that usually come with a self-test kit and require a fluid sample, such as saliva, to perform the self-test (Tonen-Wolyec et al., 2021). Self-test questionnaires usually consist

of a series of questions that aim to collect information about symptoms that occur (Sharma et al., 2022) or to determine the individual's risk for a particular condition (O'Hearn et al., 2021).

For the present study, bodily and questionnaire-based self-tests were of interest, specifically focusing on five types of self-tests: risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests, and saliva self-tests. This approach provides an array of common self-test use and enables meaningful comparisons between different types of self-tests. *Risk assessment questionnaires* can be defined as questionnaires that estimate the likelihood of a disease occurring based on various risk factors, such as behaviors (Kajdy et al., 2020). One commonly used risk assessment questionnaire is the Framingham Risk Score Questionnaire, which measures the risk of developing cardiovascular disease (Adil et al., 2023). The symptom checklist questionnaire is another type of self-test, with the distinction that it focuses on the assessment of symptoms. One widely used example is the WebMD symptom checker (R. D. Patel et al., 2021). In contrast to the aforementioned tests, *blood self-tests*, *DNA* and *saliva self-tests* involve taking body samples using self-test kits. Examples include diabetes tests with blood (Vlasschaert et al., 2024), COVID-19 tests with saliva (Ku et al., 2021) and hereditary genetic cancer tests with DNA (Patel et al., 2020).

Benefits and Drawbacks for Healthcare

Opinions differ among researchers as to whether self-testing improves preventive healthcare. Self-test proponents have argued that self-test kits promote patient autonomy, as patients can determine their own results rather than having to rely on a doctor (Jamil et al., 2021). This is particularly important for privacy regarding stigmatized diseases such as HIV. In addition, studies have shown that the results of self-test kits are generally accurate and reliable (Okoboi et al., 2020). The cost of self-testing is also beneficial, as self-tests are considered more cost-effective than conventional doctor visits and laboratory tests (Gandjour,

2022). The wide accessibility of self-tests facilitates the early detection rate of some diseases, which can lead to more promising and successful treatment outcomes (Zhou et al., 2022). In most cases, self-tests also provide faster results than conventional medical treatment. (Cassuto et al., 2021).

However, critics of self-testing have pointed out that it has been difficult to encourage high-risk groups to use self-tests, which is why self-tests are sometimes not suitable for sensitizing these groups (Indravudh et al., 2020). Another drawback of self-tests is the lack of clarity of some self-tests, which can lead to misinterpretation of the results (Oudendammer & Broerse, 2019). As self-tests are used as an alternative to visits to the doctor, they are naturally associated with a lack of advice from an expert on the appropriate behavior after receiving the result (Spyrelis et al., 2017). In some cases, the use of self-tests could also lead to the postponement of necessary treatment if they are incorrectly applied (Luo et al., 2018).

With respect to the users' motives for using self-tests, literature suggests that the motivations are diverse and depend on the users' personal preferences. There is a proportion of self-test users who use the tests because they expect a particular diagnosis. These individuals are motivated by a negative health prognosis as they seek to verify the presence of a suspected disease (Brown et al., 2016). Other users of self-tests take self-tests out of curiosity and on their own initiative, often just wanting to make sure that their perceived good health is indeed accurate (Kuecuekbalaban et al., 2017). Another motivating factor for self-test users is the ability to avoid unpleasant interactions with doctors, which saves time and gives them control over their own health (Iliyasu et al., 2024).

To date, little research has been conducted into the actual degree of use of different types of self-tests, although a few studies provide relevant insights. As far as we know there are no studies that compare the number of users of risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests and saliva self-tests with each other.

One study that may give an indication of self-test usage looked at DNA self-testing in a Russian city, which found that most participants were unaware that DNA self-tests existed (Kononova et al., 2021). This may indicate that the use of DNA self- tests is low in Europe, resulting in DNA self-tests being perhaps the least used of the self-tests selected in this study. A study from Germany (N= 2,527) on the use of (saliva, blood and DNA) self-tests found that around 8.5% of participants had already carried out a self-test in the past (Kuecuekbalaban et al., 2017). The percentage found in the study might be outdated for 2024, given that the COVID-19 pandemic led to the widespread use of saliva-based self-tests (Sakala et al., 2024). However, this cannot be said with certainty as there are no current studies comparing the number of users of the various self-tests. Moreover, there are no post-Covid studies that provide a total scale score for the use of a group of self-tests to compare with the findings of Kuecuekbalaban et al. (2017). Such an analysis would be valuable for understanding how self-test usage has evolved during the pandemic.

The factors that have previously been shown to be associated with use of (different types of) self-tests include education, health status and some personality traits. In the German study, higher education and reported health satisfaction were associated with higher self-test usage (Kuecuekbalaban et al., 2017). In the same study, older age correlated with higher self-test use. In a study from Kenya, however, the correlation with age could not be replicated, as in the Kenyan study a higher- age was associated with a lower use of HIV saliva self-tests (Iliyasu et al., 2020). In general, there are only a limited number of studies in the literature on the use and predictors of self-tests.

