

Utilizing Patient Personality Information in RGP Practice

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ABSTRACT

What impact does your personality have on your general health? Is personality something your Regular General Practitioner (RGP) could – and should – take into consideration during a consultation? The potential for creating a new service for improving RGP practice by utilizing patient personality information, shows that several aspects of the practice could be enhanced. As of today, self-report inventories would be the best existing tool for collecting patient personality information, and could be used as an input tool to the service. However, this job could potentially in the future be passed over to a software for determining a person's personality based on their digitally admitted information, by using a machine learning model. As these parameters are promising, but not regarded as success factors, having a Service Design approach to the system development process, is recommended.

KEYWORDS: Doctor-Patient Communication, Personality Psychology, Personality Inventory, Machine Learning, Service Design

1. INTRODUCTION

In Norway, most people seek consultation with their Regular General Practitioner (RGP) if something about their health is worrying- or bothering them. They all have diverging reasons for why they want to have a consultation with their RGP and how they prefer to describe and discuss these reasons for and with him. Despite all these differences, all patients face the same situation when going to their doctor's office; an average of 15 minutes of their doctor's time. During these 15 minutes the doctor is supposed to gather all relevant information considering their problem through discussions and examinations, and in collaboration with them come up with a conclusion and a plan on how to solve the problem, before documenting it all in their medical record. Between all these mandatory actions, how much effort do the

doctor put into getting to know you as a person? A RGP has about 20 consultations during a day and around 1200 patients on their patient list, which can make it hard for them to actually get to know all their patients. Does it matter however? The author of this paper suspects that the RGP practice could give patients better experiences and outcomes, if the RGPs knew their patient's personality.

This paper seeks to explore if RGP practice can be improved by utilizing patient personality information. And if so, it aims at marking out a possible development course, as a guideline for future convinced teams, who would like to use this information to create such a service.

1.1 Goals

The goal of the paper is to research if information provided by applied personality psychology can open up for new ways of interacting and communicating with patients, and how this can be applied to better the service provided by RGP's.

2. STRUCTURE OF THE PAPER

This paper starts by presenting research on relevant fields, in order to give the reader an understanding of the scope of opportunities the concept render. Finally, the findings are discussed and a recommended direction for the development of the system is presented.

3. PERSONALITY PSYCHOLOGY

People's personalities are something most of us have to deal with on a daily basis, both in our professional and personal life. We learn that all humans are unique, that they have individual differences, and that they will respond differently to the way you act around and communicate with them. This is what makes up their personality, and we learn to adapt our behavior around a person based on our impression of their personality. Even though people are unique, some people are perceived as more similar to each other than others. In attempts of categorizing and describing personalities we tend to label each other with ideas like "he is a nervous type" or "she is a positive person". People labelled with several ideas in common will be categorized as similar types of people. Reading, understanding and categorizing personalities is something all people – including RGP's – do on a daily basis to a greater or lesser extent, with varying success of accuracy. In general speech, someone who is good at reading a person's personality correctly, is called a good judge of character.

As of today, there does not exist any tool for getting knowledge about patients' personality in

RGP practice, which means that in situations where RGP's utilize this type of information, the reliability of it does solely rely on the RGP's judge of character. Personality Psychology, which aims to understand, measure, and categorize people's individual differences in a structured and standardized way, can be helpful in understanding if this can affect the RGP practice in any way.

3.1 The Big Five

Through history, many experts have studied and developed theories to describe personality. The Trait-, Psychoanalytic-, Humanistic-Existential- and Cognitive theories are the biggest theories within Personality Psychology, but out of them the Trait theory is the most influential (Kennair and Hagen, 2015). Paul T. Costa Jr and Robert R. McCrae have developed the most known and used trait theory called the Five-Factor Model (FFM), and they "define traits as *dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions.*" (McCrae, 2003). FFM is popularly known as the "Big Five", and aims at giving a correct picture of a person's personality, based on how they score on the five superior trait domains: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). Deary et al. (2010) have described the five trait domains briefly as shown in Table 1, but emphasizes that it does not cover the richness of the personality traits.

A good match with a trait description will give a high score for the given trait. Looking at trait scores in isolation can be useful for research matters, but to understand the complexity of an individual's personality, one would have to look at the combination of all their trait scores, also called their personality profile.

