
The Social-Psychological Context of Human Values: The Reciprocal Relationship between Personality Traits and Value Orientations*

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Abstract: This article investigates and tests the relationship between values (PVQ scale) and personality traits (NEO-FFI) using non-recursive structural modelling while controlling for other potentially significant variables (e.g. age, gender, attractiveness, cognitive skills), an approach that is proposed as an alternative to correlation and regression analyses, which are more common in this type of psychological research. Structural modelling, based on representative data from the Czech follow-up to the PIAAC international research project (2015), reveals the validity of the links between values and personality traits, which is still sometimes overlooked in psychology. The relationship between values and personality traits is more complex than most psychological studies assume, as some personality traits that might be expected to have a strong cognitive component are influenced more by values, while others, vice versa, are weakly associated with values. A new hypothesis then is that the influence of values on traits largely occurs on a conscious level, has a decidedly cognitive basis, and may vary in the long term and change its polarity in response to strong confrontations with the social environment, while the strength and polarity of the influence of personality traits on values remains stable over time.

Keywords: human values, personality traits, cognitive ability, PVQ scale, NEO-Five Factor Inventory, non-recursive structural modelling

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Introduction

Research on personality and the influence of personality on an individual's success in life and preferences is currently gaining in importance. In such research, current psychology and sociology increasingly propose understanding an individual's personality traits and values as an integral part of a single model of individual characteristics [McAdams 1996; Shoda and Mischel 2006; Roccas et al. 2002; Parks and Guay 2012]. Although in theory these concepts are defined differently, Schwarz [2011] points out that it is primarily a matter of empirical research to prove that these are fundamentally different concepts, which can, however, be joined together in a unified personality model. Accordingly, the first step is to determine the relationship between personality traits and values.

Significant attention has already been paid to this issue, particularly from an empirical perspective [e.g. Simmons 1976; Furnham 1984; Rim 1984; Luk and Bond 1993; Bilsky and Schwartz 1994; Dollinger, Leong and Ulicni 1996; Roccas et al. 2002; Aluja and García 2004]. There are currently two meta-analyses that summarise the many scholarly contributions in this field [see Fischer and Boer 2014; Parks-Leduc, Feldman and Bardi 2014]. Most psychological studies have found that these two concepts correlate to a certain extent, depending on the method chosen to measure them, and also that these correlations may differ, depending on the social groups researched. More cognitively based traits (Openness to Experience, Agreeableness) as a rule have a stronger tie to values, while affective traits (Neuroticism) exhibit a weaker link to the values of an individual. These findings have their roots in neuropsychological research [see De Fruyt et al. 2000; Parks-Leduc, Feldman and Bardi 2014]. These links are moreover even stronger if a personality trait and a specific value match in terms of their content and motivational goal. Nevertheless, although the results of such research indicate that there is a mutual relationship between personality traits and values, they are still sufficiently distinct from each other to warrant being spoken about as two concepts. This is also proven by the fact that many studies show a demonstrably different impact of personality traits and values on an individual's other social characteristics, such as religiousness, life satisfaction, and political choice [see Roccas et al. 2002; Caprara et al. 2006]. As Roccas et al. [2002] have shown, values probably have a greater impact on attitudes and behaviour, which can be cognitively controlled to a considerable extent, and, in turn, personality traits have a greater influence on more emotional, intuitive, spontaneous attitudes and behaviour, which are under less cognitive control.

Analyses to date also show that in only a limited number of psychological studies was the mutual relationship between these concepts controlled by other contextual variables, on either the individual or the macro level. In terms of individual-level contextual variables, these were most controlled for by respondent age and gender [see Aluja and García 2004]. The authors of the above-mentioned meta-analyses attempted to control contextual variables on a macro level, specifically the variables of country studied, along with economic, environmental,

and social macro indices. The authors conclude that the relationships between personality traits and values do not differ significantly among countries [Parks-Leduc, Feldman and Bardi 2014] and that a setting with greater economic, environmental, and social risks leads to a reduction in the links between personality traits and values and in general to a weakening of personality structure consistency [Fischer and Boer 2014].

We should also note that these psychological research projects are not usually representative and work rather with a specifically limited and small group of the population (65 to 500 respondents)—in most cases university students. From the summary tables of Parks-Leduc, Feldman and Bardi [2014: 10–11] it is possible to conclude that only 14 of the 88 studies selected for meta-analysis included a sample of various social groups comprised of the general population in their investigation. Of these, in only six instances was the size of the group indicative of a presumably representative selection.

The goal of this article is to verify the mutual relationships between personality traits and values using structural (non-recursive) modelling. In the psychological studies mentioned, where it is possible to test the strength of either a mutual or unilateral relationship, as a rule correlation or regression analysis is used to test the relationship between these concepts. Non-recursive structural modelling, however, makes it possible to simultaneously test the strength of the relationship from personality traits to values and from values to personality traits, and moreover to mutually isolate and control the influences of these variables. The ability to remove from these relationships measurement errors and the influence of additional contextual variables included in the models is another clear advantage of this method.

Since structural modelling is used to estimate partial regression coefficients in causal chains, it is appropriate to note the fact that the focus of this study is not to determine the causal relationship between personality traits and values, not only because the nature of the reciprocal relationship between personality traits and values is still a subject of heated psychological discussion [see Caprara et al. 2006; Roccas et al. 2002], but primarily because the anticipated causes and results cannot be clearly placed on a timeline without longitudinal data. Structural modelling is thus used here as an improved instrument for the regression equation set, whose primary goal is to isolate the influences of the variables studied and to identify direct effects freed of measurement errors. The interpretation of results is also adapted to this goal, with the relationships being indicated without reference to their causal character.

I consider the main contribution of this article to be not just its application of structural modelling, which can also further explain the mutual relationships between personality traits and values, but also the inclusion of several unique, robust measured control variables, or contextual variables, on the individual level (i.e. age, gender, attractiveness, cognitive skills), which are completely absent from psychological analyses of the mutual influence of these concepts. Moreover,

this relationship is tested on an up-to-date representative national questionnaire-based investigation. Although the summary meta-analyses concur that the strength and form of mutual relationships between traits and values does not differ significantly by country, so it is not likely that Czech society will greatly differ from others, an analysis of this type has not yet been carried out on Czech data. For this purpose the Schwartz PVQ scale (Portrait Values Questionnaire), made up of 21 items measuring 10 value types and 4 higher-order value dimensions, was used, along with the NEO five-factor personality inventory designed by P. Costa and R. McCrae [1989], which comprises 60 items (the Czech version was created by Hřebíčková and Urbánek [2001]) and was created to measure five general personality traits (also known as the 'Big Five').

The structure of this article reflects its aim. The first part introduces values and personality traits and the various methods used to measure them from a theoretical perspective. The relationship between values and personality traits is also discussed. The analytical part then presents the source of the data used in the analysis, a description of variables, an evaluation of the degree of influence of selected contextual variables on values and traits, and an analysis of the nature of their reciprocal relationship. The final part is dedicated to a summary of results and a discussion.

Values and personality traits

For a long time, values received almost no (empirical) attention in personality psychology and differential psychology [Bilsky and Schwartz 1994: 164]. They were, however, the subject of great interest in social psychology and sociology [e.g. Kluckhohn 1951; Rokeach 1973; Inglehart 1977; Hofstede 2001; Schwartz 1992]. According to Ciecuch, Schwartz and Davidov [2015], of the many theories of values that have appeared in these fields of study, only three had a significant impact on empirical research in values. These were: (1) Gordon Allport's theory of values in the field of personality psychology [Allport and Vernon 1931]; (2) the approach of the American social psychologist Milton Rokeach, for whom values are a key element in determining how people act and are stronger than any norms or attitudes [1973: 25]; and (3) the Schwartz theory of basic values, which is currently the most promising theory, and which approaches values as structurally organised, universal motivators of human attitudes and behaviour.