Regarding personality as a determinant of the use of self-tests, there are a few studies, some of them older, which indicate that personality can influence the use of self-tests. In the field of medical DNA self-testing, an Australian study found that higher levels of conscientiousness were associated with an increased interest of using DNA self-tests

(Schuringa, 2024). Another study that focused on actual use rather than interest found positive correlations between extraversion and the use of DNA self-tests and between neuroticism and the use of DNA self-tests (Pearce, 2023). These are interesting findings, but they only relate to the use of and interest in DNA self-tests and not to multiple types of self-tests. To date, no studies have investigated the relationships between the Big Five personality traits and multiple types of self-tests. However, self-efficacy, which describes a person's belief that they can achieve a particular goal (Wray et al., 2022), has been studied in the context of groups of different self-tests. Self-efficacy is not a personality trait, but has some distant similarities with conscientiousness, as both concepts focus on the achievement of a goal (Fosse et al., 2015). When reviewing the study on self-efficacy and the use of self-tests, it becomes clear that the studies do not provide a clear direction: While older studies found a positive relationship between self-efficacy and self-test use (Grispen et al., 2011; Cooke and French, 2008), the more recent study found no relationship between the two variables (Kuecuekbalaban et al., 2017). These findings give some insight but to properly understand the relationship between the use of self-tests and personality traits, more research on the relation between personality traits and the use of different types of self-tests is needed.

Next to that, studies have also examined which advantages and disadvantages users see in self-tests. According to a study from the Netherlands, an important perceived advantage for users of self-tests is the feeling of reassurance that self-tests can provide, as they can deliver a quick result in case of uncertainty (Oudendammer and Broerse, 2019). The same study also mentions perceived disadvantages, such as a lack of clarity about how to interpret the results which can lead to a stressful and uncomfortable situation for the tester. This lack of clarity can lead to incorrect interpretations, which has been shown to be the case with saliva tests: In an Irish study, around 4% of participants misinterpreted a positive self-test result for COVID-19 as a negative result (Jing et al., 2021). Since the study on the perceived

advantages and disadvantages conducted by Oudendammers and Broerse (2019) was completed before the COVID-19 outbreak, it is of interest to explore whether the same perceived advantages and disadvantages can be found in a similar sample.

The experience users have with self-tests has also been of interest of research. Findings indicate that the experience differs depending on whether multiple self-tests are evaluated simultaneously or individual self-tests are analyzed separately. According to one qualitative study in France, experience with various self-tests was negative, especially among people between the ages of 30 and 50 (Scaloni et al., 2021.). For DNA self-testing, a positive experience was described by most participants in a Russian study (Kononova et al., 2021). Another study focused on saliva self-tests found that participants liked them and found them helpful (Biello et al., 2021). Since the two studies with single self-tests show a positive experience and the study with multiple self-tests a negative experience, it makes sense to investigate in a group of self-tests which specific self-tests are associated with positive and which with negative experiences of the participants.

To our knowledge, there are no studies that have investigated the relationship between well-being and the use of self-tests, although well-being has been shown to correlate with general health-related behavior (Bozek et al, 2020). As self-tests are health-related behaviors, it would be meaningful to investigate the relationship between these variables. On the one hand, it could be hypothesized that self-testing increases autonomy, which in turn increases well-being. On the other hand, it could be hypothesized that people with health anxiety could resort to self-testing to alleviate their worries. To understand the possible relationship of self-test use and well-being more research is needed.

This Study

The aim of this study is to fill the gaps in the literature regarding the correlation of well-being, personality, and personal background variables with the use of self-tests. In

addition, the extent of use of different types of self-tests will be analyzed. Furthermore, the participants' experiences with self-tests will be investigated and compared with the existing literature as well as the perceived advantages and disadvantages of self-tests.

Research Questions & Expectations

RQ1

“To what extent are different types of self-tests (risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA-self-tests and saliva self-tests) being used?”

Based on the literature, we assume that saliva self-tests are used most frequently compared to the other self-tests (Sakala et al., 2024) and that around 80% of participants have used self-tests before. We assume a prevalence of around 80%, as Kuecuekbalaban et al. (2017) found a prevalence of 8.5% in 2017 and we expect that the prevalence has increased dramatically since 2017 because of the COVID-19 pandemic. We also expect that DNA self-tests are the least used among all the selected self-tests, as the Russian study indicated that most participants were not aware that DNA self-tests exist (Sardana Kononova et al., 2021).

RQ2

"To what extent is the use of self-tests related to personal background variables (gender, educational level, nationality, age, reported health score) and personality traits?"

Based on the literature, we assume that the use of self-tests is associated with a higher level of education and a higher reported health status (Kuecuekbalaban et al., 2017). Gender has not been investigated as a predictor variable in previous studies, which is why we do not have a clear expectation for gender. In terms of personality, we expect both extraversion and neuroticism to correlate positively with the use of self-tests (Pearce, 2023).

RQ3

"Are the experiences of self-test users positive or negative and what disadvantages and advantages do participants see in self-tests?"

Based on the literature we expect that experience with self-tests is mostly negative (Scaloni et al., 2021.) We expect that the most frequently mentioned perceived advantage is reassurance and the most frequently mentioned perceived disadvantage is uncertainty about the interpretation of the results (Oudendammer and Broerse, 2019).

RQ4

"To what extent is self-test use related to well-being?".

Due to the lack of literature, we have no specific expectations regarding the relationship between self-test use and well-being.

Methods

Design

To answer the research questions, a cross-sectional online survey study was performed to investigate the experience with and use of self-tests, and to analyze the correlation between self-test use with well-being, personality traits, and personal background variables.

