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Relationship Between Mindfulness and Decision Making
Outcome

Tamara Martinovic

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Supervisor: Mats Dahl

Abstract

Despite the fact that mindfulness has been gaining a lot of interest and is now being researched in different fields to examine the relevance of it to both physical and psychological health, little to almost nothing has been done in relation to everyday decision making. The present study aims to examine the link of mindfulness and decision making, as well as to identify the possible socio-demographic variables linked to decision outcome. An online study was done ($N = 199$), where Five Facet Mindfulness Questionnaire was used to assess mindfulness and Decision Outcome Inventory was used for decision making outcome. Our hypotheses were not confirmed, as our findings did not reveal any links between socio-demographic variables and decision making outcome, hierarchical analysis did not reveal any predictive validity of FFMQ on DOI, and most of the facets of FFMQ were not statistically significantly linked to DOI. The one facet that was significantly correlated to DOI indicates that abstaining from judgements about our feelings and experiences is linked with a better decision outcome score. The findings provide information on the relationship between mindfulness and decision making, but at the same time, they emphasize the need for more research on the topic in order to draw stronger conclusions.

Keywords: decision making, mindfulness, socio-demographic variables, awareness, everyday activities

Introduction

Throughout the day, we can find ourselves not being entirely aware of our thoughts quite often. Sometimes we do not completely notice what is happening around us, even when it is crucial, for example when we make decisions, which is a daily activity, whether those decisions are more or less important. Not being fully aware of our decisions and how we make them, can have a great impact on our decision quality. But, what can we do to make better decisions? And furthermore, how can we even define and measure decision quality? How do we differ between a competent decision-maker and non-competent one?

Literature review

Decision Making Skills. Three variables define decision making quality; the characteristics of the decision maker, the decision situation and the decision task (Hunt, Krzystofiak, Meindl, & Yousry, 1989). Decision making is innately cognitive, however it is influenced by different variables, such as environment, affective state and one's characteristics or history (Raglan & Schulkin, 2014). People can either learn what to do and how to decide by trial and error or they need a set of applicable decision making skills. These skills, which represent a normative model of decision making, consist of extracting important information, relating wide-ranging values and beliefs in specific situations, and integrating all of this with a rational decision rule (Parker & Fischhoff, 2002; Parker & Fischhoff, 2005). When *extracting important information*, one must include potential options, attributes, outcomes, and decision strategies (Parker & Fischhoff, 2002). Next two skills, *belief* and *value assessment* refer to the determination of the likelihood of potential outcomes and the determination of the personal value of those outcomes. *Integration* involves combining beliefs and values into intelligible decisions (Parker & Fischhoff, 2002). Parker and Fischhoff (2005) selected seven decision making tasks (Resistance to Framing, Recognizing Social Norms, Under/overconfidence, Applying Decision Rules, Consistency in Risk Perception, Path Independence, and Resistance to Sunk Costs) to represent those four skills. With these seven tasks they created a Youth Decision-Making Competence (Y-DMC; Parker & Fischhoff, 2005), a measure of decision making competence.

Decision Making Styles. Scott and Bruce (1995) talk about five different decision making styles one might use when it comes to decision making; *rational, intuitive, dependent,*

avoidant, and spontaneous. Rational style is described by a search for a logical evaluation of alternatives. Intuitive style is defined by depending on feelings and hunches when making decisions. Dependent decision style is characterized by relying on advice from others. Avoidant style includes the attempts to avoid decision making. Spontaneous style is characterized by impulsiveness, and trying to make a fast decision because of the feeling of a rush (Scott & Bruce, 1995). Their study also showed that people are not bound to use only one decision style, most common is a use of combination of all styles, with a domination of one or a couple of decision styles (Scott & Bruce, 1995). Nygren and White (2005) divided these five decision styles into functional and non-functional decision styles. They consider rational, intuitive or combination of the both to be the functional styles, because those styles are supposed to be beneficial for the decision maker. People, that use those two styles or a combination of the both, report better self-efficacy, optimism, and self-regard (Nygren & White, 2005).