Certain differences in how human values are perceived and understood still exist among psychologists, social psychologists and sociologists. One perspective is comprised mainly of psychologists, who put values on the second level of the personality system as purely individual characteristics, usually in the category of coping strategies and skills [McAdams 1996]. In their opinion, values can thus be conceived of as a dynamic, motivational aspect of personality. Another perspective on values, one that is now more widely cited, takes a different

view and argues that values are cognitively or emotionally transformed human needs, that they are linked to desirable (preferred) goals, and that they motivate an individual to reach these goals [Rokeach 1973; Schwartz 1992]. Schwartz [1994] speaks of the fact that values can be identified in the universal requirements of human existence, which come from (1) the individual's biological existence; (2) coordination and balanced social interaction needs; and (3) the survival and welfare needs of the group. Each value thus represents a desirable goal derived from one of these universal human requirements and is a motivator of a specific behaviour. The subjective weight that each individual attributes to a value and that thus creates an individual's value scale is grounded, according to Schwartz [1994], in a unique combination of the biological basis of the human personality, the individual's social experience, and the cultural context. Seen through this prism, values lie conceptually on the very edge of the field of psychology and become usable and empirically measureable for other social sciences, either as the general social and cultural values of individuals, which vary by social group or country [Inglehart and Baker 2000; Hofstede 2001], or as phenomena that influence human attitudes, opinions, and behaviours and serve as the standards or criteria that individuals apply when evaluating other people, politics, events etc. [Schwartz 2012].

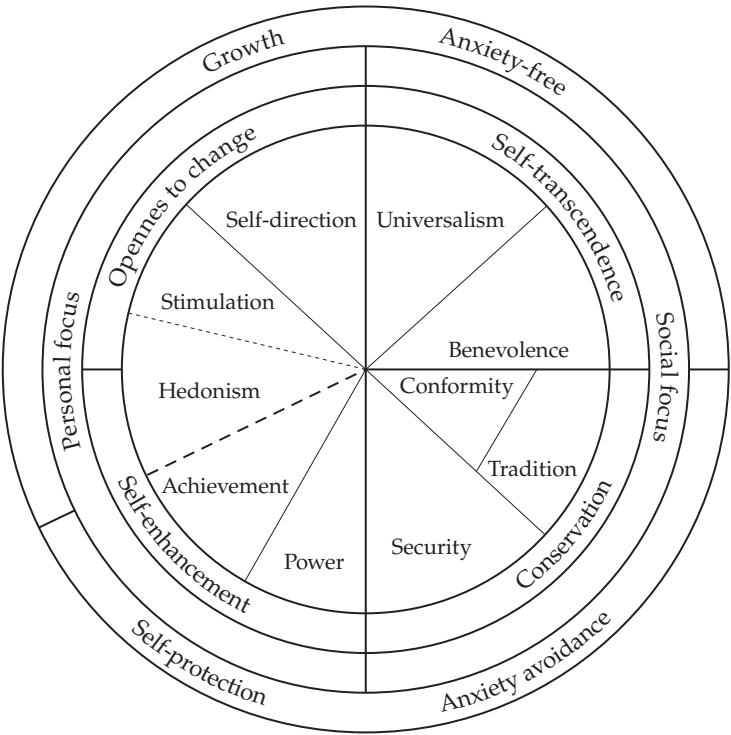
Schwartz [1992] also introduced a highly sophisticated procedure for measuring these value orientations on an international scale. A simple circular diagram typically shows Schwartz's view of the interconnection between values. The diagram shows that Schwartz's conception of these relationships is structural and universal and is a definite motivational continuum (see Figure 1). Schwartz [1992] defined the basic types of values based on the results of empirical study. The types are described along with their central motivational goal (see Table 1), and specifically include: self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism.

The values adjacent to each other in the circular diagram are complementary to each other and are deemed so because they have similar motivational goals (e.g. tradition and conformity, two values that emphasise self-control and submission, are considered complementary). Other value types are usually located opposite each other in the circular diagram because their basic motivational goals are, according to Schwartz, potentially conflicting (e.g. universalism, oriented towards the good of others, should be in direct conflict with the values of power and achievement, geared towards individual prestige and personal achievement). In addition, the theoretical model defines four higher-order value dimensions that sum up the basic motivational goal of the value types—for example, stimulation and self-direction signify an *openness to change*; an orientation towards tradition, conformity, and security indicate *conservatism*. Moreover, research has confirmed the hypothesis that there exist two other higher-order value dimensions: an orientation towards individual interests (power, achievement, hedonism, stimulation, and self-direction) and an orientation towards collective interests (benevolence,

tradition, conformity, universalism, and benevolence). Cieciuch, Schwartz and Davidov [2015] note that every researcher can divide or combine the continuum differently for the purpose of analysis depending on his or her research goals and requirements.

On the other hand, personality traits are commonly defined in psychology either as enduring, innate, and individually differentiated dispositions to various patterns of behaviour, or, conversely, as an individual's qualities, which can be used to describe that individual's personality and behaviour. According to Hřebíčková and Urbánek [2001: 8], these traits appear as 'ways of thinking, experiencing and activities by which people differ from each other' (for more on this question, see Balcar [1991] and Osecká [2000]). It is not yet clear from psychological discussions whether these are merely observable external characteristics, which can be used to describe various ways of behaving and acting, or whether they are also internal, emotional, and cognitive traits, which can explain the reasons for this behaviour [Hřebíčková and Urbánek 2001: 8]. The founder of

Figure 1. Conceptual circular model of relations among ten human values



Source: Cieciuch, Schwartz and Davidov [2015].

Table 1. Ten basic human values defined in terms of their motivational goals

Basic value	Motivational goal
Universalism	Understanding, appreciation, tolerance, protection for the welfare of all people and for nature
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact
Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms
Tradition	Respect, commitment, and acceptance of the customs and ideas that one's culture or religion imposes on the individual
Security	Safety, harmony, and stability of society, of relationships, and of the self
Power	Social status and prestige, control or dominance over people and resources
Achievement	Personal success by demonstrating competence according to social standards
Hedonism	Pleasure and sensuous gratification for oneself
Stimulation	Excitement, novelty, and challenge in life
Self-direction	Independent thought and action choosing, creating, exploring

Source: Schwartz [1992].

the personality trait theory is G. W. Allport, who identified traits as the building blocks of personality.

Although it may seem that values and personality traits are conceptually similar, it is still possible to find several fundamental differences between them [Bilsky and Schwartz 1994]. In particular, personality traits are defined as biologically determined formal characteristics of behaviour, whereas values are seen as biologically determined motivational tendencies [McCrae 2009; Cieciuch 2012]. Personality traits express the temperament of the individual, which means how an individual feels, thinks, and, most importantly, behaves. Values motivate individuals to the achievement of desirable goals, but these motivations can or do not have to be reflected in their behaviour [Roccas et al. 2002]. A person who is ambitious (a personality trait) tends to think ambitiously and to behave ambitiously. However, a person who appreciates ambition, recognises it, and ascribes a certain value to it, need not necessarily behave ambitiously. Ambition as a value and ambition as a personality trait are not identical, though they are similar in nature.

Other differences can be found in the very basis of values and personality traits. Most psychologists think that personality traits have a biological basis and are independent of culture and environment [McCrae and Costa 2008], while the Rokeach definition of values [1973: 25] implies that values are more a product of

Table 2. Description of the five personal traits from the NEO Five-Factor Inventory

Personal traits	Description of individuals who score high on
Neuroticism	Tend to be anxious, emotionally unstable, stressed, ashamed, depressed, angry, and insecure
Extraversion	Tend to be sociable, talkative, assertive, optimistic, confident, novel, excited, and active
Openness to Experience	Tend to be intellectual, imaginative, broadminded, independent, unconventional, sensitive, and open-minded. It can be measured in such diverse areas as a leaning towards fantasy, aesthetic sensitivity, empathy, psychological mindedness, willingness to try new things
Agreeableness	Tend to be good-natured, compliant, understanding, forgiving, helpful, honest, modest, gentle, and cooperative
Conscientiousness	Tend to be careful, thorough, responsible, reliable, organised, scrupulous, focused, ambitious, clean, hardworking, systematic, and disciplined

Source: Hřebíčková and Urbánek [2001].

the social environment, such as culture, family, and life experience. There are currently several studies around that undermine this basic prism. It has already been determined that, in spite of their biological basis, personality traits vary to some extent depending on the given culture and social environment and that they even significantly change over a lifetime [Bergeman et al. 1993; Soldz and Vailant 1999; Kandler 2012]. Similarly, research shows that values also have a genetic foundation as well as a socio-cultural basis [Schermer et al. 2011].

The most common personality questionnaires measure five general personality traits. These hypothetical constructs cannot be directly measured, but they can be recorded on the basis of attitudes, habits, skills, or pastimes [Hřebíčková 2004]. The five-factor model was extensively researched and developed from a combination of lexical studies and factor analysis [Goldberg 1993; in more detail Hřebíčková 2011].