Participants and Procedure

The study received ethical approval from the University of Twente's Behavioral Management and Social Ethics Committee on April 14th (study number: 240284), and shortly afterwards the questionnaire was published. Participants could take part in the study if they agreed to the informed consent form (Appendix B), were at least 16 years old and were fluent in Dutch or German. A total of 111 people took part in the survey, recruited in two ways: through a convenience sample via the Sona website and through snowball sampling by the researcher passing the survey on to friends and family members, who in turn passed it on to

others. When students accessed the link via Sona, they received 0.25 research participation credits. Sona is a website used by the University of Twente to motivate UT students to participate in the studies of other UT students, as they must achieve a certain number of "Sona-credits" to be able to start their bachelor thesis.

The link to the study was additionally sent to participants via social media platforms such as WhatsApp or Instagram. When clicking on the link to the questionnaire, participants could decide whether they wanted to complete the questionnaire in English or German. Before starting the actual questionnaire, participants had to read an information letter explaining that the data would be anonymized, that ethical approval had been obtained and that the participant could voluntarily withdraw from the study at any time without giving a reason (Appendix A). In addition, the researchers' email addresses were provided in case participants had any questions about the study. After reading the information letter, the participants had to give their informed consent to participate in the study. They did this by choosing the response option 'Yes' to the question "Do you agree with the above statement?" at the end of the information letter. It took 20-25 minutes to complete the questionnaire.

Materials

The online questionnaire was designed in Qualtrics, offered in German and English and included three different types of questions. Firstly, questions about the participants' background variables and personality. Secondly, questions about the use of self-tests including their experiences and perceived disadvantages and advantages of self-tests, and lastly, questions about mental well-being.

Personal background variables and personality traits

The first part of the questionnaire contained questions on nationality, age, gender, education, perceived health status, raising children at home, relationship status, average

screen time per day and current employment status (see Table 1 for an overview of the wording of the questions and the response options for all personal background variables included).

The Big Five Inventory 10 Item Scale (BFI-10), which consists of 10 items and has shown high validity and reliability in other studies (Rammstedt & John, 2007b), was used to assess the personality traits. The BFI-10 comprises 5 subscales namely: extraversion, agreeableness, conscientiousness, neuroticism and openness. Each of these subscales was measured with two items, a regular item, and a reverse item. An example of an item and a reverse item measuring extraversion is: "I am sociable and outgoing" and the corresponding reverse item: "I see myself as someone who is reserved". The participants could click on 5 answer options for the various items, ranging from “strongly disagree” (1) to “somewhat disagree” (2), “neither agree nor disagree” (3), “somewhat agree” (4) and “strongly agree” (5). For each personality trait, the results of the reversed items were recoded and added to the results of the regular items. This produces the BFI-10 score that indicates how strong a personality trait is, in other words, a higher score implied a stronger personality trait. In addition, the mean values and the standard deviation of each subscale were calculated. Finally, the alpha values for the individual subscales were calculated in the present study and showed a rather low reliability: extraversion ($\alpha = .46$), agreeableness ($\alpha = .49$), conscientiousness ($\alpha = .49$), neuroticism ($\alpha = .55$) and openness ($\alpha = .48$). Despite the low reliability in this study, we continued to use the BFI-10 because other studies have demonstrated its validity (Stone et al., 2022) and we were thus able to compare the results of the BFI-10 subscales with the results of previous studies.

Use, experience and perceived advantages and disadvantages of self-tests

A self-developed questionnaire was used to assess the use, experience, and perceived advantages and disadvantages of self-tests. Four multiple-choice questions were displayed for

each of five different types of self-tests: (risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests and saliva self-tests (Table 1). Before the questions for each self-test were presented, there was a brief description explaining the content and purpose of each type of self-test along with some examples to ensure that participants had an idea of the self-test, even if they did not know the particular self-test before participating in the study. For each individual self-test, participants were first asked two questions about their self-test use, with the first question being, for example: "Have you ever used blood self-tests?". Response options were: No (0), Yes once (1), Yes occasionally (2), and Yes regularly (3). The second question was, for example, "Do you still use blood tests?" (Appendix B). If the participants responded with “No” to the first question, the following questions of the individual self-test were skipped. The first two questions were followed by two further questions on experience, e.g.: "How did you like blood self-tests?” and "Did you find blood self-tests helpful?”. The mean and standard deviation were calculated separately for each self-test type regarding experience with and use of the self-test. The most important variable in this study was the total scale score for the use of the self-test, which was calculated by averaging the use items of all five self-tests. The total scale score was a continuous variable that ranged from 0-15, as five self-tests were included that could range from 0-3 on the use items. At the end of the questionnaire, two open questions were included on the advantages and disadvantages that the participants see in self-tests. There were three other questionnaires that focused on the use of online health apps (mental health apps and fitness apps) and a questionnaire about cyberchondria, but these are not described as they were not relevant for the present study.

Mental Well-Being

The Mental Health Continuum Short Form (MHC-SF) was used to measure well-being (Lamers et al., 2011). The MHC-SF consists of 14 items to which the participant can

respond: "Never"(0), "once a week" (1), "about once a week"(2), "about 2 or 3 times a week "(3), “almost every day” (4) and “everyday” (5). Three subscales are included in the test, which each showed high reliability: emotional well-being (α=0.82 in the current study), social well-being (α=0.81 in the current study) and psychological well-being (α=0.80 in the current study) and the reliability of the entire MHC-SF was high too (α=0.87 for the current study). The MHC-SF total score was calculated by averaging all item scores, with higher total scores indicating higher mental well-being.