Trait	Description
Neuroticism	<i>A tendency to feel anxiety and other negative emotions versus a tendency to be calm and emotionally stable.</i>
Extraversion	<i>A tendency to be outgoing and to take the lead in social situations versus a tendency to stay in the background socially and to be timid.</i>
Conscientiousness	<i>A tendency to be organized and to follow rules versus a tendency to be somewhat careless and disorganized and not to plan ahead.</i>
Agreeableness	<i>A tendency to be trusting and deferential versus a tendency to be distrustful and independent.</i>
Openness to experience	<i>A tendency to be open to new ideas and feelings and to like reflection versus a tendency for shallowness and to be narrow in outlook.</i>

Table 1: The five trait domains in FFM. Content credit to Deary et al. (2010)

Kennair and Hagen (2015) exemplifies the difference by giving an example where they point out that a person can be social and enjoy spending time with other people (have high score on E), but still experience that he does not go well with other people as he is too competitive and has a hard time stooping to other’s opinions (low A), and is bad at showing up to set appointments (low C).

A large amount of research in the field have generated a complex debate, where there still is disagreement in how many traits one should use for describing personality, and if traits describe behaviour or cause behaviour. Nevertheless, decades of research have proved FFM solid support (Kennair and Hagen, 2015). FFM traits are assumed to be results of genetic factors, which mean that fundamental personality traits can be identified independent of countries and cultures. The same goes for genders, where the gender differences one can see between the different traits are minor and consistent across cultures (Kennair and Hagen, 2015).

As the previous paragraphs reinforces, knowledge from personality research can be used to find people with specific and desirable qualities, or qualities that might become problematic in certain situations (Kennair and Hagen, 2015). Today, the use of personality

psychology is especially widespread in personnel selection and recruitment, but it has also gotten an increased attention in team and management composition. An interesting thought is that in the future, personality information may be used for construction of adaptive systems, e-commerce, and recommendation systems (Tsung-Yi et al., 2016).

3.2 Big Five in regards to health

When it comes to RGP practice, looking at how patients’ personality might affect their health and their experience with RGP consultations, is essential for understanding the concept’s potential.

Kannair and Hagen (2015) states that several health-related studies have shown that some personality traits increases the general risk of illnesses and disorders, and that some can also increases the risk of particular illnesses and disorders. They also point out that some traits themselves can be the actual cause for an illness or a problem in someone’s life – often referred to as disease-prone personality, but that other traits again can protect a person from such risks factors. These risk factors, traits and qualities could be seen as individual symptoms or health parameters, which the RGP could compare and see in relation to the symptoms patients report

during their medical consultations, for better diagnosing.

Deary et al. (2010) have also illustrated how personality traits could be used by health practitioners and policymakers in the future to improve public health service, through creating four hypothetical examples. In the first they discuss the potential of targeted surveillance, where they propose to monitor people with certain risk traits for an illness, more regularly than standard procedure. This could help distributing the surveillance resources smarter, and in the long-term cause large organizational economic savings and reduced likelihood of the illness monitored.

The second exemplifies that tailored intervention strategies could be developed for the patients, if the RGPs knew what tendencies the patient usually show when faced with different task oriented situations. This could lead to higher likelihood of patients complying of medication regimens and successful treatment. They exemplify this by saying “when faced with a patient high in conscientiousness, a physician’s or nurse’s advice to change his or her diet or give up smoking would be likely to be met by a high self-directed effort on the part of the patient. However, for a patient low in conscientiousness this advice may need to be accompanied with short-term incentives and regular monitoring and reminders or behavior modification either by the health-care provider or some other expert.”

The third discusses how patient trait information can help the RGPs in situation where there are several treatment options, and the traits could help them get a better picture of what drugs a patient can tolerate and thereby prescribing better fitted drugs. They mean that “as such, information about personality could not only improve health and patient compliance but also improve patient satisfaction and well-being”.

The final example discusses whether patient trait information could be used to improve doctor-patient communication. “According to Cole and

Bird (2000) and Makoul (2001) excellent doctor–patient communication involves effective relationship building, information gathering, understanding of the patient's perspective, information giving, and good decision making. Positive outcomes of excellent doctor–patient communication include increased adherence and compliance, adjustment of expectations, self-regulation, and coping” (Matusitz and Spear, 2014). By giving the RGP information about his patient’s personality, he could adjust his way of communicating to better fit the patient.

All these examples are promising and quite realistic, and shows a great potential for the concept of creating a new service for improving RGP practice by utilizing patient personality information.

4. APPLIED PERSONALITY PSYCHOLOGY

The possibilities implied in the previous section, opens up for a new crucial question; how can one gather patient personality information?