The five dimensions mentioned describe personality on the highest level of abstraction, and each dimension contains a number of other characteristics [Hřebíčková and Urbánek 2001: 9]. These dimensions are: (1) Extraversion, (2) Agreeableness, (3) Conscientiousness, (4) Emotional Stability/Neuroticism, and (5) Openness to Experience (sometimes also called Intellect or Imagination); for more detailed characteristics, see Table 2. Costa and McCrae [1989] introduced another approach to personality structure research, according to which traits not only describe personality but also explain its dynamics and motives. They called this approach the NEO model and it uses a dispositional approach (questionnaire item analysis) instead of a lexical approach (a list of adjectives for a specific per-

sonality dimension). In the psychological literature there are a number of criticisms that take issue with this personality measurement approach, the structure of five personality dimensions, and their mutual relationships [Costa and McCrae 1989; Goldberg 1993], as well as with the number of factors, as some psychologists argue for a larger number of factors and others, in contrast, for a smaller number (for more on the criticism of the five-factor model, see Hřebíčková [2011]).

The relationship between personality traits and values

When reviewing the nature of the relationships between personality traits and values we can find many different perspectives. First of all, they can be understood as parallel concepts. Values and personality traits predict (to a certain level, in the same manner) individuals' attitudes and habits and their behaviour; both concepts thus function as motivational factors [Campbell 1963]. According to Gorsuch and Cattell [1977], as personality dispositions values are also indisputably connected with an individual's temperament, and therefore, from a certain perspective, we can view these two phenomena as largely identical concepts. Psychologists who believe personality traits and values to be a single theoretical concept, differing only in empirical measurement, have already been presented with sufficient proof that this assumption is not completely correct [see Roccas et al. 2002; Parks-Leduc, Feldman and Bardi 2014]. Analyses of the mutual relationship between values and personality traits show that this relationship is significant, but also that these concepts are not identical.

A second group of psychologists, and currently the more numerous group, is of the opinion that personality traits and values are different components of personality. As noted above, McAdams [1996] distinguishes between personality traits, which he understands as part of the first (more biological) level of the personality system not affected by any kind of social context, and values, which he places on the second level of the personality system, being in his opinion considerably affected by the social contexts of an individual's life. This logic can also be observed among other psychologists, who assert that personality traits, which have a biological basis, further influence values, which are part of the character of the individual [McCrea and Costa 2008]. By nature, the dimensions of personality are already something that is more stable than values in the long term, because values may change in response to substantial exposure to one's social environment [Rokeach 1973]. Moreover, according to McClelland, Koestner and Weinberger [1989], individuals also consciously adapt their values to their own self-concept. Because they are part of a person's actual identity, as the directing principles of their life, values may be organised according to how important and up to date they are. This does not happen with other personality dispositions, which more often function on a subconscious level. In this way, values are influenced both by personality traits (personality traits → values) and by the external socio-cultural environment.

The discussion about the causal relationships between these concepts is still open. Research does not yet indicate whether personality traits are superior to values or vice versa. Social psychologists began to advance the idea that these concepts should be regarded as reciprocally connected and researched as equal phenomena [Bilsky and Schwartz 1994: 178; Roccas et al. 2002: 792]. They speak about the probability of values also being able to influence personality traits (values → personality traits). They explain this using the example that values as motivational factors can lead to a certain type of behaviour, and that over the long term this leads to strengthening the relevant personality trait. For instance, value orientation to success supports the extravert model of an individual's behaviour, later leading to a strengthening of the Extraversion personality trait. Other psychologists note that personality traits and values must coexist in a certain accord, so that people have a tendency to reduce any discrepancies between them to a minimum. Either they modify their values to match their consistent behaviour manifestation,¹ or they regulate their behaviour according to their values [Kluger and DeNisi 1996]. In other words, a person who values conformity will probably not behave unconventionally and vice versa.

Psychobiological research indicates that both values and personality traits reflect an individual's basic biological predispositions. Both these personality dispositions are thus partially innate [Schermer et al. 2011]: from this perspective, it is therefore not possible to speak unequivocally about their causal relationship. Even if most psychologists agree that personality traits preferentially influence an individual's values along with the external environment, other studies clearly show that one must also take into account the situation where people modify their behaviour according to the priority values they hold. If one considers the strength of the mutual relationship between these concepts, however, personality traits will probably have a consistently stronger influence on values than the other way around.

Empirical studies focusing on the mutual relationship between values and personality traits already have a relatively long history. In the 1970s and 1980s, psychologists mostly researched the relationship between the value scale from the Rokeach Value Study and Eysenck personality temperament typology, with an emphasis on the extraversion and instability dimensions [Simmons 1976; Furnham 1984; Rim 1984]. In the 1990s, psychologists continued the tradition of measuring values with RVS, but with a greater emphasis on the structural approach [Bilsky and Schwarz 1994]. For instance, Dollinger, Leong and Ulicni [1996] merged 36 values from the RVS into seven factors and in the five-factor personality model, they focused on Openness to Experience, which has the strongest link to an individual's cognitive skills and intelligence [see McCrae and John 1992;

¹ Schwartz and Bardi [1997] explain this phenomenon using the example of how people adapted their values under the communist regime as a way of justifying or rationalising their behaviour (a phenomenon known as 'value justification').

Goldberg 1993]. Two of the meta-analyses of published studies mentioned in the introduction above [Fischer and Boer 2014; Parks-Leduc, Feldman and Bardi 2014] present the latest results of analyses of the mutual correlation between values measured using the Portrait Values Questionnaire (PVQ) [Schwartz 1994] or the Schwartz Value Survey (SVS) [Schwartz 1992], and personality traits measured using the NEO questionnaire [Costa and McCrae 1989] or the Big Five Inventory (BFI) [John et al. 1991].

As has also been already noted, most of the studies mentioned test these relationships using correlation or regression analysis, and they have reached the following conclusions. The strength of the relationship between personality traits and values is firstly based on similarities in the content of traits and values and secondly on similarities in the cognitive nature of traits and values [see Parks-Leduc, Feldman and Bardi 2014]. In general terms, those personality traits that have more of a cognitive component (i.e. Openness to Experience, Agreeableness) [see De Fruyt et al. 2000; Pytlik Zillig et al. 2002; McCrae and Costa 2003], also have a stronger relationship to values, because values are inherently cognitive [Schwartz and Bilsky 1987; Roccas et al. 2002]. On the other hand, those personality traits that have a large emotional component (i.e. Neuroticism) also have a weaker link to values.

- 1) *Agreeableness*: A personality trait that should have a relatively strong relationship to values since it is cognitive in nature. Agreeableness correlates most strongly with the Benevolence, Universalism, and Tradition value types (the higher value dimension of Conservatism and Orientation towards Others). In contrast, it is contrary to the value types Success and Power value types.
- 2) *Openness to Experience*: This personality trait has the largest cognitive component and therefore should in general have the strongest correlation with values. It correlates most with the Universalism, Self-direction, and Stimulation value types (the higher value dimension Openness to Change and Orientation towards Others). In contrast, it has little connection with Security, Conformity, and Tradition.
- 3) *Extraversion*: Extraversion correlates most strongly with the Success, Stimulation, and Hedonism value types (the higher value dimension Openness to Change). In contrast, it is contrary to Security, Conformity, Tradition, and Universalism.
- 4) *Conscientiousness*: Conscientiousness correlates most strongly with the Conformism and Achievement value dimensions (the higher value dimension Conservatism and Orientation towards Success). In contrast, it is contrary to Hedonism.
- 5) *Neuroticism*: This trait is primarily affective, and therefore should not have a very strong relationship to values [see Bilsky and Schwartz 1994]. Nevertheless, some psychologists claim that even Neuroticism can have a strong consistent relationship to stable values [Jang et al. 2006], such as Conservatism, and particularly the value types Security and Conformity [Fischer, Boer 2014].

Both the theories and the empirical results of much psychological research into the relationship between values and personality traits lead to the verification of the following research hypotheses:

- (H1): We expect that those personality traits that have a larger cognitive component (i.e. Openness to Experience, Agreeableness) will more strongly influence values with similar content (personality trait → value) in the structural model while controlling for feedback, measurement error, and intervening variables. In contrast, those personality traits that have a large emotional component (i.e. Neuroticism) will have less of an influence on researched values.
- (H2): In the opposite relationship link (values → personality traits) we expect that values with similar content will more strongly influence those personality traits that are more cognitive in nature (i.e. Openness to Experience, Agreeableness).
- (H3): Finally, we expect that the reciprocal relationship between values and personality traits is not equal and that these characteristics influence each other to differing degrees. We think that we will find more instances where personality traits have a stronger influence on the values of the individual than the opposite paradigm.