Data analysis

The responses to the questionnaire were downloaded from Qualtrics and imported into Excel. The first step was to delete all questionnaires in Excel that were not relevant for the present study. The data set was checked for the presence of missing values. Three participants had items with missing values in the BFI-10 and five participants had missing values in the MHC-SF, hence these participants were excluded from further data analysis. Subsequently, the Excel spreadsheet was imported into R-Studio, where the data was further analyzed. Descriptive statistics were calculated for the personal background variables, in which percentages, mean value, standard deviation, ranges and frequencies were determined. To examine the use of and experience with self-tests, descriptive statistics on the questions about self-test use were computed. The Mann-Whitney U test was performed to check if gender was associated with self-test use and the Kruskal-Wallis test was used to check whether there is a significant difference in nationality when it comes to self-tests use. Descriptive statistics were conducted to investigate the experience with self-testing. A content analysis was performed for the two open questions to examine the participants' perceived advantages and disadvantages of self-testing.

Additionally, Kendall rank correlation coefficient was performed to test the correlation of age, education level, health, current employment and average screen time per day with self-

test use. Pearson correlation coefficients were applied to analyze the correlation of personality traits and well-being with the use of different self-tests (Table 6). Normality, random sampling and an expected linear relationship are assumptions of the Pearson correlation coefficient that were met, which allowed the application of the test. Correlation coefficients were interpreted in such a way that coefficient values between 0.1 and 0.3 indicate a weak correlation, between 0.4 and 0.6 a moderate correlation, between 0.7 and 0.9 a strong correlation (Akoglu, 2018).

Results

Description of the Participant Group

Table 1 shows that most of the 111 study participants were either German (69.4 %) or Dutch (19.8 %), with an average age of 33.4 years. Around two thirds of the participants were women. The majority of participants had a high-school diploma (42.4 %), indicated good to excellent health (68.5 %) and were employed full-time (42.4 %).

Table 1

Personal background variables of the participant group. (N=111)

Demographics	Categories	N	Percentage	M (SD)
Nationality	Dutch	22	19.8%	
	German	77	69.4%	
	Other	12	10.8%	
Age		111		33.4 (16.1)
Gender	Female	74	66.7%	
	Male	37	33.3%	
	Prefer not to say	0	0.0%	
Education	Less than high school degree	34	30.6%	
	Highschool degree	47	42.4%	
	Bachelor's degree	10	9.0%	
	Master's degree	14	12.6%	
	Doctorate	0	0.0%	
	Others	6	5.4 %	
Health				
	Poor	2	1.8%	
	Fair	33	29.7%	
	Good	51	46.0%	

	Very good	22	19,8%
	Excellent	3	2.7%
Average Screen time per Day			
	0-2 hours	12	10.9%
	3-4 hours	35	31.5%
	5-7 hours	40	36.0%
	8-10 hours	14	12.6%
	More than 10 hours	10	9.0%
Current employment Status			
	Pupil	17	15.3%
	Full time student	27	24.3%
	Not employed	5	4.5%
	Part time employed or part time own business (>8 hours < 32 hours)	15	13.5%
	Full time employed or occupied with own business (>32 hours a week)	47	42.4%

Note. M= mean; SD= standard deviation; %= percentage of sample; N= number of participants

Personality and Well-Being

In the BFI-10 test, the participants scored highest on conscientiousness and lowest on neuroticism (Table 2). In the MHC-SF participants scored highest on psychological well-being and lowest on emotional well-being. Reference scores were used to check whether the results of this study are significantly different than the mean scores of other studies. A one sample t-test was performed for the BFI-10 using the means of Kwon and Park (2016) and MHC-SF using the means of Khazaei et al. (2022). The one sample t-test for the BFI-10 test showed that the mean values of the reference study did not differ significantly from the results of the present study ($p > .05$). The only exception was the subscale of neuroticism, which was significantly higher in the present study. Apart from emotional well-being, the one-sample t-test showed that all subscales of the MHC-SF of the present study were significantly lower compared to the reference means ($p < .05$).

Table 2

Descriptive Statistics (means, SD), on Personality traits (BFI-10) and Mental Well-Being (MHC-SF). (N=111)

Variable	Number of items	Range	M (SD)	Reference mean[12]
BFI-10 Extraversion	2	2-10	6.4 (2.1)	6.1 (1.40)

BFI-10 Agreeableness	2	2-10	6.8 (1.6)	6.7 (1.52)
BFI-10 Conscientiousness	2	2-10	7.2 (1.8)	6.8 (1.68)
BFI-10 Neuroticism	2	2-10	6.2 (2.1)	5.5 (1.77)
BFI-10 Openness	2	2-10	6.6 (2.1)	6.4 (1.69)
MHC-SF Total	14	0-70	40,1 (13,5)	45.1 (11.2)
MHC-SF Emotional Well-Being	3	0-15	10.2 (3.4)	10.5 (3.5)
MHC-SF Social Well-Being	5	0-25	11.1 (5.7)	12.9 (5.2)
MHC-SF Psychological Well-Being	6	0-30	18.8 (6.5)	21.7 (5.2)

Note. M= Mean; SD= standard deviation; [1]BFI-10= The Big Five Inventory 10 Item Scale; [2]MHC-SF = Mental Health Continuum-Short Form; reference study for the MHC-SF is Khazaei et al. (2022) with 800 Iranian participants; Reference study for the BFI-10 is Kwon and Park (2016), which had 110 participants.

