Personality as Determinant of Domain Specific Risk Attitude and Behaviour

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Abstract

Literature about risk research deals with the questions if and why people with distinct types of personalities differ in their extend of risk behaviour and which perception and expectations are connected to the situations of risk. In the current study, the concepts of risk taking, risk perception and expected benefits in the health/safety domain from the DOSPERT scale and personality of the honesty/humility type from the HEXACO-PI-R were investigated with an online survey. The answers of 106 participants supported significant correlations between personality of the honesty/humility type and the variables of risk taking, risk perception and expected benefits. Against expectations, risk attitude was not significantly correlated to that personality type. Concluding, personality of the honesty/humility type is a determinant of domain specific risk behaviour, but not of risk attitude. Further relations between risk taking, risk perception and expected benefits confirmed findings out of referred literature. Additional analyses demonstrated more supporting results to previous research about gender[1] and the above named risk variables, except risk attitude.

Keywords: honesty/humility, personality, risk domain, health/safety, risk taking, risk attitude, risk perception, expected benefits

Samenvatting

Literatuur over wetenschappelijk risico onderzoek gaat over de vraag of en waarom mensen me bepaald typen van persoonlijkheden in het verhouding naar het nemen van risico's verschillen en erover welk waarneming en verwachtingen mee de risico situaties samenhangen. In de actueel studie zijn de concepten van risico gedrag, risico perceptie en verwacht nut in de domein van gezondheid/veiligheid van de DOSPERT schaal en persoonlijkheid van het type integriteit van de HEXACO-PI-R mee hulp van een online enquête onderzocht worden. De antwoorden van 106 participanten hebben significant correlaties tussen persoonlijkheid van het type integriteit en de variabelen van risico gedrag, risico perceptie en verwacht nut bevestigd. Tegen verwachtingen was risico attitude niet significant naar dit type van persoonlijkheid gecorreleerd. Concluderend, persoonlijkheid van het type integriteit is een determinant van domein specifiek risico gedrag, maar niet van risico attitude. Verder relaties tussen risico gedrag, risico perceptie en verwacht nut hebben resultaten uit gerefereerd literatuur bevestigt. Aanvullend analysen hebben meer ondersteunend uitkomsten naar eerder wetenschappelijk onderzoek over geslacht en de boven genoemde risico variabelen opgeleverd, met behalve van risico attitude.

Sleutelwoorden: integriteit, persoonlijkheid, risico domein, gezondheid/veiligheid, risico gedrag, risico attitude, risico perceptie, verwacht nut

Personality as Determinant of Domain Specific Risk Attitude and Behaviour

Behaviour in situations of risk can be explained by the person taking part in and deciding on it. Moreover, in this paper it is expected that the personality of a person influences behaviour and decisions this person makes in situations of risk. Human beings face situations of risk every day. Overtaking another car on the way to work bears a higher risk than staying on the same roadway and thus driving slower. Using a condom reduces the health risk of an infection with a partner, but may decrease the intensity of the bodily contact. Doing high intensity sport as for example bungee jumping may risk the physiological safety of a person, but experiencing this excitement would maybe exactly fit the preferences of the person involved (Figner & Weber, 2011). These examples show situations which may bear risks, but even more they demonstrate that situations differ in the extend of risks.

One decisive reason for these differences is the person involved in them. People value situations through perception and expectations. They decide how to ride a car, enjoy bodily pleasures and if or if not to take part in extreme sport. In addition to gender, age or cognitive traits, one of the most important characteristics of a decision maker is the personality (Weber & Johnson, 2009). In this context, risk taking, which can be defined as choosing one option above another because of a higher amount of achievable results, is influenced by personality (Figner & Weber, 2011). Sensation seeking personalities for example are associated with risk taking (Charnigo, Noar, Garnett, Crosby, Palmgreen & Zimmerman, 2013; Nicholson, Soane, Fenton-O'Creevy & Willman, 2005; Weber, Blais & Betz, 2002; Weber & Johnson, 2009; Zuckerman & Kuhlman, 2000). Based on the widely used Five-Factor model of personality risk takers show high scores on extraversion and openness, as well as low scores on conscientiousness, agreeableness and neuroticism (Nicholson et al., 2005). These findings show that the behaviour of risk taking is connected to the personality of a decision maker.

In risk research understanding a personality's behaviour and decisions is also investigated

with the help of risk attitude. Through risk attitude the tradeoff between a risk and a return is mediated. This connection was originally based on a financial risk framework. The psychological risk-return framework, is based on the specialized tradeoff between the perceived risks of a behavioural option and the expected gains from taking part in it. The named tradeoff is in most cases based on a preference of riskier options, when returns gained from these are expected higher than from less riskier options. Most people prefer benefits over risks. But, research shows that people differ in their risk attitudes, which is probably due to differences in risk perception en perceived or expected benefits (Figner & Weber, 2011). In the current study, risk attitude is defined as a construct combined out if risk perception and expected benefits of a situation (Blais & Weber, 2006).