Data and variables

The data that we used for this article come from a research project entitled 'Conditions for Success in Work and in Life', which built on an extensive investigation of adults' competencies. The research was carried out as part of the OECD-PIAAC project.² Data for 6081 respondents ranging in age from 16 to 66 years were available from the initial investigation carried out from 2012 to 2013. For the follow-up research project, 'Conditions for Success in Work and Life' (2015), 2200 respondents were randomly selected from this basic group. Additional research was conducted on them, focusing in particular on physical attractiveness, personal characteristics, values, social capital, and certain lifestyle dimensions.

In this analysis, the key variables are value types measured on the PVQ scale [Schwartz 1994]. Respondents were given a list of 21 indirect statements (with language modified by gender) comprising verbal portraits of different people. On a six-point verbal scale, the respondent had to rate how similar he or she was to the person described. Persons were depicted through their life goals and aspirations. The assumption is that self-comparison to a person described can say a great deal about the respondent's relevant values, although some distortion of the interpretation of the items or the perception of themselves/self-comparison

² Basic information about the PIAAC investigation carried out in the Czech Republic can be found in the summary report on the research [Straková and Veselý 2013].

can be expected [Schwartz 1994]. An algorithm for centred value scores designed by Schwartz and recommended by the ESS consortium was used to calculate scores corresponding to ten central value types.³

The five personality traits were also measured using the NEO-FFI inventory [Costa and McCrae 1989].⁴ The NEO-FFI is comprised of 60 items that best characterise specific personality traits, and these items are then further differentiated on subscales. These inventories have to date been translated into and used in more than 30 languages and factor analysis has confirmed the five-factor solution in the majority of them [McCrae et al. 2000]. As for the reliability of the scale, the Cronbach alpha coefficient values in our research on individual personality traits are as follows: 0.78 (N), 0.81 (E), 0.62 (O), 0.66 (A) to 0.81 (C).⁵ Factor analysis of the NEO five-factor personality inventory items confirmed the existence of the presumed five-factor structure. Exploratory factor analysis using the main component method was carried out. Five components were extracted that explain 33.9% of the dispersion. Out of the total number of 60 items, 51 have a factor score that is greater than or equal to 0.3 in the corresponding factor. Individual scores were then calculated as a summation index from individual items that measure a given personality trait.⁶

An individual's age and gender are important control contextual variables used on an individual level in the structural model (1 = male, 2 = female). Also important is the attractiveness of the individual, which is connected with a number of other social (education, income, position at work) and psychological (competence, self-confidence) characteristics of the individual. The basic attractiveness scale was composed using the main component method from the respondent's self-evaluation on a ten-point scale (0–10) of attractiveness, the evaluation of the interviewee, and BMI index (body mass index)⁷ [for more see Matějů and Anýžová 2017]. The competencies of the individual comprise the final control variable. The PIAAC project focused on the following three competency

³ The computational algorithm is available on the ESS website: http://www.europeansocialsurvey.org/docs/methodology/ESS1_human_values_scale.pdf.

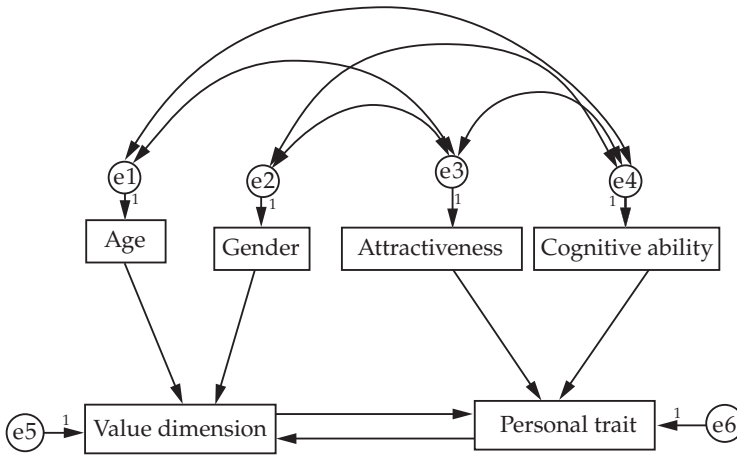
⁴ To date, three versions of NEO inventories have been created: the NEO Personality Inventory (NEO-PI), the revised version NEO-PI-R, and the abbreviated version NEO Five-Factor Inventory (NEO-FFI); in Czech the NEO five-factor personality inventory (*NEO pěti-faktorový osobnostní inventar*) (for more information on its creation, see Hřebíčková and Urbánek [2001]). They differ primarily by the number of items for measuring individual factors.

⁵ The letters stand for the following: N (Neuroticism), E (Extraversion), O (Openness to Experience), A (Agreeableness), C (Conscientiousness).

⁶ The exact procedure for score calculation, which also included a reversion of certain answer scales, can be found in the NEO inventory manual and its scoring template; see Hřebíčková and Urbánek [2001].

⁷ The main component method loadings: self-evaluation (0.690), evaluation by the interviewee (0.778), and BMI index (-0.722).

Figure 2. Diagram of reciprocal relations between personal values and personal traits (non-recursive structural model)



domains: (a) numeracy skills (NUM), (b) literacy skills (LIT), and (c) information technology problem-solving skills (PSL). In the following analysis an index of cognitive abilities is used. It was created by averaging the values of the NUM and LIT variables $[(NUM + LIT)/2]$. Standardised variables of numeracy and literacy skills corresponding to the first plausible values were used to calculate it.⁸ Information technology problem-solving skills are not included in the index, since their values are only for economically active persons and for respondents who demonstrated at least an elementary ability to use the computer.⁹

The tested structural model is set forth in Figure 2. Its basic theoretical presumptions can be summarised as follows:

- A simultaneous (reciprocal) mutual relationship exists between the higher-order value type and personality trait.
- Value orientations are strongly influenced by age and gender as typical socio-demographic variables (i.e. an older age reduces openness to change and orientation towards success and strengthens conservatism and transcendence; women are less oriented towards success and less open to change than men).
- Personality traits in individuals are strongly influenced by attractiveness and cognitive skills (as these also have a biological basis to a certain extent); here it is possible to expect that cognitive skills will have a greater influence on those

⁸ For more on measuring the cognitive competencies of respondents from the PIAAC research carried out in the Czech Republic, see the summary research report by Straková and Veselý [2013].

⁹ On the distributions of the variables, see Table 1 in the Appendix.

personality traits that were defined in the theory as traits with a larger share of cognitive components.

- There also exist mutual links between the control variables, besides gender and age, which are depicted in the model as correlations of their measurement errors.¹⁰

As Matějů [1989: 410–411] notes, the advantages of structural modelling also include the ability to create models with reciprocal causal links, which is beyond the capabilities of traditional multiple regression or path analysis. In this model, the direct influence of the value dimension on the personality trait is revealed at the same time as the direct impact of the personality trait on the value dimension, which typical regression analysis does not allow for. At the same time, it is also true that the model's specification for this must have a good theoretical justification. Even in this case it is possible to interpret structural coefficients in a manner similar to path regression coefficients. Additional socio-economic variables were also included in the model; in this case they serve primarily as an instrumental exogenous variable (for more on the technical specification of the model, see Jöreskog and Sörbom [1988: 108]). This involves a limited number of control variables, which provide only a limited picture of how socio-cultural variables influence values and personality traits as a whole (which, however, is not the goal of this article). Despite this limitation, the number of control variables used substantially exceeds common standards of psychological studies, where it is rare for even two control variables to be used, and gives the study a unique character.

For reasons of stability, it was impossible to include more than one value dimension and one personality trait in the model at once, which means that their direct influences are not 'purified' of residual value orientations and personality traits. However, I think that it can paradoxically reflect the mutual relationships between these concepts more realistically, since neither values nor personality traits influence each other ('purely') without reflecting the influence of other value orientations and personality characteristics; moreover, testing the more complex model is beyond the scope of a single article. For that reason I consider the following type of analysis to be rather an attempt at examining this matter from a different perspective than has been done to date.