RQ1: To what extent are different types of self-tests (risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests and saliva self-tests) being used?

Table 3 displays the responses to the question: "Have you ever used this type of self-test?". The most commonly used tests were saliva self-tests (combined yes answers= 66.6%), followed by risk assessment questionnaires (combined yes answers=29.7%) and symptom questionnaires (combined yes answers=26.1%). A minority (26.5%) were categorized as non-users, meaning that they had never used any of the five self-tests. Notably, almost none of the participants had ever performed a DNA or blood self-test; only five (4.5%) had ever performed a DNA self-test and only three (2.7%) participants had previously performed a blood self-test. For this reason, blood self-tests and DNA self-tests were not considered for separate analysis, as the sample size of six users for both self-tests are too small for data analysis.

Table 3

Descriptive statistics on the use of various self-tests. (N=111)

Self-test	No (0)	Yes once (1)	Yes occasionally (2)	Yes regularly (3)	M (SD)	n (%)
Risk assessment questionnaire	78 (70.3%)	18 (16.2%)	13 (11.7%)	2 (1.8%)	0.5 (0.8)	
Symptom checklist questionnaire	82 (73.9%)	9 (8.1%)	17 (15.3%)	3 (2.7%)	0.5 (0.9)	
Blood self-test	108 (97.3%)	2 (1.8%)	1 (0.9%)	0	0.0 (0.2)	
DNA self-test	106 (95.5%)	5 (4.5%)	0	0	0.0 (0.2)	
Saliva self-test	37 (33.3%)	5 (4.5%)	44 (39.6%)	25 (22.5%)	1.5 (1.2)	
Total scale score [0-15]					2.5 (2.1)	
Non-users (0)						28 (25.2%)
Users (1-3)						83 (74.8%)

Note. M= mean; SD= standard deviation

RQ2: To what extent is the use of self-tests related to personal background variables (gender, level of education, nationality, age) and personality traits?

The Mann-Whitney U-test indicated a non-significant difference in the use of self-tests between men ($M = 2.03$, SD = 1.9) and women ($M = 2.75$, $SD = 2.1$; U = 1124,5, p = .069). The Kruskal-Walli's test revealed that there were no significant differences between German, Dutch and other nationalities with respect to the use of self-tests ($\chi^2 (2) = 1.01, p = .603$).

Correlation between Age, Level of Education, Health, Employment Status, Average Screen Time per Day, and Use of Self-Tests

The total scale score for self-test use and saliva self-test use was weakly, but significantly associated with higher age scores. Risk assessment questionnaire use and total scale self-test use was weakly associated with higher self-reported health scores (Table 5).

Table 5

Kendall Tau Correlation between Age, Level of Education, Health, Employment Status, Average Screen Time per Day, and Use of Self-Tests. (N=106)

Self-test	Age	Highest education completed	Health	Current employment	Average screen time per day
Risk assessment questionnaire	.09 (.247)	-.12 (.139)	.17 (.031*)	.07 (.415)	.03 (.727)
Symptom checklist questionnaire	-.10 (.298)	-.09 (.206)	.14 (.096)	.04 (.557)	-.07 (.467)
Saliva self-test	.29 (.001***)	-.02 (.859)	.03 (.756)	-.11 (.194)	.09 (.256)
Total scale score	.26 (.002***)	-.10 (.263)	.19 (.042*)	-.13 (.141)	.03 (.717)

Note. The p-values are given in brackets; *p < 0.05. **p < 0.01. *** p < 0.001. The values in brackets represent the p-value for the individual correlations. DNA and blood self-tests were excluded from the Kendall-Tau correlation because the overall use of these tests in the given group of participants was too low; The total scale score comprises the use items of all five self-tests for each participant and ranges from 0 to 15.

Correlation between Personality Traits and Self-Test Use

More self-test use and risk assessment questionnaire use was associated with higher scores on conscientiousness (Table 6). Self-test use was also associated with higher scores on neuroticism.

Table 6

Pearson´s Correlation Between Personality Traits and Self-Tests. (N=111)

Self-test	BFI- 10 Extraversion	BFI-10 Agreeableness	BFI-10 Conscientiousness	BFI-10 Neuroticism	BFI-10 Openness
Risk assessment questionnaire	.02 (.872)	.03 (.722)	.21 (.029*)	.10 (.261)	12 (.162)
Symptom checklist questionnaire	.06 (.502)	.02 (.838)	-.13 (.094)	-.03 (.704)	.11 (.267)
Saliva self-test	.11 (.297)	-.05 (.621)	-.12 (.113)	-.07 (.447)	.06 (.586)

Total scale score	.04 (.674)	.08 (.369)	.17 (.046*)	22 (.012*)	-.13 (.079)

BFI-10= Big Five Inventory-10 (BFI-10); The p-values are given in brackets; *p < 0.05. **p < 0.01. *** p < 0.001. DNA and blood self-tests were excluded from the Pearson correlation because the overall use of these tests in the given group of participants was too low; The range of the total scale score is 0-15

RQ3: "Are the experiences of self-test users positive or negative and what disadvantages and advantages do participants see in self-tests?"