Important to mention is, that next to risk taking, the perception of risks and associated benefits are also related to the personality of a person. With the HEXACO personality framework (Lee & Ashton, 2013) it was investigated that people differ in risk perception and attitude on the six personality domains of openness, conscientiousness, agreeableness, emotionality, extraversion, and honesty/humility. In the study of Weller and Tikir (2011) emotional people were associated with the highest risk perception and high conscientiousness was connected to a decreased amount of expected benefits. Finally, risk perception and expectations or perception about benefits also are connected to the personality of a person.

Based on the fact that risk taking, perception and expectations about benefits differ between personalities, it is expected that risk attitude may also differ between those. In addition to that, decisions and behaviours in relation to risks seem to be mediated by personality types. Grounded in these assumption and the referred research findings, the current study focuses on personality related to risk behaviour and attitude, through dealing with the following research question: Is personality a determinant of risk attitude and risk behaviour?

Theoretical framework

Above it was argued that personality is connected to risk attitude and behaviour. In this section literature based evidence is given for domain specificity of the risk constructs, it is focused on the honesty/humility personality type and methods for measuring the mentioned constructs are discussed. Scientific literature confirms domain based risk taking, perception and perceived or expected benefits (Ashton & Lee, 2008; Blais & Weber, 2006; Figner & Weber, 2011; Weber & Johnson, 2009; Weber et al., 2002; Weller & Thulin, 2012; Weller & Tikir, 2011). These constructs of risk research have been investigated with the Domain-Specific Risk-Taking Questionnaire (DOSPERT) for adult populations (Weber et al., 2002; actual version from: Blais & Weber, 2006), with which five domains can be examined: social, recreational, health/safety, ethical and financial risks.

One of the most used models for analysing a personality structure is the Big-Five. Much literature in risk research deals with it's personality structures (see for example: Ashton & Lee, 2008; Lauriola, Russo, Lucidi, Violani & Levin, 2005), but less is publicized about the HEXACO personality questionnaire. The latter was translated in at least 12 languages and seems wider applicable than the Big-Five. With the last mentioned, the dimensions of neuroticism, extraversion, openness to experience, agreeableness and conscientiousness can be measured. The HEXACO-PI-R has a supplemental sixth dimension called honesty/humility (Weller & Tikir, 2011). People of this personality type are defined as honest, just, moderate, less assuming or self controlled, in comparison to unreliable, timid, careless, acquisitive or presumptuous (Ashton & Lee, 2007; Lee & Ashton, 2013; Weller & Tikir, 2011).

Studies with the HEXACO-PI-R showed that with the honesty/humility dimension risk behaviour can be better predicted than with the Big-Five model (Lee, Ashton & de Vries, 2005; Weller & Tikir, 2011). Moreover, research has been done about personalities engaging

in psychopathy, Machiavellianism and narcissm (Lee & Ashton, 2005; Weller & Tikir, 2011). This is important, because results showed that psychopathy was related to bad decision making (Lösel & Schmucker, 2004) and risk taking in gambling tasks (Mitchell, Colledge, Leonard, & Blair, 2002). Although the investigated sample is not representative for the one of the current study, after all the results demonstrate the relevance of risk taking for a far reaching research context. In addition, the honesty/humility scale is referred to be more fitting to measure possible psychopathic tendencies, as well as risk taking in form of workplace offences, in comparison to the Big-Five model (Weller & Tikir, 2011). Finally, this paragraph highlights first, that the constructs of risk taking is dependent on domains, which separately can be measured with the DOSPERT. Second, reasoned arguments for choosing the HEXACO-PI-R as a method to measure personality in the context of risk research are given.

Further, scientific findings about the honesty/humility dimension of personality are argued about in the context of the domain specificity in risk research. Evidence have been found for predictions on risk preferences and decisions of honest personalities. People scoring higher on the named HEXACO-PI-R dimension tended to take less risks than people with lower scores (Weller & Thulin, 2012). These results prove that a honest personality can be a variable of influence in the extend of a person's risk taking. Moreover, domain specific differences in risk taking for this personality type have been investigated (Weller & Tikir, 2011). The results of the authors show, that personalities who scored high on the honesty/humility dimension also had high scores in the ethical and the health/safety domain of risks.

The connections of personality and risk taking on one side and domain specificity and risk taking on the other side indicate, that the tendency to take risks is influenced by multiple factors. One of these variables of influence may also be risk attitude, which mediates between

risks and returns and thus between perception and expectations of benefits of a risk situation. Blais and Weber (2006) argued that the connection of risk perception and expected benefits would be an explaining factor for the differences in risk behaviour between participants. The value people give to perception and benefits, their risk attitude, seems thus to be also dependent risk domains and personalities. This assumption can be explained by people's preferences in either seeking or avoiding risks. These concepts called risk seeking and risk aversion, are regarded as being linear connected to risk attitude, indicating a direction of risk behaviour (Rohrmann, 2005). Being for example more honest or impulsive is therefore assumed to be related to the risk attitude of a person. Further arguments support risk attitude to be domain specific. First, risk tanking is known to be domain dependent (Weller & Tikir, 2011). Second, risk taking is statistically connected to risk perception and expected benefits (Weber et al., 2002; Weller & Tikir, 2011). Therefore, risk attitude may also be domain specific.