In the case of structural modelling, missing values in the data set were handled using the 'listwise deletion' method, and a total of 1994 respondents were included in the analysis. The maximum likelihood method (ML) was used to estimate model parameters. This method is recommended if there is a consistently large quantity of missing values in a data set [Byrne 2010]. The calculation is derived from the original data matrix—in other words, from co-variant matrices of the respective number of groups in the analysis. All model analyses were carried out in AMOS (version 21.0).

¹⁰ The mutual relationship between control values is theoretically justified and was tested in Matějů and Anýžová [2017].

Data analysis

A more detailed description of the results is presented in Table 3, where standardised partial regression coefficients are given, which indicate by how many standard deviations the value of the dependent variable changes if the value of the independent variable is changed by one standard deviation while controlling for all the other variables that directly or indirectly influence the dependent variable. Table 3 also shows the non-standardised partial regression coefficients, together with the standard error of non-standardised regression weight and the *p*-value indicating the statistical significance of a given result.¹¹

In all, 20 models were assessed independently for each value type and personality trait. The overall suitability of each model was judged using chi-squared tests and other (less strict) statistics of model suitability, which take into account first of all the (still) acceptable model parsimony, measurement errors, and also the extent to which the tested model reproduces the initial covariance matrix. In our study, we decided to assess model fit using a comparative fit index (CFI) and a goodness of fit index (GFI), where values greater than or equal to 0.95 mean that the model is considered to be sufficiently suitable, values between 0.92 and 0.94 indicate an averagely suitable model, and values around 0.9 mean a still acceptable model. We also assessed the RMSEA index. An index size of less than or equal to 0.05 indicates a very good model fit with the data, from 0.06 to 0.09 indicates medium acceptable results, and above 0.1 means unacceptable results [Byrne 2010: 80].

Results of the influence of selected socio-cultural contextual variables

First, the analysis presented in Table 3 yields several anticipated results. As people grow older, they become more conservative and oriented to others. In contrast, they also become less oriented towards success and less open to change. The same relationship formula applies to gender: women are more conservative and oriented towards others, while men are more oriented towards success and open to change.

The more attractive a person is, the more positive an impact this has, primarily on their conscientiousness and extraversion, and, to a lesser extent, on their openness to experience and agreeableness; it also significantly reduces the tendency towards neuroticism. The very cognitive skills that reflect an individual's literacy and numeracy skills then contribute mainly to higher Openness to Experience and Agreeableness. As already mentioned above, Openness to Experience and Agreeableness are considered the personality traits with the strongest cognitive component. A new finding can be added to that fact, which is that they

¹¹ For the basic correlation table of tested variables, see Table 2 in the Appendix.

are also significantly strengthened by higher cognitive skills. It is interesting that a higher level of cognitive skills significantly reduces the inclination to Neuroticism, despite Neuroticism's presumed affective character. An explanation for this phenomenon can be found in the connection between higher cognitive skills and the individual's success in life (higher salary, higher level of education, higher employment status, higher life satisfaction, etc.) [see Matějů and Anýžová 2015], which overall also reduces the level of Neuroticism. The influence of cognitive skills on the level of Extraversion does not appear to be significant, and in the case of Conscientiousness it is only very slight.

The reciprocal relationship between personality traits and values

The analysis indicates that the expectation of an interconnection between value dimensions and personality traits is well-founded. In only three cases out of twenty did feedback (most often in the direction personality trait → value type) turn out to be too weak and insignificant.

As for the basic general hypotheses, we came to the following conclusions: The first hypothesis (H1) has been supported. Those personality traits that, according to the above-cited neuropsychological research, have a stronger cognitive component (i.e. Openness to Experience, Agreeableness) will more strongly influence values with similar content (personality trait → value), even after controlling for feedback and the influence of intervening variables. For personality traits like Extraversion or Conscientiousness, no deviation in general is expected in any direction; even so, it turns out that the Conscientiousness personality trait influences corresponding values to a similar degree as Agreeableness. In contrast, Extraversion does not seem to be strongly linked to values. However, for personality traits that are more affective in character, such as Neuroticism, it was expected that the influence of the values studied would be weaker. Given the disputable suitability of the test model ($CFI < 0.9$, $RMSEA > 0.1$) in the case of Neuroticism this assumption will also probably be justified.

In the case of the second hypothesis (H2) in the opposite relationship link (value → personality trait) we expected a stronger influence of values with similar content on those personality traits with a stronger cognitive component (i.e. Openness to Experience, Agreeableness). According to regression coefficient size, values really do have a significant influence, primarily on the Agreeableness personality trait, as well as Conscientiousness. In the case of Extraversion and Openness to Experience, these links were not very strong.

Finally, we expected (H3) that the reciprocal relationship between values and personality traits would not be equal and that these characteristics would influence each other to various degrees. However, we did not find many cases where personality traits have a significant influence on the values of the individual. In many cases, the relationship seems to be almost equal in terms of strength. In this context, however, it is worth noting that we would need primarily longi-

tudinal data and deeper psychological research to verify this hypothesis. A clear judgement cannot be made about the actual strength or prevalence of their influence on the basis of these statistical data.

Neuroticism

According to the original theoretical assumption, Neuroticism, which is significantly affective in character, should not have a particularly strong relationship to values [see Bilsky and Schwartz 1994]. At first glance, the regression coefficients seem to be strong enough and statistically meaningful; however, the model fit statistics indicate that the model studied is not very suitable for testing the relationships and that the results are disputable at the very least. The model appears to be acceptable only for testing the mutual relationship between Neuroticism and conservative values. The results thus indicate the possible validity of the claim made by Fischer and Boer [2014] that neuroticism may have a strong, consistent relationship to stable values such as conservatism.

Extraversion

The Extraversion personality trait has the strongest mutual connection to Openness to Change. While Extraversion strengthens the Openness to Change (0.18) value, increasing Openness to Change then also strengthens Extraversion (0.18), which exactly matches the scenario of how their reciprocal interconnection works [see Bilsky and Schwartz 1994; Roccas et al. 2002]. More conservative individuals then have the tendency to be less extraverted, and in contrast the degree of extraversion is strengthened among individuals who are more oriented to success.

In certain cases, the polarities of the reciprocal relationships between personality traits and values are opposite. In my opinion there is a theoretical explanation for this. If personality traits have a biological basis to a considerable extent, and if values have both a biological and social basis, the personality trait → value direction of influence could largely work on a subconscious level. If we are born with a strongly developed Extraversion trait, then this personality trait will naturally (or automatically) reduce the orientation towards success value, but will increase openness to change, as extraverts, creativity, and the search for adventure may attract us more than personal success and dominance.

On the other hand, if it is true that values have a significant cognitive basis [see Schwartz and Bilsky 1987] the value → personality trait direction of influence will probably work more on a conscious level. If people appreciate and seek personal success, social prestige and dominance—orientation towards success has value for them—then it will also be to their advantage to strengthen the Extraversion personality trait. Social research has shown that most successful professions in which it is important to be in regular contact with clients require a sufficient

amount of extraverted behaviour. Because this value can be a strong motivator under certain conditions (particularly in today's success-oriented society) it can also be sufficiently strong to change behaviour and consequently on a wider scale to change the personality trait of a specific individual. This is an assumption that would require more sophisticated verification, but as such it provides a theoretical basis for an explanation of the various polarities of the mutual relationships between personality traits and values.

Openness to Experience

The Openness to Experience personality trait has (in accordance with the results of other empirical studies) a positive relationship with the Openness to Change value orientation and with Transcendence. In contrast, this trait reduces the tendency to have conservative values. Here again we find several contradictory tendencies in the relationships. It seems that a more developed Openness to Experience trait does not have a direct influence on whether we have transcendental values or not. However, a high value for tolerance and orientation to others strengthens our Openness to Experience personality trait. If the Openness to Experience personality trait defines us, then this slightly increases our tendency to hold success-oriented values. In contrast, if we highly value social prestige and dominance, this weakens our Openness to Experience personality trait.

Agreeableness

It has been confirmed that this personality trait has a relatively strong relationship to values since it is at least partially cognitive in nature. A highly developed Agreeableness personality trait supports the Openness to Change value and success-oriented values. In contrast, an appreciation for creativity and hedonism or life success markedly weakens a person's Agreeableness personality trait. On the other hand, this trait reduces the tendency to having conservative and transcendental values; however, people who appreciate (or start to appreciate) traditions and security or tolerance in their life and focus on others, strengthen their Agreeableness personality trait.