Experiences with self-tests were measured using descriptive statistics for the question: "Do you find the self-test helpful?" (Table 8). Saliva self-tests were found to be the most helpful while risk assessment questionnaires were found to be the least helpful. Overall, participants found self-tests rather unhelpful.

Table 8

Descriptive Statistics of Experiences with Self-Tests.

	N (Number of participants that did such a test)	Not at all (0)	Very little (1)	Somewhat (2)	Very much (3)	M(SD)
Did you find the test helpful?						
Risk assessment questionnaire	33	11 (33%)	9 (27%)	11 (33%)	2 (6%)	1.1 (1.0)
Symptom checklist Questionnaire	29	5 (17%)	13 (45%)	10 (34%)	1 (3%)	1.2 (0.8)
Saliva self-test	73	15 (21%)	12 (16%)	22 (30%)	24 (33%)	1.7 (1.1)

Note. M= mean; SD= standard deviation; N= number of people who completed the questionnaire for each self-test type, percentages for N are shown in relation to entire participant group (N= 111); the percentages of the four answer options are in relation to the number of participants that completed each questionnaire; DNA and blood self-tests were excluded from the table as the number of users of these tests was too small

Content Analysis of Open Questions

According to the participants, the most frequently perceived advantages of self-tests were “Timesaving and speed” (26), followed by “Reassurance” (16) (Table 9). In terms of disadvantages, “Lack of accuracy” (37) and “Execution mistakes” (20) were mentioned most frequently.

Table 9

Content Analysis of Replies on Open Questions.

	Code	Frequency
Perceived advatages		
	Timesaving and speed	26
	Reassurance	16
	Convenience	14
	Autonomy from medical professionals	10
	Flexibility	8
	Cost-effective	2
Perceived Disadvantages		
	Lack of accuracy	37
	Execution mistakes	20
	Low confidence in results	6
	No counselling by medical professional	7

Note. Codes were created by the main researcher

RQ4: “To what extent is self-test use associated with well-being?”

No correlations were found for the total scale score, risk assessment and symptom checklist questionnaire. A significant weak positive correlation was detected for the use of the saliva self-tests and social well-being, suggesting that use of saliva self-tests is associated with higher scores on social well-being (Table 10).

Table 10

Pearson’s correlation between well-being and the use of self-tests. (N=111)

Self-test type	MHC-SF Emotional Well Being	MHC-SF Social Well-Being	MHC-SF Psychological Well-Being	MHC-SF Total Score
Risk assessment questionnaire.	.03 (.743)	.07 (.452)	.01 (.842)	.03 (.745)

Symptom checklist questionnaire	.06 (.522)	.06 (.563)	.03 (.767)	.08 (.421)
Saliva self-test	.09 (.342)	.18 (.031*)	.02 (.862)	-.04 (.671)
Total scale score	.12 (.182)	.09 (.379)	.07 (.472)	.03 (.753)

Note. MHC= Mental Health Continuum-Short Form; The p-values are given in brackets: *p < 0.05. **p < 0.01. *** p < 0.001. DNA and blood self-tests are excluded from the Pearson correlation because the overall use of these tests in the given group of participants is too low. The range of the total scale score is 0-15

Discussion

The aims of this study were to determine the extent of and experiences with self-test use. Also, it was investigated if the use of self-tests is associated with participants' well-being, personality traits and personal background variables. The results of this study show that the majority of participants have used self-tests in the past and their experiences with them were often negative. Several correlations were found between the use of self-tests with personality traits and personal background variables.

With respect to the lifetime use of different types of self-tests (risk assessment questionnaires, symptom checklist questionnaires, blood self-tests, DNA self-tests and saliva self-tests) being used, the results showed that about 66% of the participants had ever performed a saliva self-test, making the saliva test by far the most frequently used self-test, compared to the other self-tests used in this study (Table 3). The high use of saliva self-tests in this study was to be expected, as the recent study by Sakala et al. (2024) found a high use of saliva self-tests of 87% in a European sample. Although it was expected that saliva self-tests would be used most frequently compared to other self-test types in the present study, the percentage of use in the study by Sakala et al. (2024) is higher than in the present study. As Sakala et al. (2024) does not mention the mean age of participants, it is difficult to compare the results of Sakala et al. (2024) with the present study.

In the present study around 75% of participants, had used at least one of the self-tests in the past, indicating widespread one-time use of self-tests. This shows a sharp increase in self-test use compared to Kuecuekbalaban et al. (2017), who reported 8.5% one-time usage in a German sample. Unlike our study, which included questionnaire self-tests, Kuecuekbalaban et al. focused solely on bodily self-tests (DNA, blood and saliva). The inclusion of self-test questionnaires in our study may have contributed to the higher overall use. We also hypothesize that the higher prevalence of self-testing in our study is largely due to COVID recommendations, which is supported by the fact that saliva self-tests were by far the most commonly used self-test type in our study. The use of blood and DNA self-tests was so low that these tests had to be excluded from further analysis. This was unexpected as Kononova et al. (2021) indicated a low use of DNA self-tests, but not too small to be excluded from further statistical analysis. To our knowledge, no studies indicated a very low use of blood self-tests among European samples which made the low use of blood self-tests in our study unexpected.