A challenge is that personality is complex and difficult to observe in a purely objective matter, since there are no physical evidences of it, only subjective evidences like actions, thoughts and feelings. This means that one can only achieve personality knowledge through indirect measurements, which introduces uncertainty around what a valid personality measurement can be (Kennair and Hagen, 2015).

Different methods have been designed to measure personality, and the most central ones are “physiological theories/approaches, projective tests, self-report methods, observer-based methods, behavioral observation methods, content encoding, psychobiographic measurements, and recently also genetic methods and brain imaging methods” (Kennair and Hagen, 2015). Regardless of which method one would prefer to use, an important guideline would be that personality measurements should capture something stable in humans, in other words; capture trends that are unaffected by

situations and time (Kennair and Hagen, 2015). The self-report method is the most dominating method in the field, and is typically executed using personality inventories. It is also the most investigated method in research literature. A study showed that "over 95% of the empirical papers in the Journal of Personality and 50% of those published in the journal Child Development in 2006 used self-report instruments as a source of information or as the only source" (Kagan, 2007).

4.1 Self-report personality inventory

A self-report personality inventory, often referred to as a "personality test", is a questionnaire where the test-takers is presented with a series of questions, and each question have a range of appurtenant alternatives or statements. The test-takes is asked to rate the alternatives or chose the statement they mean applies best to their character. The answers will be translated to trait scores, and the combination of them will be used to create the test-taker's personality profile. There have been made an enormous amount of personality inventories, both serious ones supported by thorough research, and informal and frilly ones mainly made for entertainment. Some well-known and serious inventories are NEO PI-R, MMPI, MBTI, Eysencks PI and 16PF, where the first-mentioned is the one best known in relation to FFM.

The biggest challenge with self-report inventories is the risk of people adjusting their answers, either intentionally or unintentionally, which can lead to systematic reported errors, also called response bias. Validity indexes are often created to correct these problems, but they cannot be trusted blindly, as vigilant people may see straight through the purpose of them (Kennair and Hagen, 2015). A strategy for reducing the risk of people adjusting their answers is to formulate the questions in an indirect way so that their intention is less obvious (Kennair and Hagen, 2015). The three biases to watch when it comes to self-report responses are acquiescence, social desirability and lies. Only acquiescence can be

controlled through how the inventory is composed, the other two have to be examined after data collection (Kennair and Hagen, 2015). Social desirability bias is a phenomenon describing how people would either exaggerate or understate their answers in the inventory, often because of the fear of being judged or because they want to meet the expectations expected of them. Acquiescence bias is about being more positive (or negative) in one's answer than one really is. This is a partly automated unintentional cognitive process (Gilbert, 1991), and studies show that answering complicated questions trigger it more than answering easy ones (Schuman, 1981). A common way to try to control acquiescence is to formulate half of the questions in a positive way and half of them in a negative way, before turning the negative test results to positive, and in that way (theoretically) remove the effect of acquiescence (Kennair and Hagen, 2015).

An inventory's overall validity gives an understanding of how one can interpret the test scores (Kennair and Hagen, 2015). In other words, it means what conclusions we can allow ourselves to draw from the results, which is ultimately what tells us how we can utilize the results from the inventory and which limitations we have to be aware of. On the question on which inventory to use, a comparative study done by Grucza and Goldberg (2007) where 11 of most known personality inventories was compared, showed that the tests are more similar to each other than different, which they mean indicates that the risk of error is small and independent of which inventory one might chose.

4.2 Behavioural observation

The behavioural observation method is based on having a third party evaluate a person's personality, based on observations of the person. This is a resource demanding method, but is a good alternative when the self-report method is not an option. In terms of some health aspects it could be a desired option, for example in

situations where one would like to study the personality changes that follow getting Alzheimer's disease, and the patient is not capable of evaluating himself any more (Kennair and Hagen, 2015).

4.3 Personality observation through digital media

Through several studies, experiments have shown that also strangers to a person can observe FFM based on how the person express himself through on-line social networking sites (OSNs) and other communication platforms.

A study done by Back et al. (2010) examined if it is possible to observe real personality by observing people's Facebook profiles, or if they only reflect the profile owner's ideal self. They carried out this experiment by comparing scores from test-takers' self-report inventories and reports from their well-acquainted friends, where they both mapped the test-taker's real personality and how they would describe their ideal self, to results from unacquainted observers who had rated their impressions of the test-taker's personality based on their Facebook profile using an observer-report. The "results suggest that people are not using their OSN profiles to promote an idealized virtual identity. Instead, OSNs might be an efficient medium for expressing and communicating real personality".