Conscientiousness

Conscientiousness also has a very strong mutual relationship to values. Like the Agreeableness personality trait, it has the strongest positive relationship with Openness to Change and with values oriented to success; in contrast, it weakens conservative and transcendental values. In keeping with earlier results, people who value tradition and security or tolerance in their life and focus on others strengthen their Conscientiousness personality trait as well.

Table 3. The regression coefficients of the reciprocal relations between personal values and personal traits—part one

	Regression coefficients			Sig
	Standard- ised	Non- standardised	S.E.	
NEUROTICISM				
Model 1: CMIN = 105.13; <i>p</i> value = 0.000; GFI = 0.986; CFI = 0.891; RMSEA = 0.113; BIC = 234.3				
Attractiveness → NEUROTICISM	-0.188	-1.351	0.200	0.001
Age → Openness to Change	-0.357	-0.013	0.001	0.001
Gender → Openness to Change	-0.036	-0.042	0.025	0.093
Cognitive Ability → NEUROTICISM	-0.166	-1.216	0.191	0.001
Openness to Change → NEUROTICISM	0.375	4.656	0.910	0.001
NEUROTICISM → Openness to Change	-0.483	-0.039	0.005	0.001
Model 2: CMIN = 97.86; <i>p</i> value = 0.000; GFI = 0.985; CFI = 0.881; RMSEA = 0.109; BIC = 227.03				
Attractiveness → NEUROTICISM	-0.091	-0.656	0.162	0.001
Age → Self-transcendence	0.168	0.005	0.001	0.001
Gender → Self-transcendence	0.289	0.277	0.021	0.001
Cognitive Ability → NEUROTICISM	-0.135	-0.988	0.165	0.001
Self-transcendence → NEUROTICISM	0.195	2.929	0.953	0.002
NEUROTICISM → Self-transcendence	-0.169	-0.011	0.004	0.006
Model 3: CMIN = 107.86; <i>p</i> value = 0.000; GFI = 0.983; CFI = 0.878; RMSEA = 0.114; BIC = 237.02				
Attractiveness → NEUROTICISM	-0.126	-0.910	0.169	0.001
Age → Self-enhancement	-0.317	-0.014	0.001	0.001
Gender → Self-enhancement	-0.145	-0.203	0.030	0.001
Cognitive Ability → NEUROTICISM	-0.168	-1.230	0.170	0.001
Self-enhancement → NEUROTICISM	0.195	2.013	0.625	0.001
NEUROTICISM → Self-enhancement	-0.198	-0.019	0.006	0.001
Model 4: CMIN = 86.29; <i>p</i> value = 0.000; GFI = 0.986; CFI = 0.922; RMSEA = 0.102; BIC = 215.4				
Attractiveness → NEUROTICISM	-0.218	-1.576	0.210	0.001
Age → Conservation	0.437	0.018	0.001	0.001
Gender → Conservation	-0.008	-0.010	0.027	0.713
Cognitive ability → NEUROTICISM	-0.211	-1.544	0.199	0.001
Conservation → NEUROTICISM	-0.473	-5.486	0.776	0.001
NEUROTICISM → Conservation	0.541	0.047	0.007	0.001

Table 3. The regression coefficients of the reciprocal relations between personal values and personal traits–part two

	Regression coefficients			Sig
	Standard- ised	Non- standardised	S.E.	
EXTRAVERSION				
Model 1: CMIN = 63.01; <i>p</i> value = 0.000; GFI = 0.990; CFI = 0.947; RMSEA = 0.086; BIC = 192.2				
Attractiveness → EXTRAVERSION	0.218	1.511	0.152	0.001
Age → Openness to Change	−0.291	−0.011	0.001	0.001
Gender → Openness to Change	−0.128	−0.147	0.023	0.001
Cognitive Ability → EXTRAVERSION	−0.012	−0.085	0.149	0.567
Openness to Change → EXTRAVERSION	0.180	2.163	0.678	0.001
EXTRAVERSION → Openness to Change	0.176	0.015	0.005	0.001
Model 2: CMIN = 52.57; <i>p</i> value = 0.000; GFI = 0.992; CFI = 0.940; RMSEA = 0.078; BIC = 181.7				
Attractiveness → EXTRAVERSION	0.250	1.742	0.151	0.001
Age → Self-transcendence	0.179	0.006	0.001	0.001
Gender → Self-transcendence	0.261	0.249	0.020	0.001
Cognitive Ability → EXTRAVERSION	−0.004	−0.026	0.155	0.868
Self-transcendence → EXTRAVERSION	−0.097	−1.407	0.825	0.088
EXTRAVERSION → Self-transcendence	0.005	0.000	0.004	0.928
Model 3: CMIN = 51.26; <i>p</i> value = 0.000; GFI = 0.992; CFI = 0.946; RMSEA = 0.077; BIC = 180.4				
Attractiveness → EXTRAVERSION	0.229	1.592	0.155	0.001
Age → Self-enhancement	−0.346	−0.016	0.001	0.001
Gender → Self-enhancement	−0.167	−0.235	0.030	0.001
Cognitive Ability → EXTRAVERSION	−0.035	−0.244	0.159	0.124
Self-enhancement → EXTRAVERSION	0.255	2.525	0.545	0.001
EXTRAVERSION → Self-enhancement	−0.185	−0.019	0.006	0.001
Model 4: CMIN = 77.82; <i>p</i> value = 0.000; GFI = 0.987; CFI = 0.938; RMSEA = 0.096; BIC = 206.9				
Attractiveness → EXTRAVERSION	0.196	1.356	0.152	0.001
Age → Conservation	0.392	0.016	0.001	0.001
Gender → Conservation	0.085	0.106	0.025	0.001
Cognitive Ability → EXTRAVERSION	−0.038	−0.269	0.148	0.070
Conservation → EXTRAVERSION	−0.260	−2.885	0.548	0.001
EXTRAVERSION → Conservation	−0.060	−0.005	0.004	0.222

Table 3. The regression coefficients of the reciprocal relations between personal values and personal traits—part three

	Regression coefficients			Sig
	Standard- ised	Non- standardised	S.E.	
OPENNESS				
Model 1: CMIN = 39.59; <i>p</i> value = 0.000; GFI = 0.993; CFI = 0.961; RMSEA = 0.067; BIC = 168.8				
Attractiveness → OPENNESS	0.159	0.953	0.142	0.001
Age → Openness to Change	−0.303	−0.011	0.001	0.001
Gender → Openness to Change	−0.132	−0.152	0.024	0.001
Cognitive Ability → OPENNESS	0.192	1.169	0.143	0.001
Openness to Change → OPENNESS	−0.122	1.265	0.625	0.043
OPENNESS → Openness to Change	0.294	0.028	0.005	0.001
Model 2: CMIN = 12.82; <i>p</i> value = 0.012; GFI = 0.998; CFI = 0.989; RMSEA = 0.033; BIC = 141.9				
Attractiveness → OPENNESS	0.141	0.845	0.131	0.001
Age → Self-transcendence	0.177	0.005	0.001	0.001
Gender → Self-transcendence	0.262	0.250	0.020	0.001
Cognitive Ability → OPENNESS	0.189	1.148	0.134	0.001
Self-transcendence → OPENNESS	0.130	1.636	0.708	0.021
OPENNESS → Self-transcendence	−0.009	−0.001	0.004	0.870
Model 3: CMIN = 20.38; <i>p</i> value = 0.000; GFI = 0.997; CFI = 0.980; RMSEA = 0.045; BIC = 149.5				
Attractiveness → OPENNESS	0.153	0.919	0.135	0.001
Age → Self-enhancement	−0.293	−0.013	0.001	0.001
Gender → Self-enhancement	−0.184	−0.258	0.030	0.001
Cognitive Ability → OPENNESS	0.210	1.278	0.137	0.001
Self-enhancement → OPENNESS	−0.191	−1.641	0.465	0.001
OPENNESS → Self-enhancement	0.126	0.015	0.006	0.017
Model 4: CMIN = 36.58; <i>p</i> value = 0.000; GFI = 0.994; CFI = 0.970; RMSEA = 0.064; BIC = 165.8				
Attractiveness → OPENNESS	0.172	1.033	0.148	0.001
Age → Conservation	0.375	0.015	0.001	0.001
Gender → Conservation	0.100	0.124	0.025	0.001
Cognitive Ability → OPENNESS	0.208	1.271	0.147	0.001
Conservation → OPENNESS	0.167	1.619	0.544	0.003
OPENNESS → Conservation	−0.367	−0.038	0.005	0.001