For future studies on the use of self-tests, we recommend that researchers include not only bodily self-tests (e.g. blood, saliva and DNA), but also online questionnaires (e.g. symptom checklist and risk assessment questionnaires) in their studies to gain a more comprehensive overview of the general use of self-tests. This is valuable as self-tests can be better tailored to at-risk groups when the extent of use of different types of self-tests is better researched. To our knowledge, this is the first study to take this broader approach to self-test use, and to verify these results for self-test use, it would be useful to replicate this study with the same approach in larger and more representative samples.

In respect to the personal background variables, it was found that participants with high self-reported health scores and higher age were more likely to use self-tests. These results align with Kuecuekbalaban et al. (2017) who also found a correlation between health scores and higher age with increased use of self-tests. It was not expected that older age

would predict self-test use, as Iliyasu et al (2020) who focused exclusively on HIV self-tests, found that younger people were more likely to use them. As there was no consensus in previous studies on the direction of the age variable as a predictor for the use of self-tests, we had no clear expectation for the age variable. It may well be a characteristic of HIV self-tests that they tend to be used by younger people. One reason for this could be that younger people perceive themselves to be at higher risk of HIV (Clifton et al., 2016). Kuecuekbalaban et al. (2017) also found a positive correlation for education level and self-test use, which could not be replicated by our study. Compared to Kuecuekbalaban et al. (2017), where 10.1% of participants had a university degree, 21% in this study did, indicating they are more educated on average.

In terms of personality traits, greater use of self-tests was associated with both higher neuroticism and conscientiousness scores. These results are partly consistent with those of Pearce (2023), who also found a correlation between neuroticism and self-tests use. However, we did not observe a correlation with extraversion which does not align with Pearce (2023). Furthermore, Pearce (2023) did not find a correlation with conscientiousness that we found in our study. It should be noted that Pearce (2023) focused exclusively on genetic self-tests and not on the use of different kind of self-tests, which could explain that the findings are partly different. However, the fact that both studies found a correlation with neuroticism could indicate that neuroticism is not only associated with genetic self-tests but also with general self-test use. As the present study is the first to examine the relationship between personality traits and general self-test use, further studies are needed to determine whether self-test use is consistently associated with neuroticism and conscientiousness. Notably, the alphas of the BFI-10 in this study were quite low, which may have suppressed the statistical significance of the results. Future research is needed to replicate these results for personality traits and to examine whether the low alphas of the BFI-10 have an impact on test scores. To test this, it is

recommended to use the BFI-44 instead of the BF-10 so that future studies do not suffer from low reliability.

In terms of personal experience, the perceived helpfulness is often perceived as "very little" by the participants (Table 8). We therefore categorize the participants' experiences with self-tests as rather negative in the present study. This aligns with Scaloni et al. (2021) who also found that participants described the experience with self-tests as rather negative. When looking at the perceived disadvantages and advantages, the content analysis revealed that the three most common disadvantages were: lack of accuracy, execution mistakes and low confidence in the results. The three most common positive experiences were: Time saving and speed, reassurance and convenience. Based on Oudendammer and Broerse (2019), we expected reassurance to be the most frequently mentioned positive experience and the uncertainty about the interpretation of the results to be the most frequently mentioned negative experience. In our study, reassurance was the second most used positive code and uncertainty about the interpretation of the results did not occur in our study. Therefore, the perceived advantages found in this study aligned with Oudendammer and Broerse (2019) but the perceived disadvantages did not.

As there are not many studies examining the experiences and perceived advantages and disadvantages of using self-tests, researchers are advised to check if these findings can be replicated. Understanding the perceived advantages and disadvantages of self-tests is valuable because this knowledge could guide a change of design of self-tests and self-test interventions. In this study, for example, execution errors were cited as the second most common disadvantage of self-tests. This finding suggests that the instructions of self-tests is not detailed enough and needs to be improved. If the instructions for self-tests are subsequently improved, the negative experiences that users have with self-tests could be reduced.

Regarding well-being and the use of self-tests, the total use of self-tests did not correlate with any subscale of well-being, but a correlation was found for the use of saliva self-tests with social well-being. Saliva self-test users were more likely to have higher social well-being. As there are, to our knowledge, no studies that have investigated the relationship between well-being and the use of self-tests, it is not possible to relate these results to previous studies. Having more insights into the correlation of well-being and self-tests is valuable, as it can indicate whether self-tests can be a useful tool to improve well-being. Further replication studies examining the correlation of well-being and self-test use are needed to verify the consistency of these findings.

An interesting finding of this study was that almost none of the participants used DNA and blood self-tests. A reason for that could be that the mean age of the participant group is quite young (33.4), and chronic diseases such as diabetes that require regular blood self-testing are more likely to be found in older participants. Also, the awareness of genetic illnesses might raise with age which would then motivate older participants to use genetic self-tests. Another interesting finding is that the reported good health of the participants is rather low in this study compared to other studies. In the present study only 25 out of 111 participants indicated their health to be excellent or very good. In Henchoz et al. (2008), in contrast, half of the sample reported a ‘very good’ state of health. A possible reason for the low health scores in the present study could be that our sample is more neurotic than in previous studies and has lower well-being scores than in previous studies. The covid-pandemic could have also led to lower reported health scores.