Grounded on the previous argumentation and findings, the aim of the study is to find additional evidence for the honesty/humility dimension of personality in relation to the constructs of risk attitude and risk taking. In this context it will be focused on the risk domain of health/safety. This is reasoned through the previous examples, demonstrating that the extend of risks taking, perception and expected benefits seem not only to depend on personality types, but also on domains.

Based on the mentioned scientific findings, the purpose of the current study is to investigate if personality of the honesty/humility type is related to risk taking and risk attitude. Therefore, it is hypothesized that (a) personality of the honesty/humility type is negatively correlated to risk taking in the health/safety domain. Further, it is assumed that this personality type is positively correlated to risk perception (b) and negatively correlated to expected benefits (c) in the same risk domain. Finally, from risk perception and expected

benefits the construct of risk attitude will be calculated (Blais & Weber, 2006). At least, the hypothesis will be investigated, that personality of the honesty/humility is negatively correlated to risk attitude (d).

Method

Design and Participants

An online survey was chosen as research strategy, constructed with Qualtrix and spread via Mail and on the online platform of the research lab of the University of Twente. A correlational survey design was used. Personality of the honesty/humility type was the independent variable. Risk taking, risk perception, expected benefits, and risk attitude (a combined concept consisting of risk perception and expected benefit, see Blais & Weber, 2006) measured for the health/safety domain were the dependent variables.

A total of 123 participants took part in the study. The data of 16 participants was excluded from the study, because of incompleteness. Of the remaining 107 people, 29 (27 %) males and 78 (73 %) females participated in the study. The main group of participants indicated to be in the age range of 18-24 years (100), 6 people were in the age range of 25-34 years and one person was in the age range 35-54. The ethnic identities[2] of the participants differed between White (100), Black or African American (2), Asian (3) and others (2). The broadest size of participants reported to have a college degree[3] (60). Of the remaining 47 participants, 43 had less than a college degree and 4 a postgraduate degree. People were partially recruited via a convenience sample through the research lab from the section of Psychology at the University of Twente. Further, family members, friends and random people were asked to participate in the study personally and via Mails. Student participants of the University of Twente were granted credit points as a compensation for running in the study. Other participants received no material compensation.

Materials

For measuring the variables, a combined questionnaire was constructed, which consisted of the following parts. First, it was asked for four demographics (age, gender, nationality and state of education). Second, three risk concepts (1. risk taking, 2. risk perception and 3. expected benefits) were measured with the Domain-Specific Risk-Taking Scale (DOSPERT) in the health/safety domain (Blais & Weber, 2006). Third, the personality scale for the honesty/humility type of the HEXACO-PI-R questionnaire (Ashton & Lee, 2008) was used.

Domain-Specific Risk-Taking Scale (DOSPERT). The used DOSPERT is a 30-item questionnaire with which optional 3 risk concepts (risk taking, risk perception and expected benefits) can be evaluated in five different domains: ethical, financial, health/safety, social and recreational (Blais & Weber, 2006). In the current study, it was focused just on the health/safety domain, which consisted of 6 items. The same items were used for the concepts of risk taking, risk perception and expected benefits. Participants first valued the items in relation to risk taking. Their task was to answer the likelihood of engaging in the described activity. One typical example out of this domain scale was: *Driving a car without wearing a seat belt*. Evaluation took place on a 7-point Likert-scale, ranging from 1 (*extremely unlikely*) until 7 (*extremely likely*). The second concept of risk perception described the assessment of the participants about perceiving the stated situations. Answers were also possible on a 7-point Likert-scale, but ranging from 1 (*not at all risky)* to 7 (*extremely risky).* The third concept of expected benefits indicated the assessment of participants about the benefits they would think to obtain from the described situations. Rating was possible on a 7-point Likert-scale, ranging from 1 (*no benefits at all*) to 7 (*great benefits*). Because no items were reversed, no transformation was necessary. The internal consistency was measured for risk taking ($\alpha = .40$), risk perception ($\alpha = .61$) and expected benefits ($\alpha = .61$). An additional Lambda-2 testing showed all items of risk taking to be on nearly the same reliability level, ranging from ($\alpha = .33$) until ($\alpha = .43$). Coefficients from the concepts of risk perception and

expected benefits were used to calculate risk attitude (α = .14). A Lambda-2 testing for risk attitude showed no usable results, because of a stated negative covariance of the items. The sequence of the items of the three risk scales was restructured for the survey, in order to prevent inclinations in answering (see *Appendix A*).