Table 3. The regression coefficients of the reciprocal relations between personal values and personal traits–part four

	Regression coefficients			Sig
	Standard- ised	Non- standardised	S.E.	
AGREEABLENESS				
Model 1: CMIN = 43.69; <i>p</i> value = 0.000; GFI = 0.993; CFI = 0.954; RMSEA = 0.071; BIC = 176.9				
Attractiveness → AGREEABLENESS	0.207	1.061	0.143	0.001
Age → Openness to Change	−0.389	−0.015	0.001	0.001
Gender → Openness to Change	−0.239	−0.276	0.035	0.001
Cognitive Ability → AGREEABLENESS	0.095	0.495	0.137	0.001
Openness to Change → AGREEABLENESS	−0.796	−7.068	0.690	0.001
AGREEABLENESS → Openness to Change	0.673	0.076	0.011	0.001
Model 2: CMIN = 10.43; <i>p</i> value = 0.034; GFI = 0.998; CFI = 0.993; RMSEA = 0.028; BIC = 139.6				
Attractiveness → AGREEABLENESS	0.076	0.390	0.117	0.001
Age → Self-transcendence	0.216	0.007	0.001	0.001
Gender → Self-transcendence	0.342	0.327	0.030	0.001
Cognitive Ability → AGREEABLENESS	0.067	0.344	0.121	0.004
Self-transcendence → AGREEABLENESS	0.674	7.181	0.757	0.001
AGREEABLENESS → Self-transcendence	−0.447	−0.042	0.009	0.001
Model 3: CMIN = 21.62; <i>p</i> value = 0.000; GFI = 0.997; CFI = 0.981; RMSEA = 0.047; BIC = 150.8				
Attractiveness → AGREEABLENESS	0.108	0.549	0.122	0.001
Age → Self-enhancement	−0.347	−0.016	0.001	0.001
Gender → Self-enhancement	−0.264	−0.369	0.040	0.001
Cognitive Ability → AGREEABLENESS	0.137	0.710	0.125	0.001
Self-enhancement → AGREEABLENESS	−0.696	−5.079	0.479	0.001
AGREEABLENESS → Self-enhancement	0.474	0.065	0.012	0.001
Model 4: CMIN = 71.14; <i>p</i> value = 0.000; GFI = 0.989; CFI = 0.934; RMSEA = 0.092; BIC = 200.3				
Attractiveness → AGREEABLENESS	0.203	1.042	0.135	0.001
Age → Conservation	0.456	0.018	0.001	0.001
Gender → Conservation	0.180	0.222	0.033	0.001
Cognitive Ability → AGREEABLENESS	0.148	0.772	0.132	0.001
Conservation → AGREEABLENESS	0.714	5.931	0.522	0.001
AGREEABLENESS → Conservation	−0.542	−0.065	0.009	0.001

Table 3. The regression coefficients of the reciprocal relations between personal values and personal traits—part five

	Regression coefficients			Sig
	Standard- ised	Non- standardised	S.E.	
CONSCIENTIOUSNESS				
Model 1: CMIN = 7.72; <i>p</i> value = 0.102; GFI = 0.999; CFI = 0.996; RMSEA = 0.022; BIC = 136.9				
Attractiveness → CONSCIENTIOUSNESS	0.317	2.032	0.196	0.001
Age → Openness to Change	−0.408	−0.015	0.001	0.001
Gender → Openness to Change	−0.231	−0.267	0.034	0.001
Cognitive Ability → CONSCIENTIOUSNESS	0.025	0.161	0.174	0.354
Openness to Change → CONSCIENTIOUSNESS	−0.784	−8.699	0.837	0.001
CONSCIENTIOUSNESS → Openness to Change	0.700	0.063	0.007	0.001
Model 2: CMIN = 19.19; <i>p</i> value = 0.001; GFI = 0.997 CFI = 0.980; RMSEA = 0.044; BIC = 148.4				
Attractiveness → CONSCIENTIOUSNESS	0.186	1.184	0.171	0.001
Age → Self-transcendence	0.241	0.007	0.001	0.001
Gender → Self-transcendence	0.355	0.339	0.027	0.001
Cognitive Ability → CONSCIENTIOUSNESS	−0.005	−0.035	0.168	0.834
Self-transcendence → CONSCIENTIOUSNESS	0.614	8.197	1.014	0.001
CONSCIENTIOUSNESS → Self-transcendence	−0.576	−0.043	0.006	0.001
Model 3: CMIN = 16.00; <i>p</i> value = 0.003; GFI = 0.997; CFI = 0.986; RMSEA = 0.039; BIC = 145.2				
Attractiveness → CONSCIENTIOUSNESS	0.215	1.375	0.178	0.001
Age → Self-enhancement	−0.369	−0.017	0.001	0.001
Gender → Self-enhancement	−0.273	−0.383	0.038	0.001
Cognitive Ability → CONSCIENTIOUSNESS	0.061	0.393	0.171	0.021
Self-enhancement → CONSCIENTIOUSNESS	−0.650	−5.912	0.657	0.001
CONSCIENTIOUSNESS → Self-enhancement	0.585	0.064	0.008	0.001
Model 4: CMIN = 28.34; <i>p</i> value = 0.000; GFI = 0.995; CFI = 0.979; RMSEA = 0.055; BIC = 157.5				
Attractiveness → CONSCIENTIOUSNESS	0.319	2.050	0.188	0.001
Age → Conservation	0.475	0.019	0.001	0.001
Gender → Conservation	0.182	0.226	0.033	0.001
Cognitive Ability → CONSCIENTIOUSNESS	0.081	0.529	0.170	0.002
Conservation → CONSCIENTIOUSNESS	0.731	7.580	0.666	0.001
CONSCIENTIOUSNESS → Conservation	−0.616	−0.059	0.007	0.001

Source: Conditions for Success in Work and Life 2015, a follow-up to the PIAAC project in the Czech Republic). Data are weighted by the design weight; author's calculations.

Note: In this table, Openness and Openness to experience are used as synonymous terms.

Summary

The goal of this article was to design a new method to test the mutual relationships between personality traits (NEO-FFI) and values (the PVQ scale), specifically a structural (non-recursive) model as an alternative to correlation and regression analyses. If these two differently defined psychological concepts are to be not only understood, but also empirically studied as an integral part of a single model of an individual's personal characteristics, then it is necessary to investigate them not separately but simultaneously. Furthermore, since current research on personality and its impact on an individual's success in life clearly show that the influences of both personality traits and value orientations are not insignificant [e.g. Jackson 2006], then our primary goal is to understand the nature of their reciprocal relationship.

It is clear that this article enters into a highly disputed area of research, namely the causality among investigated phenomena. As already mentioned, discussions about the causal relationships between these concepts are still ongoing. Due to the biological or partially innate basis of both these personality dimensions, the direction of influence has already been clearly justified theoretically in the direction of personality traits to values. Recently, however, social psychology has significantly promoted their reciprocity—in other words, that it is also possible to defend links from values to personality traits. Because correlation is not capable of determining the direction of the relationship and regression analysis is able to verify only a uni-directional relationship, structural modelling seems to be the best possible tool. In the case of determining causes and effects, the time perspective (what preceded what) is obviously also important, and it is not possible to determine this without longitudinal data, or as Parks-Leduc, Feldman and Bardi [2014] propose, without such things as adequate neuropsychological research.

The structural model used is thus still only a simplified tool, which makes it possible for us to form a more comprehensive view of the reciprocal relationships between traits and values using this type of data (representative, one-off national research); however, it is not sufficient to clarify the causality between them. More precisely, we are still only guessing how it works over time. Its main advantage, however, is the ability to simultaneously test the strength of the relationship from personality traits to values, and from values to personality traits, as well as to mutually isolate and control the influences of these variables. The ability to 'purify' these relationships of measurement errors and the influence of additional contextual variables included in models is another clear advantage.

The present study has helped us to clarify certain details about the nature of this mutual relationship and propose additional hypotheses for verification. First of all, we managed to find support for the justified assumption that the Openness to Experience and Agreeableness personality traits have a stronger cognitive component. This fact supports the new finding that the personality traits meas-

ured in the adult population in the PIAAC research were strengthened more by cognitive skills (i.e. literacy and numeracy skills) than other personality traits.