Decision Making Competence and Outcome. People can also make decision with help of heuristics, or biases that can be either beneficial or harmful to the decision outcome (Raglan & Schulkin, 2014). With lower decision making quality, more difficult life experiences can be expected, while the stress of bad decision outcomes might undermine the quality of one's decisions (Bruine de Bruin, Parker, & Fischhoff, 2007).

There have been some studies that were trying to define what is needed for a good decision making competence. Study of Parker and Fischhoff (2005) had an aim to see to what extent individuals show consistent performance differences when presented with typical behavioral decision making tasks, and deriving from that aim they also wanted to see how those differences apply to real-world factors of good decision making. Their findings showed that decision making performance was related to basic cognitive abilities, cognitive styles, developmental conditions, and also risk-taking behaviors. Results of this study also showed that poor decision making on common laboratory tasks is related to everyday decision making in real-world. Bruine de Bruin and colleagues (2007) also focused on what predicts decision-making outcomes. They examined demographic variables, cognitive ability, and decision making styles. Their findings showed that using rational or intuitive decision style is linked to a better decision outcome score, which is in line with the findings of Nygren and White (2005), whereas the usage of avoidant or spontaneous style is related to a more frequent negative decision outcome (Bruine de Bruin et al., 2007). Faletič and Avsec (2013) did a similar research, essentially on the link between decision making styles and subjective well-

being, and the results showed that using the avoidant decision style is related to a worse decision making outcome. Dewberry, Juanchich and Narednran (2013) also discovered that decision making styles predicted decision making competence quite well. Avoidant decision making style, feeling anxious about decision making and rumination about the decision making errors provided a contribution to the decision outcome score (Dewberry et al., 2013).

Parker, Bruine de Bruin and Fischhoff (2015) reported that negative decision outcomes are more common with younger individuals and participants that have lower socio-economic status. They assume that younger individuals had less opportunities to learn how to make decisions, and individuals with lower SES could be exposed to more dangerous situations that present more chances of negative outcomes.

Decision making processes have usually been studied in isolation to understand each process in detail (Bruine de Bruin et al., 2007). Studying decision making in isolation, however, represents a number of limitations, such as limited understanding of how decision making skills are connected with demographic characteristics like SES and age, other cognitive abilities and decision making styles, and real-world outcomes. Examination of decision making of daily activities in real-world is rare.

Is there a way to improve our decision making, and maybe be more aware when making decision in our daily life? One way to be more self-aware and attentive to our thoughts and activities that are happening around us, is mindfulness. Having the ability to sustain mindfulness is beneficial in all situations (Wallace, 2011).

Mindfulness. Mindfulness is a psychological phenomenon that is now being researched in different fields to examine the relevance of it to both physical and psychological health (Garland, 2013). Across different fields, such as psychology, medicine and neuroscience, mindfulness has been gaining a wide interest. Mindfulness has its practice origin in Asia, where it began more than 2500 years ago (Garland, 2013). The concept of mindfulness in the Western psychology is supposed to reflect the Buddhist construct but in reality, the concept varies from a therapeutic technique to a complex activity that requires practice (Grossman & Van Dam, 2011). Buddhist teachings say that mindfulness is innate in everyone but can often be disguised by conditioning throughout life. Mindfulness can therefore be considered as a basic and inherent capacity (Brown et al., 2007). People are rarely completely present in every moment but with a mindful practice we can train the mind to pay attention in a discerning way (Shapiro & Carlson, 2009; Kabat-Zinn, 2015a).

Mindfulness is rooted in attention and awareness, which are essential characteristics of consciousness (Brown, Ryan, & Creswell, 2007). Kabat-Zinn (2015a) argues that out of all meditative wisdom practices that exist in traditional cultures, mindfulness could be the most rudimentary, simple, and common one.