HEXACO-PI-R Personality Inventory. The 60-item version of the HEXACO-PI-R was used. It consisted of five personality domains: Extraversion, emotionality, agreeableness, openness to experience, conscientiousness and honesty/humility. Each domain had 10 items. For the current study just the honesty/humility scale was used, which can be further divided in the following four characteristics: sincerity, fairness, greed avoidance and modesty. The answers on the items were measured on an ordinal level of a 5-point Likert-scale, ranging from 1 (*strongly disagree*) until 5 (*strongly agree*). One typical item from the scale was for example: *If I knew that I could never get caught, I would be willing to steal a million dollars*. (Ashton & Lee, 2008). The internal consistency of the scale was measured (α = .67). The sequence of the 10 items was taken as listed in the 60-item full version of the HEXACO-PI-R. Before data analysis the coding of 6 items was reversed.

Procedure

An informed consent was given by the participants when they started completing the survey. The questionnaire was filled in, in the mentioned order: beginning with demographics, followed by risk taking items, risk perception, expected benefits and finally the personality items of the HEXACO-PI-R (Blais & Weber, 2006). For the demographics the following explanation was given: *Please provide the following information about yourself.* Before people filled in the risk taking scale, they were informed about their task: *For each of the following statements, please indicate the likelihood that you would engage in the described activity or behaviour, if you were to find yourself in that situation. Provide a rating from 1 (extremely unlikely) to 7 (extremely likely), using the following scale*. For the risk

perception scale the following instruction was given: *People often see some risk in situations that contain uncertainty about what the outcome or consequences will be and for which there is the possibility of negative consequences. However, riskiness is a very personal and intuitive notion, and I am interested in your gut level assessment of how risky each situation or behaviour is. For each of the following statements, please indicate how risky you perceive each situation. Provide a rating from 1 (not at all risky) to 7 (extremely risky), using the following scale*. The expected benefits scale was instructed as follows: *For each of the following statements, please indicate the benefits you would obtain from each situation. Provide a rating from 1 (no benefits at all) to 7 (great benefits), using the following scale.* Finally, the personality scale was introduced as: *On the following rows you will find a series of statements. Please read each statement and decide how much you agree or disagree with that statement, ranging form 1 (strongly disagree) until 5 (strongly agree). Please answer every statement. If you are not completely sure of your response, choose the option which is most appropriate to you.* (Ashton & Lee, 2008).

Results

Preparation of Dataset

First, new variables for personality of the honesty/humility type (M = 2.84, SD = 0.33), as well as the three risk concepts of the health/safety domain of risk taking (M = 3.14 , SD = 0.82), risk perception (M = 4.93, SD = 0.75) and expected benefits (M = 2.39, SD = 0.82) were made. Then, a Kolmogorov-Smirnow-Test was done. Results revealed that the answers on the honesty/humility scale (p = <.01), as well as those for risk perception (p = .01) and expected benefits (p = .02) differed significantly from a normal distribution. Just the answers of risk taking were normal distributed (p = .20). Nevertheless, the statistical tests used were conduced under the assumption of having a normal distribution. A confidence interval of 95% was used for all analyses in this paper. All following correlations were based

on one-sided tests.

Personality and Risk Variables

As a second step of analysis Pearson correlations were measured in order to examine the hypotheses. Significant correlations were found between personality and risk taking (r = -.27, p = <.01), between personality and risk perception (r = .30, p = <.01), as well as between personality and expected benefits (r = -.23, p = <.01). This proved the risk variables to be statistical related to personality of the honesty/humility type. A negative correlation was found between personality and risk taking and between personality and expected benefits. Scoring higher on the personality scale was thus related to lower scoring on risk taking and expected benefits. Vice versa, scoring lower on the personality scale was connected to higher scoring on risk taking and expected benefits. Risk perception was positively correlated to personality. High scoring on the personality dimension went accord with a high scoring on risk perception. This correlations means vice versa, that a low risk perception score was connected to a low honesty/humility score. For answering the last hypothesis the variables of risk perception and expected benefits were combined to a new variable, called risk attitude (M = 3.66, SD = 0.42). No significant correlation between personality and risk attitude (r = .04, p = .34) was found.

Risk Taking, Perception and Expected Benefits

Additional analyses were conducted and results showed significant correlations between the measured three risk variables. Risk perception and expected benefits (r = -.44, p = < .001), as well as risk taking and risk perception (r = -.45, p = < .001) were negatively correlated. This means, that higher scores on the perception sale were connected to lower scores on the expecting benefits scale. Scoring higher on the risk taking scales was connected to scoring lower on the risk perception scale. But, risk taking and expected benefits were positively correlated to each other (r = .52, p = < .001), which means that the risk taking

scores rose together with the expectation scores on gaining benefits. For more results about risk attitude see Table B1 in Appendix B, which shows all measured correlations.

Personality, Risk Variables and Gender

Further statistical tests for main effects between the demographical variable of gender and the variables of risk taking, risk perception, expected benefits and personality of the honesty/humility type were executed. Significant correlations were found for all four pairs of variables: gender and personality (r = .32, p = <.001), gender and risk taking (r = -.36, p = <.001), gender and risk perception (r = .44, p = <.001), and also gender and expected benefits (r = -.32, p = <.001). These statistical results showed that males scored lower on the honesty/humility scale than females did. According to the other correlations, being male was statistically related to higher scores on risk taking and expected benefits, but to lower scores on risk perception. Risk attitude was not significantly correlated to gender (see Table B1).