Similar studies have been done by testing how real personality is reflected in other OSNs, in the content of people's emails, in people's general internet use and in people's general smartphone use.

One of these studies done on personality in relation to OSNs examined Twitter (Quercia et al., 2011), and showed "a way of accurately predicting a user's personality simply based on three counts publicly available on profiles: following, followers, and listed counts. Knowing these three quantities about an active user, one can predict the user's five personality traits with

a root-mean-squared error below 0.88 on a [1,5] scale."

In another study, Shen et al.'s (2013) result showed that personality prediction based on email content is feasible, and that the email feature set they have developed can predict personality with reasonable accuracies.

Xu et al.'s (2016) studies showed that "personality traits have significant impact on the adoption of different types of mobile apps", while McElroy et. Al.'s (2007) study "show that general personality factors predict aspects of Internet use".

All these studies indicate a future potential for using openly accessible- or existing (but private) data about a person to construct his personality profile. Still it has a long way to go in terms of research, reliability and validity, before being able to meet the standards demanded when applying new technology to RGPs' practice or other healthcare services. A natural obstacle for this is of course also the fact that one would have to have observers evaluating each patient's data, which would demand an enormous amount of resources. Applicable observers would also be limited to professionals with good knowledge about FFM (Kennair and Hagen, 2015).

4.4 Automatic determination of personality

In an experiment to see if it is possible to remove the need for an observer in the evaluating phase of the previous mentioned method, Xu et al. (2016) presents "a scalable machine-learning approach to predict personality traits with information like app installations and update events". They created an app to collect the two types of information they needed to run the experiment; 1) a self-report inventory for the test-taker to answer, and 2) an Android operation system that provides an Application Program Interface (API) for retrieving the test-taker's mobile app data, to see how the test-taker adopts different types of mobile apps. Once the test-taker's data is collected they run the app

data through a machine-learning algorithm to train the program to evaluate test-taker's personality by using the scores from the test-taker's self-report inventory as ground-truth for training, validation, and testing. Their "prototype app shows a 65% higher precision than a random guess", and they conclude that these findings "suggest that existing questionnaire-based approaches can be replaced by this highly scalable and efficient method", when the limitations they mention have been researched and tested further.

4.5 Gathering patient personality information

Since collecting personality information using self-report inventories or a machine learning model - which would automatically determine a person's personality - would not require any extra resources from the RGPs or other involved parties in the health care service, they would be preferred as methods, if a tool for mapping a patient's personality should be developed.

Comparing them to each other, leads to preferring self-report inventories on a short-term basis, but a machine-learning model on a longer term. As mentioned earlier, several serious self-report inventories are already made and could be implemented as an input data to the tool as soon as patients submit their test scores. The biggest challenge with using a self-report inventory would be to make sure patients actually complete such a test, due to how time-consuming it can be. There are a lot of different opinions on how much time it will take to complete a serious self-report inventory, but it seems like most of them will require between 15- to 90 minutes. Making sure the service asking the patients to fulfil the personality inventory actually motivates the patients to do so, is a crucial criterion for being successful.

A machine learning model would remove this type of issues, and could also help overcome problems such as response bias. On the other hand, it would limit the input basis to information patients easily could give the service

admission to and permission to use, such as digital information. However, as stated this is a long-time preference, due to the need for further research and testing, and the machine learning method would not be implementable many years to come.

Regardless of which method one chose to utilize, it is important reflect upon and design for patient privacy and service transparency. Therefore it is important that the service would state explicit information to the patient about "when and what data will be collected and for what purpose" (Xu et al., 2016) and letting them have insight into what type of information the service have stored about them, and when and by whom it is used.

5. IMPLEMENTING PERSONALITY INFORMATION IN RGP PRACTICE

Being able to utilize personality information in RGP practice would require development of two types of new tools: one for gathering patient personality information, and another giving RGPs access to this information. When choosing platforms for this development, "new systems are not always the answer. Consider the cumulative impact of the thousands of cognitive interactions required of users for every new service, system, interface, device, or billing statement" (Jones, 2013). Looking at existing services might be a good idea.