The first one to introduce the concept of mindfulness that can be used as a clinical tool, was Jon Kabat-Zinn in late 1970s. He created mindfulness-based stress reduction (MBSR) practice by adapting Eastern Buddhist practices, whose purpose was to help people with stress (Purser & Milillo, 2015). Mindfulness is said to contribute to wellbeing and helps with stress struggling in many diverse areas like behavioral, cognitive, ethical, social, affective and others (Grossman and Van Dam, 2011).

Mindfulness as awareness. There are different definitions of mindfulness, but most of them relate the concept of mindfulness closely to the concept of awareness. Shapiro and Carlson (2009) consider mindfulness as both a process and an outcome. Mindful awareness is an outcome which refers to attentiveness and presence, which results in so called “freedom of mind”, or in other words freedom from reflexive conditioning. Mindfulness as a process is a practice or a systematic exercise, where one intentionally attends in an open and perceptive way that consists of both knowing and shaping the mind (Shapiro & Carlson, 2009). Mindfulness is the process of paying attention without judgement but with openness, consciously being present and aware (Mars & Oliver, 2016). Shapiro and Carlson (2009) also describe mindfulness as the awareness which arises through purposely attending in an open, caring and nonjudgmental way. Kabat-Zinn (2015a) claims that mindfulness results in increased awareness, and that those two terms are often used synonymously.

Lastly, Shapiro and Carlson (2009) define mindfulness as knowledge about one’s emotional state in the moment, without trying to change it, evaluate it and judge it. Mindfulness is a human capacity with which an individual experiences life in an open, receptive way (Shapiro & Carlson, 2009).

Mindfulness as a state, practice or a trait. With definitions above, we can see, that mindfulness is often defined either as a state, practice or a trait (Garland, 2013). Mindfulness as a *state* is defined by an attentive metacognitive monitoring of present cognition, emotion, perception and sensation (Garland, 2007). As a *trait*, mindfulness is considered as a characteristic that can be developed and enhanced during the practice of mindfulness. (Garland, 2013). Mindfulness trait specifically refers to the tendency of displaying

nonjudgmental, open awareness of individual's thoughts, emotions, actions in day-to-day life (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Dreyfus, 2011). Mindfulness trait can be trained and strengthened with mindful practice (Garland, 2013). Mindful practice is a way to recover unconscious values to awareness and to improve skillful values (Shapiro, Carlson, Astin, & Freedman, 2006).

Buddhist explanation of mindfulness usually refers to practice more than to a trait, but the Western psychology refers to mindfulness more often as a relatively stable trait (Grossman & Van Dam, 2011), which can be assessed with people's description of themselves based on questionnaires.

As it is mentioned already, mindfulness is innate but people can vary in the extent to which they show mindful dispositions (Carmody & Baer, 2008). There are also scales that are meant to assess mindfulness in children, which supports the claim that mindfulness is innate and can be measured in almost everyone (Grossman & Van Dam, 2011). These mindful dispositions can be strengthened with training (Carmody and Baer, 2008). Mindfulness as a trait or state is cultivated by meditation, or in other words, mindfulness practice (Carmody and Baer, 2008; Noguchi, 2017). With mindful practices one induces repeated activation of the mindful state, which can cause long-lasting changes in mindfulness as a trait (Garland et al., 2010). A study from Hölzel et al. (2011) suggested that mindful practice is linked with changes in gray matter concentration in the brain regions that are involved in emotion regulation, self-referential processing, learning, memory processes, and perspective taking.

Shapiro (1992) found that the intentions of people, who practice meditation, shift along a continuum with time and practice, from self-regulation to self-exploration, and in the end to self-liberation. His research also showed that one's intentions were connected also to outcomes. Those results are also in line with results from a study (Shapiro et al., 2006) that claim that intentions are dynamic and evolving, especially with awareness, insight and practice.