Discussion

Evaluation of Hypotheses

The results of a statistical relation between personality of the honesty/humility type and risk taking confirmed the first hypothesis (a). The negative direction of the connection was as expected. The resulting implication that more honest participants tended to take less risks, replicated outcomes of earlier research (Weller & Thulin, 2012; Weller & Tikir, 2011). Weller and Tikir (2011) analysed the the six personality dimensions of the HEXACO-PI-R in relation to the risk domains of the DOSPERT. The honesty/humility personality type had the strongest correlation to risk taking in the health/safety domain. These results support the current findings on personality and the related risk domain. Other authors also found a negative correlation between the mentioned personality type and risk taking (Weller & Thulin, 2012). Nevertheless, it has to be mentioned, that these results were based on the risk domain of potential gains and losses, instead on the DOSPERT domains. But, the authors

stated an important finding. Participants rather prevented risks, instead of seeking for them. This assumption can be supported by other scientific references (Blais & Weber, 2006; Weber et. al., 2002). Results of the current study can also be explained with previous implications. First, because of the negative correlation found and second, because of the mean answer of participants to have a *somewhat unlikely* tendency to take the described risks. The second argument supports the tendency of participants to rather avoid risks.

The second hypothesis (b) was supported by the result of a positive significant correlation between personality of the honesty/humility dimension and risk perception. Based on these outcomes, more honest people tended to perceive more risks. In comparison to than, participants who answered to perceive less risks also scored lower on the honesty/humility dimension. Outcomes of Weller & Tikir (2011) can be compared to the second hypothesis, too. Their research results showed a positive correlation between the reported personalty type and risk perception in the health/safety domain. Nevertheless, results of the emotional and conscientious personality types were stronger related to a higher perception of risks, in comparison to the honesty/humility personality. Out of this reason, one recommendation for future research is, to investigate more personality types than in the current study. Such a study could give insights, if differences in personality would have an influence on a person's perception of risks. Another recommendation for more detailed research shall emphasize risk domains. To support this view, scientific results gave evidences for differences in risk perception and risk taking between risk domains (Blais & Weber, 2006; Weber et al., 2002). And, in relation to risk taking, Weller and Tikir (2011) reported strongest associations not only between the named personality dimension and the health/safety domain, but also for the ethical domain. Therefore, additional research on the other risk domains of the DOSPERT, as well as other personality types seems valuable. Investigations could provide deeper insights in possible explanations for individual differences in domain specific risk perception and risk

behaviour.

Hypothesis number three (c) was verified through significant results. The statistically evidenced connection, that more honest participants expected less benefits from the evaluated situations, were viewed in the light of results from Weller and Tikir (2011). The authors reported these variables to be inversely related to each other, too. In the context of the reported correlations of (a) and (b), the finding of (c) supports the following explanation. Participants who described themselves as more honest had a lower tendency to take risks, which may be due to their high perception of risks and their low expectations connected to them. This assumption would fit the characterization of the honesty/humility personality type, as being self controlled and therefore probably taking less risks, as being less assuming and therefore maybe expecting less benefits, and as not being careless according to which being sensitive in perceiving risks seems plausible. The offered explanation discussed in literature is, that a person's extend of risk taking would be influenced by their perception of risks en benefits (Weber et. al., 2002).

Hypothesis number four (d) was rejected. Against expectations, the average risk attitude concerning the health/safety domain was not significantly associated to honesty/humility. These result can be compared to findings of Weller and Tikir (2011), who reported relations between risk attitude and the emotional and conscientious personalty type. After all, no further detail about concrete results for risk attitude were found in their article. This makes clear, that the *perceived risk attitude* may have not been measured separately (Weller & Tikir, 2011, p. 189). Rather, it appeared to be associated as a multidimensional concept, consisting of risk perception and *perceived benefits* (Weller & Tikir, 2011, p. 189). This understanding can be explained by significant results referred to by the researchers for perceiving risks and benefits in the social, recreational, ethical and health/safety domain. What shall be highlighted with the reference to Weller and Tikir (2011) is that, although they made use of

the DOSPERT, they did not measure risk attitude as recommended by Weber et al. (2006). Concluding, risk attitude was probably not used as a uniform concept between these researchers. Finally, the definition and validity of the attitude concept was proven controversial.

In the context of all measured risk concepts a concrete recommendation for future research shall be made. For the current study, only correlational analyses were conducted. But, the inventors of the DOSPERT scale (Blais & Weber, 2006) also made use of regression analyses, in order to measure the amount of risk seeking or risk averse behaviour of a person. As stated in the introduction, some authors regard these as linear connected to risk attitude (Rohrmann, 2005). Therefore, regressing risk taking as a dependent variable on the predictors of risk perception and expected benefits could be a useful source of information. Weber et al. (2002) conducted this regression analysis and reported decisive arguments for the value of risk perception. They discussed the differences in risk behaviour for gender and domains to be attributed to risk perception. In comparison to that, the attitude of how participants perceived risks seemed less attributed to the mentioned differences. Additional explanations about the influence of perceptions on real live situations of risk, would be interesting. Moreover, regression analyses taking personality dimensions into account, could give additional valuable information. The power of influence of a personality on risk perceptions would be an interesting point of investigation.