5.1 Existing services as development platform

As "patients may be confused by the sprawling range of Web services and competing arrays of redundant online health information" (Jones, 2013), getting a collaboration with, and employ an acknowledged services the patient already use, could be a success criteria. In Norway, most RGP offices offer their patients a digital system, where they can address patients' inquiries - often considering appointments, prescriptions and other health related questions - and distribute private health related messages such as medical test results. PasientSky (Pasientsky)

HelseRespons (WTW) and ePortal (Medical, 2011) are example of Norwegian parties that offer these kinds of services. Considering the fact that these are services where the patient already is used to handing over private health related information, using them as platforms for either asking a patient to complete a personality inventory or asking for permission to access relevant information on the patient's device, might feel as a natural expansion of the service, as long as patient privacy and service transparency is cared for. These systems generally also provide an integration with the systems doctors use for keeping their patients' medical records. According to Jones (2013), "doctors are too busy to adopt more than a few essential services, and they often maintain older systems that are safely committed to memory, rather than invest time in learning a new system". Therefore, using medical record systems for giving RGP's access to patient personality information could higher the likelihood of adoption, as doctor would only have to deal with an expansion of a system in comparison to a whole new system.

5.2 RGP access to patient personality information

When it comes to the design of the tools RGP's will use to access patient personality information, it would be most beneficial if the information was displayed in a clear, concise, and relevant way (Deary et al., 2010).

Deary et al. suggest summarizing the results in simple reports like the ones "that are often provided to subjects in research studies or to possible employers", where "patients could be described in ways relevant to health practitioners; that is, their disposition, risk factors for any diseases, and ability to comply with medication regimens. In addition, certain personality styles, such as those who are high in neuroticism and low in extraversion, could be flagged as being at much higher risk for specific problems".

The presence of such a tool under a consultation should not negatively interfere with the doctor-patient communication.

6. DISCUSSION AND CONCLUSION

This paper highlights five areas of application, where utilizing patient personality information in RGP practice can better the service:

1. Using patient traits as a supplement to other symptoms, which can help RGP's make better decisions when it comes to diagnosing.
2. Targeting surveillance at people that have certain risk traits for an illness can help distributing the surveillance resources smarter, so that one in the long term could see large organizational economic savings and reduced likelihood of the illness monitored.
3. Tailored intervention strategies could be developed for each patient, for improving the likelihood of patients complying of medication regimens.
4. An overview of patient's toleration of drugs could be developed, for improved prescription of drugs.
5. Improving doctor-patient communication, which could increase patient adherence and compliance, adjustment of expectations, self-regulation, and coping.

To gather patient personality information, the paper initially indicates that using self-report personality inventories would be the best suited method. In the future, this job could be passed over to a software for determining (using a machine learning model) a person's personality based on their digitally admitted information. The design of the tool RGP's will use to access patient personality information, should be perceived as clear, concise, and relevant, and should not negatively interfere with the doctor-patient communication. Integrating both the tool for information gathering, and the tool for giving

RGPs access to the information, into already existing systems, could be a good guide for overcoming challenges with doctor and patient system adaptation.

All these parameters are promising if one is looking at the possibility of developing a successful system that utilizes patient personality information to improve RGP practice. At the same time, they are not success factors in themselves, but is highly dependent on how one chooses to implement this knowledge into the different parts of the system one is creating. Making holistic decisions will be crucial, and therefore having a Service Design approach to the project can be a good idea. Service Design can help the team get an understanding of how their solution best can fit into the bigger picture of the RGP service, to have the greatest influence.

This understanding is often gotten through firsthand research involving different users of the service. Patients and RGPs would be the most important users to involve in such a research, as they are main users of the system. At the same time a patient's "circle of care includes not only immediate family and increasingly responsive providers but also extended family and friends as direct caregivers" (Jones, 2013), so having both them and people involved in the everyday life at RGP offices included in the research, could help the team see other influential perspectives. All these stakeholders could be involved in co-creation sessions during development of the solution as well, utilizing creative processes to detect and intercept conflicting needs, and potentially even turn them into advantages.

As the first ideas one comes up with rarely are the best, having an iterative process where one develops, tests, and refines prototypes through several iteration will improve the influence of the final service (Schneider et al., 2010). A good way of doing this is to develop a minimum viable service as the first prototype, where one can test the entire experience and outcomes of it, at lowest possible effort and cost (Bank et al.,

2014). This way one makes sure that further iterations focuses on development of only necessary system parts and that there are logic links between them.

Ways of evaluating the success of the iterations can be to verify if patient privacy and service transparency is thoughtfully ensured, and that the service overall actually provides better health care and health outcomes for the patient. One should always be on the lookout for unexpected outcomes of the system, as "we are responsible for outcomes, whether or not we accounted for them in our local projects" (Jones, 2013).

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