Intentional persuasion of mindful awareness is done with mindful practice, which includes a set of skills such as ability to direct and pay attention, less reactivity, better judgement and compassion (Shapiro and Carlson, 2009). Mindful practice can be either *formal* or *informal*. Formal practices consists of systematic meditation practices that are intended to cultivate mindfulness skills, some of them being body scan meditation, sitting meditation and walking meditation. Formal practice can also refer to short daily meditation practice or a practice that is a part of intensive retreat which is consisted of more hours of formal sitting and walking meditation each day for either only a week, months or longer

(Shapiro & Carlson, 2009). Informal practice refers to a practice, where one brings an open attention to whatever activity is going on; reading, driving, eating, etc. It is a generalization of formal practice, to bring attention to everyday life activities (Shapiro & Carlson, 2009).

Mindfulness as a practice is supposed to induce the state of mindfulness. Practices consist of sustaining attention on an object and discarding other thoughts and emotions. Often the object of mindfulness is breathing (Garland, 2013), that can serve as an anchor to consciousness in meditation (Grossman & Van Dam, 2011).

Model of mindfulness (Shapiro, Carlson, Austin & Freedman, 2006). To incorporate both the simple and complex procedures of mindful practice, Shapiro and colleagues (2006) have developed a model. This mindfulness model consists of three basic elements; intention, attention and attitude, which are not individual processes but instead are intertwined parts of a single cyclic process and happen concurrently, informing and feeding back into each other.

The first element, intention, is essential to mindfulness. As it is mentioned above, the outcome of meditation is related with intentions (Shapiro, 1992). Second basic mindfulness component is attention, which involves observing internal and external experience (Shapiro et al., 2006). Attention is the core of mindfulness. Third component is attitude, which is also one of the essential elements of mindfulness. How we practice and attend mindfulness is crucial (Shapiro et al., 2006). Attitude is often overlooked but how one commits to meditation is important. It might not add anything to the experience, however it pervades attention with openness, acceptance, and curiosity (Shapiro and Carlson, 2009).

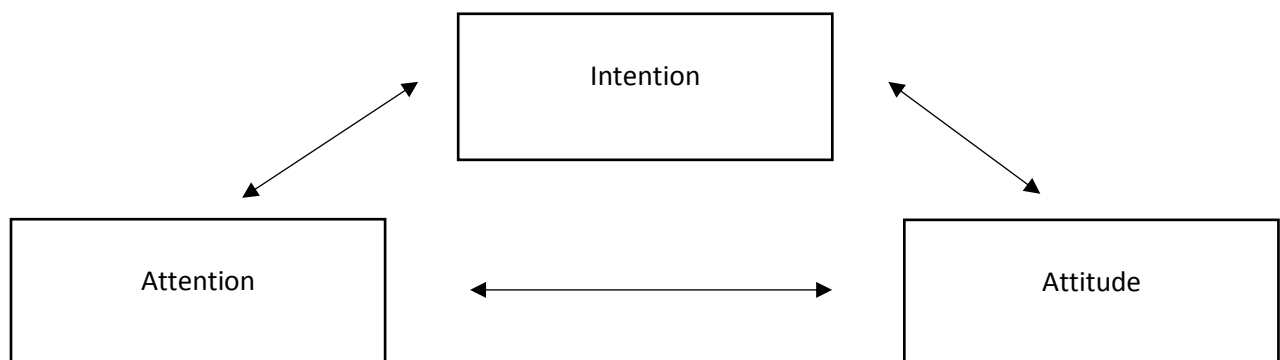


Figure 1. Three elements of mindfulness model, which are not individual process but are intertwined and happen simultaneously.

Their theory infers that intentionally (I) attending (A) with openness and non-judgmentalness (A) can cause an important shift in perspective-reperceiving (Shapiro et al., 2006).