Strengths and Limitations of the Study

Regarding data analysis, it should be noted that the tests performed in this cross-sectional sample, such as the Pearson correlation test, do not allow conclusions about the cause-effect relationship between the variables. In the context of this study, the correlation

between social well-being and the use of saliva self-tests is very interesting, as such correlation has not been found by other studies. However, the present results do not allow us to determine whether the use of saliva self-tests leads to high social well-being or whether high social well-being leads to greater use of saliva self-tests.

Another limitation of the study was that the self-test questionnaire was created in English by the researcher, who is not a native English speaker, and then translated into German without the help of a professional translator who could have checked the language for consistency and comprehensibility for the participants. In this context, the way the content analysis was conducted can be improved too as only one researcher performed the content analysis opposed to a trained team. The low alpha values of the BFI-10 subscales are also a weak point of the study, as the results of the BFI-10 cannot be regarded as reliable, which reduces the statistical significance of the study.

A clear strength of the study was the inclusion of five different self-tests, which included both bodily and questionnaire-based self-tests. There are almost no studies that include multiple types of self-tests and no studies that use a group of self-tests that include bodily self-tests and self-test questionnaires. Therefore, the current study made an important contribution to current self-test research, as the group of self-tests investigated was broader than in previous studies.

Conclusion

To conclude, one-time self-test use was higher compared to previous studies and the overall experience with self-tests was rather negative. Older participants and participants who reported a high level of perceived health were more likely to use self-tests. More conscientious and more neurotic participants were also more inclined to use self-tests. The use of saliva self-tests was associated with higher social well-being. For future studies on the

general use of self-tests, we recommend including a group of bodily self-tests and self-test questionnaires to provide a broader overview of the use of self-tests.

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Appendix

Appendix A

Informed Consent

Informed consent

Thank you for your participation in this research study. Please read the following information carefully.

The data collected during the study will be used solely for research purposes and is only available for the research team. The data will be stored anonymously to protect your privacy. It will not be possible to trace the answers back to you.

For this study, ethical approval has been gained by the Ethics Committee of the Faculty of Behavioural and Management and Social Sciences at the University of Twente.

Your participation in this study is voluntary. If you decide to participate, you have the right to withdraw from the study at any time without naming a reason and without any consequences. The responses recorded before withdrawal may still be used in this study.

If you have any questions, feel free to contact one of the researchers for this study:

- g.trompramirez@student.utwente.nl
- a.freier@student.utwente.nl
- m.a.maurer@student.utwente.nl
- r.koch-1@student.utwente.nl

- I have read and understood the information provided

- I consent voluntarily to be a participant in this study and understand that I can withdraw from the study at any time, without having to give a reason and without any consequences

- I am aware I can contact the researchers in case I have any questions

- I understand that my answers will be saved and used for the research

- I understand that my responses will be anonymous

- I give my consent to participate in this study

Do you agree to all the above-mentioned statements? (yes/no)

Appendix B

Symptom Checklist Questionnaire				
Have you ever used symptom questionnaires (e.g. symptom checker or WebMD)?	No	Yes, once	Yes, occasionally	Yes, regularly
Do you still use symptom check questionnaires?	No	Yes, occasionally	Yes, regularly	
To what extent do you like do you like symptom check list questionnaires?	Not at all	Very little	Somewhat	Very much
To what extend did you find using symptom checklist questionnaires helpful?	Not at all	Very little	Somewhat	Very much
Risk Assessment Questionnaires				
Have you ever used risk assessment questionnaires to check whether you have an increased risk of certain physical or mental illnesses (e.g. COPD or ADHD)?	No	Yes, once	Yes, occasionally	Yes, regularly
Do you still use risk assessment questionnaires?	No	Yes, occasionally	Yes, regularly	
To what extent do you like	Not at all	Very little	Somewhat	Very much

do you like risk assessment questionnaires?				
To what extend did you find using risk assessment questionnaires helpful?	Not at all	Very little	Somewhat	Very much
DNA self-tests				
Have you ever used a DNA self-test before (e.g. hereditary cancer test)?	No	Yes, once	Yes, occasionally	Yes, regularly
Do you still use DNA self-tests?	No	Yes, occasionally	Yes, regularly	
To what extent do you like do you like DNA self-tests?	Not at all	Very little	Somewhat	Very much
To what extend did you find using DNA self-tests helpful?	Not at all	Very little	Somewhat	Very much
Blood self-tests				
Have you ever used blood self-tests?	No	Yes, once	Yes, occasionally	Yes, regularly
Do you still use blood questionnaires?	No	Yes, occasionally	Yes, regularly	

To what extent do you like blood self-tests?	Not at all	Very little	Somewhat	Very much
To what extend did you find using blood self-tests helpful?	Not at all	Very little	Somewhat	Very much

Saliva self-tests

Have you ever used saliva self-tests (e.g. Covid antigen self-test)?	No	Yes, once	Yes, occasionally	Yes, regularly
Do you still use saliva self-tests?	No	Yes, occasionally		Yes, regularly
To what extent do you like saliva self-tests?	Not at all	Very little	Somewhat	Very much
To what extend did you find using saliva self-tests helpful?	Not at all	Very little	Somewhat	Very much

Open questions

In your opinion, what are the main advantages or benefits of self-testing?

In your opinion, what are the main drawbacks or risks of self-testing?