The proposed structural model also supports the plausibility of the hypothesis that value dimensions and personality traits are reciprocally linked, as Roccas et al. [2002] claim. In only three cases out of twenty did feedback (most often in the direction personality trait → value type) turn out to be too weak and insignificant. As for the basic general hypotheses, we came to the following conclusions. Those personality traits that have a stronger cognitive component (i.e. Openness to Experience, Agreeableness) will more strongly influence values with similar content (personality trait → value) even while controlling for feedback and the influence of intervening variables. The same trend, however, is also apparent for the Conscientiousness personality trait. In contrast, Extraversion and Neuroticism do not seem to be particularly connected with values.

If we assess the significance of the opposite relationship link (value → personality trait), values with similar content have a stronger impact primarily on the Conscientiousness and Agreeableness personality traits, for which we expected an average to strong cognitive component. In contrast to Openness to Experience, the trend has not been confirmed in the Czech population, although it is judged to be a trait with a strong cognitive component.

Even if the results of the structural modelling seem to indicate that the reciprocal relationships between values and personality traits are equal, there remains the question of the extent to which it is possible (or still informationally productive) to compare the size of these regression coefficients in their absolute values. Even in this case, it would be more appropriate to monitor the strength and polarity of these relationships in the long term rather than cast judgements (probably hasty ones) about whether traits more strongly influence values or vice versa. Moreover, on this point it can be argued that the weak relations between traits and values are due to the similar semantic content of the items in both instruments (NEO-FFI, PVQ scale) rather than to a real correspondence between traits and values. It seems more useful to monitor primarily how these relationships vary over time. We may expect (perhaps in a highly speculative way) that, if the assumption is valid, both personality traits and values have a certain biological basis and the direction of this influence (personality → trait values) works to a large extent on a subconscious level. It is also possible to expect that the strength of this relationship should remain stable over time.

On the other hand, if values have a strictly cognitive basis and the direction of influence (values → personality trait) works to a large extent on a conscious level, then it is also possible to expect that this relationship will probably be markedly situationally influenced. From the longitudinal perspective, the strength and polarity of this relationship should vary and change much more depending on social, economic, political and personal life changes, or strong interactions with the social environment. I expect that a less stable period of life or a less stable social, economic, and political situation will lead to the effect that certain val-

ues will start to have a stronger influence on certain personality traits depending on how the individual subjectively perceives these changes. For example, if the level of fear and anxiety increase in a society (e.g. due to the migration crisis in Europe), according to Schwartz people will espouse more conservative values (Security, Traditions), which will, after some time, start to influence individuals' behaviour and, to a lesser extent, also their personality traits. Fischer and Boer [2014] already proved the macro-contextual connection of the variability of relationships between traits and values, but did so only in the framework of correlation analysis, which is not capable of distinguishing the directions of relationships and thus testing their variability independently.

It is apparent that this study raises a number of new or revived questions. The tested structural model represents merely an initial stage in this type of research in the mutual relationship between personality traits and values, which goes beyond psychological experiments and uses not only representative quantitative data from the entire population but also more sophisticated approaches. The proposed approach has clear limitations with respect to the limited number and the nature of the selected socio-cultural variables used as contextual variables; the model is also limited in terms of its comprehensiveness, considering that to maintain stability it was not possible to include more than one value dimension and one personality trait at a time. A definite challenge that remains before us is to perform longitudinal research and a number of comparative studies, which thanks to the cultural context could provide even better explanations of the nature and variability of the influence of values on personality traits.

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Appendix

Table 1. Descriptive statistics of the variables

	Mean	Std. error of mean	N	Mini- mum	Maxi- mum
Security	0.2514	0.01926	2219	-3.02	2.57
Conformity	-0.1745	0.02004	2218	-3.81	2.67
Tradition	0.0417	0.01888	2217	-3.62	2.62
Benevolence	0.7125	0.01257	2219	-2.55	3.05
Universalism	0.5269	0.01292	2219	-2.33	2.81
Self-direction	0.5497	0.01503	2219	-2.19	2.71
Stimulation	-0.5112	0.02099	2219	-3.56	2.40
Hedonism	0.0029	0.01862	2219	-3.24	2.48
Achievement	-0.6577	0.01906	2219	-3.86	2.10
Power	-1.0118	0.01790	2218	-3.75	1.57
Conservation	0.0394	0.01291	2219	-2.26	1.90
Openness to Change	0.0138	0.01205	2219	-1.90	2.05
Self-enhancement	-0.8349	0.01488	2219	-3.15	1.52
Self-transcendence	0.6197	0.01013	2219	-1.92	2.36
Neuroticism	21.0699	0.15293	2174	0.00	45.00
Extraversion	30.4467	0.14552	2164	3.00	48.00
Openness to Experience	26.0085	0.12654	2159	3.00	44.00
Agreeableness	30.8875	0.11026	2177	12.00	48.00
Conscientiousness	33.0482	0.13718	2167	9.00	48.00
Age	40.6	0.31	2220	15.00	66.00
Education (years of schooling)	12.9	0.06	2220	5.00	21.00
Attractiveness (factor score)	0.00	0.02	2130	-4.75	2.71
Cognitive competencies (Z score)	0.00	0.02	2220	-3.73	4.03
Percentages (%)					
Men			50.2		
Women			49.8		
Religious			23.8		
Not religious			76.2		

Source: Conditions for Success in Work and Life 2015, a follow-up to the PIAAC project in the Czech Republic. Data are weighted by the design weight; author's calculations.

Table 2. Zero-order correlations of (NEO-FFI) personality traits and (Schwartz's PVQ scale) personal values and number of valid cases—part one

	Conservation			Self-transcendence		Openness to Change		
	SECUR	CONF	TRAD	BENE	UNIV	SELF	STIMU	HEDO
Neuroticism	0.160**	0.082**	0.062*	0.042*	0.031	-0.181**	-0.081**	-0.073**
Extraversion	-0.250**	-0.211**	-0.183**	0.018	-0.134**	0.035	0.332**	0.273**
Openness	-0.183**	-0.280**	-0.061*	0.004	0.171**	0.207**	0.181**	0.023
Agreeableness	0.076**	0.163**	0.178**	0.254**	0.233**	-0.069**	-0.167**	-0.124**
Conscientiousness	0.008	0.126**	0.059*	0.074**	0.025	0.057*	-0.090**	-0.121**
Neuroticism	2173	2172	2171	2173	2173	2173	2173	2173
Extraversion	2162	2162	2161	2162	2162	2162	2162	2162
Openness	2158	2157	2156	2158	2158	2158	2158	2158
Agreeableness	2175	2175	2174	2175	2175	2175	2175	2175
Conscientiousness	2165	2165	2164	2165	2165	2165	2165	2165

Source: Conditions for Success in Work and Life 2015, a follow-up to the PIAAC project in the Czech Republic. Data are weighted by design weight; author's calculations

Note: ** mean $p \leq 0.001$, * mean $p \leq 0.05$. In this table, Openness and Openness to Experience are used as synonymous terms.

Table 2. Zero-order correlations of (NEO-FFI) personality traits and (Schwartz's PVQ scale) personal values and number of valid cases—part two

	Self-enhancement				CONS	TRANS	OPNS	SUCC
	ACHIEV	POWER						
Neuroticism	0.006	-0.072**			0.152**	0.045*	-0.160**	-0.039
Extraversion	0.142**	-0.021			-0.322**	-0.074**	0.348**	0.077**
Openness	0.045*	-0.076**			-0.265**	0.112**	0.201**	-0.017
Agreeableness	-0.236**	-0.253**			0.209**	0.306**	-0.189**	-0.303**
Conscientiousness	-0.038	-0.070**			0.098**	0.062*	-0.091**	-0.066*
Neuroticism	2173	2172			2173	2173	2173	2173
Extraversion	2162	2162			2162	2162	2162	2162
Openness	2158	2157			2158	2158	2158	2158
Agreeableness	2175	2175			2175	2175	2175	2175
Conscientiousness	2165	2165			2165	2165	2165	2165

Source: Conditions for Success in Work and Life 2015, a follow-up to the PIAAC project in the Czech Republic. Data are weighted by design weight; author' calculations

Note: ** mean $p \leq 0.001$, * mean $p \leq 0.05$. In this table, Openness and Openness to Experience are used as synonymous terms.