Reperceiving. Reperceiving is expected to develop in the developmental process but mindfulness practice can accelerate the shift (Shapiro et al., 2006). Shapiro and others (2006) argue that mindfulness practice leads to reperceiving, which refers to a perspective shift. Reperceiving is the ability to observe the contents of one's consciousness. Reperceiving leads to a positive outcome and change, and is considered to be a metamechanism of action. Reperceiving enables an individual to stand back and witness an emotional state so one is able to use a wider and more adaptive range of coping skills (Shapiro et al., 2006). Shifting perception may also influence on one's values, that are often conditioned by family, culture, and society (Shapiro et al., 2006). Brown and Ryan (2003) argue as well that people that are "acting mindfully" also act in way that is more congruent with their values and interests. Reperceiving can also lead to more flexible and adaptive reactions to different situations. Shapiro and others (2006) clarify this with an example that if an individual is able to see the environment and his own reactions to it with better clarity, one will be able to react less automatic and conditioned. Shifting perspective helps people to see the situation as it is in the present moment and react accordingly (Shapiro et al., 2006).

Mindfulness leads to perspective shift, and it continues and accelerates this shift. When we are fully aware of the moment, when our attention is open and nonjudgmental, reperceiving happens (Shapiro et al., 2006). Reperceiving can be therefore considered as a change in consciousness (Shapiro et al., 2006).

Measuring mindfulness. There are many methods for measuring human behaviors, traits and psychological functions. Some of these methods are better than others when trying to measure mindfulness. One of the methods of assessing mindfulness are scanning techniques that target especially the results of long-term meditators and results of mindfulness-based practices but are not so useful when trying to evaluate mindfulness in everyday life (Baer, 2011). We can also use cognitive tests that show objective measures of many abilities that are closely related to mindfulness. Another way to measure mindfulness is through self-report questionnaires, where people report their thoughts, behaviors and feelings. Many mindfulness self-questionnaires are established on items that are related to daily activities and tendencies to notice and observe any internal or external experiences (Baer,

2011). Most of these questionnaires consider mindfulness as a trait that is relatively consistent over time (Baer, 2011).

Mindfulness and decision making. With everything mentioned above, we can see that we can closely relate attention and awareness with mindfulness. Not being present and not paying attention can lead to a mis-appraisal of a situation or a circumstance, and it can end in making mistakes in our daily activities (Kabat-Zinn, 2015b). Positive affect, such as opening one's mind to the present and internal and external experiences, enhances decision making (Isen, 2001). Studies, mentioned below, examined how mindfulness affects behavior and decisions in our daily activities.

Hafenbrack, Kinias, and Barsade (2014) did an experiment, in which they focused on effect of mindfulness on the sunk-cost bias, which refers to the tendency to continue with investing in a losing proposition, just because of what we have already invested in. Their results showed that mindfulness does improve decision making by increasing resistance to the sunk-cost bias. In a similar note, Lakey, Campbell, Warren Brown, and Goodie (2007) conducted two studies, where they tested the relation of mindfulness to the severity of gambling outcomes. Both studies suggested that mindfulness is linked with less severe gambling outcomes, which indicates that mindfulness could have a role when it comes to making adaptive decisions, especially in risk-relevant contexts and could also facilitate self-regulation.

A study by Black, Sussman, Anderson Johnson, and Milam (2012) examined if mindfulness helps shield decision making from translating health-risk behavior. They claim that mindfulness may relate to health and risk behaviors by increasing awareness of decision making processes. The results indicated that mindfulness could protect against decision making processes that are harmful for adolescents when it comes to risk for smoking.

Another study (Jo, Hinterberger, Wittman, & Schmidt, 2015) showed that meditators are in comparison with non-meditators more able to access the emergence of negative deflections of slow cortical potentials, which could result in affecting on initiating a voluntary movement with awareness.

A study from Reynolds, Lin, Zhou, and Consedine (2015) examined if a brief state mindfulness induction affects decision making. They predicted that higher state mindfulness would result in less conflicted decision making but they did not discover any links between state mindfulness alone to decision making variables.