Relations Between Risk Variables and Limitations in Research

For discussing risk attitude it is important to mention, that risk perception and expected benefits were negatively correlated to each other. This means that a higher perception of risks went accord with a lower expectation of benefits in the participants. These findings are relevant, due to the measurement of risk attitude out of risk perception and expected benefits (Blais & Weber, 2006). In an earlier article Weber et. al. (2002) describe the attitude scale as

consisting out of the two variables of *risk perception and attitude towards perceived risk* (p. 264). The last mentioned variable was not available in the actual DOSPERT version of 2006. But, Blais and Weber (2006) clearly advised to measure risk attitude as mentioned above. This led to a discrepancy in understanding, how exactly the authors define the construct of risk attitude. This point of view can be underpinned by the positions of other authors. Risk attitude is described as a less investigated construct in academic literature (Rohrmann, 2005), which would be lacking valid measurements and as a consequence of this could fall short on significant correlations (Figer & Weber, 2011). Weber probably would not criticize the own measurement recommendations, but that is not the point of interest for the current argument. The experienced discrepancy in understanding shall highlight, that researchers not always agree on a universal concept of risk attitude. This shortfall in the definition and connected valid methods complicates the investigation of risk attitude.

One source of the inconsistency in defining and measuring also the other mentioned risk concepts, are the underlying theoretical frameworks. The risk-return framework used by Weller and Tikir (2011) gives another measurement of risk taking, than the Prospect Theory, used by Weller and Thulin (2012). Another argument are the measurements itself, shown on the example of risk attitude. Maybe, the concepts of perception and expected benefits are too different to each other, that combining them to a unidimensional construct can decrease the validity. This argument can be supported by the weak internal consistency found for the measured variable ($\alpha = .14$). Rohrmann (2005) supported this estimation indirectly through specifying risk attitude to not only vary between domains, but also seeming to consist of multiple concepts. This argument shall clarify, that investigating more risk domains could have contributed to a higher internal consistency. Under another viewpoint, the current Cronbach's Alpha, could also have been the result of an inconsistency in understanding Blais & Weber (2006).

Moreover, counting a greater number and broader range of differentiable participants, could have contributed to more generalizable results. Variables of influence could be nationality, gender, age or state of education. Because the current sample mainly consisted of students, the age of the young adolescents could have affected the investigated variables. Critique about the sample size can be regarded as a standard argument in science. In spite of this, it is important to mention in the present context, because research proved risk taking and also perception (Sjöberg, 2000) as being influenced by cultural contexts (Blais & Weber, 2006). In accordance to cultural considerations, Sjöberg (2000) defines risk attitude as related to beliefs and values. The items investigated may be therefore be evaluated less risky than for example in cultures where health and safety are at greater danger. The current sample may thus offer not enough information about the interests or even preferences of risks, values and beliefs of participants, to generalize a tendency for the health/safety domain.

Scientific measurement and results are simplified means to give insights on reality and can therefore be criticized in not providing absolute reliable information about real world scenarios. In relation to the previous paragraph, the danger itself is reported to be another variable influencing differences between individuals (Rohrmann, 2005) and possible differences in real life. Imagining a short situation, consisting of one sentence, probably is less intense than a real life situation, which is influenced by far more variables. Driving without a seatbelt could suddenly be seen as a higher risk, when actually driving a car with a pregnant wife or the own 5 year old child sitting in it, too. The described thought underpins the importance of research not only about risks and returns, but about the probabilities of risks to happen and the chances of reaching the expected benefits connected to the situation (Byrnes, Miller & Schafer, 1999). The mentioned probabilities may help giving a more reliable understanding of people's reactions to real life risk situations.

The previous argument can be connected to other significant results of the relations

between risk taking and risk perception as well as risk taking and expected benefits. Participants who described themselves as rather tending to take part in risks also inclined to perceive situations as less risky, but expected more benefits from taking part in the described situations. Because of this relation, it seems plausible that low expectations of benefits could be based on a decreased tendency to show risk behaviour, which might be influenced by a higher risk perception. Results and followed explanation can be underpinned by previous findings about risk taking, perception and expected benefits (Weber et al., 2002; Weller & Tikir, 2011). The relationship between risk taking and perception shall be additionally confirmed with the health/safety related example of vaccination, which was investigated in the meta-analysis of Brewer, Chapman, Gibbons, Gerrard, McCaul and Weinstein (2007). Other authors showed similar results based on the DOSPERT scales, especially for the health/safety domain (Beyer, Fasolo, Graeff, & Hillege, 2015).

Finally, a consensus in the correlations between risk taking, risk perception and expected or perceived benefits seems far reaching in risk research. Nevertheless, reliability and validity can be criticized for being limited in the current as well as previous investigations on risks.

Findings about Gender Differences

The last results which shall be discussed, are additional correlations found in relation to gender. Measurements showed significant statistical connections of gender with personality, risk taking, risk perception and expected benefits. Females who took part in the study described themselves as less honest than male participants did. A more relevant result is, that females on average indicated to take less risks then males. This finding is supported by the meta-analysis of Byrnes et al. (1999), in which risk taking of males was stated as higher than that of females. In relation to the DOSPERT, women were described as being more aversive against risks in all domains, except the one for social risks (Weber et al., 2002).

Moreover, males tended to have a lower risk perception than females, but higher

expectations of benefits. These results duplicate outcomes of Weber et al. (2002), who found significant differences between male and female participants in risk perception and expected benefits. Especially benefits in the health/safety domain were associated higher for male than for female participants. This viewpoint towards expectations seems to be a consequence of the higher risk taking of male participants. The expectations connected to a situation of risk thus may justify the commitment of risk behaviour, which would be underpinned by the basic assumption of the risk return framework. Thus, expecting more benefits would fit to perceiving less risks and as a possible consequence having higher tendencies to engage in risk behaviour.

Risk attitude, by contrary, seems not to be relevant for indicating gender differences. No significant correlation could be found between gender and risk attitude. This result was already verified in past research (Figner & Weber, 2011). Similar as for domain specific differences in risk behaviour, gender differences would be based more on the variation in perception than in risk attitude (Weber et al., 2002). The importance of risk perception was also supported by Slovic (1999), who mentioned biological factors like the live bringing function of women as possible source of influence.

Even though risk taking, perception and expectations about benefits have been proven different for gender, these results are still based on hypothetical decisions in surveys. But, in the meta-analysis of Byrnes et al. (1999) hypothetical choices were stated to be less different between males and females. The authors inferred that gender differences may be stronger based on actual risk behaviour than just on weighing decisions against each other. This consideration may be an interesting point for future research, because it is thinkable that the subjective assessment of one's own intentions still differs to the actual behaviour.

The previously mentioned argument about the discrepancy between scientific measurement and real life situations in risk research, may also fit to the gender debate. One

example is the health/safety risk of being sexually abused. Prevalences in the United States are reported to be higher for women than for men (Briere & Elliott, 2003; Finkelhor, 1994). It can be carefully assumed that answers on the measured risk variables probably would differ between males and females. Thinking this argument further, one way of modifying an investigation on gender and risks could be, to analyse the items of the current questionnaire in more detail. The investigation about possible gender differences for each items could lead to deeper insights for or against deviations.

For example, *Engaging in unprotected sex*, obviously is a situation concerning health/safety concerns of females as well as males. It demonstrates an everyday situation in comparison to the extreme example mentioned before. But, both examples have been stated in order to demonstrate, that there are possible gender differences in risk sensitivity and maybe even vulnerability (Slovic, 1999). If biological or other factors may bear greater risks for one gender, this could give valuable information for practical utility. It could help improving safety standards in society. Gained insights through risk research on gender could help providing interventions to decrease risk taking. Moreover it could help to evaluate decision making in judicial cases (Figner & Weber, 2011).

Concluding gender was shown to be a valuable variable to investigate in risk research. The used examples made the complexity of risks and resulting situations more visible. This complexity seems hardly be possible to enclose in scientific research. Some discrepancies between real life and hypothetical scenarios seem always to be present. Nevertheless, scientific findings help getting a broader understanding of dealing with risks. Finally, discussed findings have shown, that some domain specific results are similar to those of gender. In this context risk perception was claimed to be the most influential variable for the differences in risk taking. If risk perception really influences behaviour that much, it should be not forgotten that risks not always are objective, but may also be socially constructed

(Slovic, 1999).

Conclusion

To give a final conclusion to this paper, the research question can be answered as follows: Based on the evaluation of the hypotheses, personality of the honesty/humility type is a determinant of domain specific risk behaviour, but risk attitude is not. But, relevant is first, that personality would have been a determinant of risk perception and expected benefits, when these would have been hypothesized as separate concepts. The question arises, if risk attitude consists out or risk perception and expected benefits (Blais & Weber, 2006) or if it rather mediates these concepts (Figner & Weber, 2011). Finally, risk attitude proved to be a far more complex concept, missing a universal definition and a consensus in reliable methods. Moreover, it has to be mentioned, that the formulation *determinant* is not regarded in the context of causality, which was not investigated in the current study. It shall rather be regarded as a variable of influence, which is the case for a correlation between variables influencing each other in direction and strength.

Additional interesting findings about the relations between the three risk variables of risk taking, risk perception and expected benefits, as well as statistical relations to gender proved risks to be connected to multiple aspects of a person. Therefore, more investigations are needed to get a better and more detailed insight in the complexity of risky situations, the people participating in them and the underlying factors of influence, as well as their multidimensional and probably mediating risk attitudes. Finally, risk attitude is at least a determinant worth doing further research about.

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Recommendations for Further Literature Related to Risk Research

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Footnotes

[1] The term *gender* is based on subjective answers of participants to be *male* or *female*. Any injustice done to somebody not convergent with these definitions was not intended.

[2] For insights in the composition of ethnic identities, previously prepared options of answers were used from Qualtrix. It shall be apologized for the imprecision in identities, like *native Hawaiian or Pacific Islander* and for the stereotyping in *Black* and *White*. These answer options were not used with the intention to harm anybody and will be considered with more sensitivity in future research.

[3] The educational degree of the main number of participants was reported as *college degree.* Because of a nearly pure convenient sample, consisting of first and second year students collecting credits for participating in experiments and studies, this quantity seems imprecise. It is assumed that the *college* was perhaps mistaken for the American high school, British secondary school or the Dutch VWO. The survey was conducted via a Dutch University. Because *college* can be understood in Dutch as university building or class , but also as school building, is seems plausible that the translation may have led to misunderstandings.

Appendix A

Questionnaire, Consisting out of Risk Taking, Risk Perception and Expected Benefits Scale for the Health/Safety Domain and Honesty/Humility Scale of Personality with Instructions

Risk taking scale. For each of the following statements, please indicate the likelihood that you would engage in the described activity or behaviour if you were to find yourself in that situation. Provide a rating from 1 (Extremely unlikely) to 7 (Extremely likely), using the following scale: Extremely unlikely (1), Moderately unlikely (2), Somewhat unlikely (3), Not sure (4), Somewhat likely (5), Moderately likely (6), Extremely likely (7).

1. Drinking heavily at a social function.
2. Engaging in unprotected sex.
3. Driving a car without wearing a seat belt.
4. Riding a motorcycle without a helmet.
5. Sunbathing without sunscreen.
6. Walking home alone at night in an unsafe area of town.

Risk perception scale. People often see some risk in situations that contain uncertainty about what the outcome or consequences will be and for which there is the possibility of negative consequences. However, riskiness is a very personal and intuitive notion, and I am interested in your gut level assessment of how risky each situation or behaviour is. For each of the following statements, please indicate how risky you perceive each situation. Provide a rating from 1 (Not at all risky) to 7 (Extremely risky) , using the following scale: Not at all risky (1), Slightly risky (2), Somewhat risky (3), Moderately risky (4), Risky (5), Very risky (6), Extremely risky (7).

1. Engaging in unprotected sex.
2. Riding a motorcycle without a helmet.

3. Walking home alone at night in an unsafe area of town.
4. Driving a car without wearing a seat belt.
5. Drinking heavily at a social function.
6. Sunbathing without sunscreen.

Expected benefits scale. For each of the following statements, please indicate the benefits you would obtain from each situation. Provide a rating from 1 (No benefits at all) to 7 (Great benefits), using the following scale: No benefits at all (1), Slightly benefits (2), Somewhat benefits (3), Moderate benefits (4), More than moderate benefits (5), Good benefits (6), Great benefits (7).

1. Driving a car without wearing a seat belt.
2. Walking home alone at night in an unsafe area of town.
3. Riding a motorcycle without a helmet.
4. Engaging in unprotected sex.
5. Drinking heavily at a social function.
6. Sunbathing without sunscreen.

Honesty/humility scale. On the following rows you will find a series of statements. Please read each statement and decide how much you agree or disagree with that statement. Options reach from 1 (Strongly disagree) to 5 (Strongly agree). Please answer every statement. If you are not completely sure of your response, then choose the answer which is most appropriate to you. Use the following scale: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5).

1. I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
2. If I want something from someone, I will laugh at that person's worst jokes.
3. I wouldn’t pretend to like someone just to get that person to do favours for me.

4. If I knew that I could never get caught, I would be willing to steal a million dollars.
5. I would never accept a bribe, even if it were very large.
6. I'd be tempted to use counterfeit money, if I were sure I could get away with it.
7. Having a lot of money is not especially important to me.
8. I would get a lot of pleasure from owning expensive luxury goods.
9. I think that I am entitled to more respect than the average person is.
10. I want people to know that I am an important person of high status.

Appendix B

Table B1

Means (M), Standard Deviations (SD), and Correlations between the Variables of Personality (P) of the Honesty/Humility Type, Risk Taking (RT), Risk Perception (RP), Expected Benefits (EB), Risk Attitude (RA) and Gender.

	M	*SD*	P	RT	RP	EB	RA
P	2.84	.33	–				
RT	3.14	.82	-.27**	–			
RP	4.93	.75	.30**	-.45***	–		
EB	2.39	.82	-.23**	.52***	-.44***	–	
RA	3.66	.42	.04	.10	.47***	.59***	–
Gender	1.71	.48	.32***	-.36***	.44***	-.32***	.08

*** = $p < .001$; ** = $p < .01$; * = $p < .05$; one-tailed