Ruedy and Schweitzer (2010) have hypothesized in their study that mindfulness is associated with a lower prevalence of unethical behavior. They also predicted that mindfulness is related with a lower magnitude of unethical behavior. Results showed that individuals with higher mindfulness showed also higher ethical standards. Mindful individuals also reported a higher emphasis on moral principles in comparison to less mindful individuals.

A similar research was done by Shapiro, Jazaieri, and Goldin (2012) where they wanted to see if mindfulness-based stress reductions effects on decision making. They expected that mindfulness-based stress reduction trainings will result in improved decision making among other things. Two-month follow-up results showed that training improved ethical decision making. This study and its results provide evidence which indicate that MBSR might potentially facilitate decision making in adults.

To sum up the studies mentioned above, it is often reported that mindfulness has beneficial effects on our behavior and is linked to a better decision making but there is still a lack of information and evidence when it comes to research on how mindfulness can influence our everyday decision outcomes.

The present study

Mindfulness has gained a lot of interest in the last couple of decades, and there is a growing body of evidence of physical, cognitive and psychological effects. However, there has been little research on mindfulness in relation to decision making, and almost none in relation to real-world decision making, because, as mentioned above, decision competence is usually studied in isolation. The present study aims to contribute to the literature on mindfulness as a trait and decision making, and present some initial findings on the links of both by examining if any of the mindfulness variables have any predictive effect on real-world decision making and decision competence.

Studying decision making in isolation of external factors limits the possibility of generalization and comparison to real-world activities and decisions. Unlike most other studies, this research looks into decision making that is connected to everyday activities, to real world outcomes. Despite the growing interest and literature on mindfulness, and the effects on it on our well-being, little has been done to see if it can affect our decision competence and in what way. Most of the research done on mindfulness, report about beneficial effect of it in all areas, so it could be of great importance to see if and how it influences our decision skills, especially with knowing that mindfulness can be improved with

practice, which could also imply we could improve our decision making if the findings will show the connection between mindfulness and decision making.

We also assess the socio-demographic factors such as gender, age, education and occupation, to see and control their effect on decision making outcome.

Basing on previous research, we hypothesized that decision making will be positively linked with (1) age, education and occupation. We also hypothesized that (2) all facets of mindfulness will be positively related with decision making outcome and that the same facets will have predictive power on decision outcome.

Methods

Participants

There were 199 participants in total, 63 men (31.7%) and 136 women (68.3%), aged 18 to 59 (average 26.6 years). Participants had a diverse employment status, but most participants were students (46.2% with 26.1% employed full time, 14.1% studying and working part time, 5.5% studying and working full time, 4.0% employed part time, 1.5% unemployed, 0.5 retired and 2.0 % other). Participants also had diverse educational background, but most had Bachelor's degree (49.7%, with 25.1% participants with high school education, 22.6% with Master's degree, 1.0 % with Doctoral degree, 0.5% with grammar school and 1.0 % with other).

The only inclusion criteria was that they should be 18 years or older.

Materials

Mindfulness. Five Facet Mindfulness Questionnaire (FFMQ, Baer et al., 2006) was used to assess one's mindfulness. FFMQ was developed by using five different mindfulness questionnaires, for which the authors examined the facet structure of mindfulness. The already developed questionnaires that were used were The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), The Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman, & Walach, 2001), The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), The Cognitive and Affective Mindfulness Scale (CAMS; Feldman, Hayes, Kumar, & Greeson, 2004; Hayes & Feldman, 2004), and The Mindfulness Questionnaire (MQ; Chadwick, Hember, Mead, Lilley, & Dagnan, 2005). Authors examined psychometric properties of those five questionnaires, and the factor analysis of all items gave five interpretable facets of mindfulness (Baer et al., 2006). These five factors that represent mindfulness are *Observing*, *Describing*, *Acting with awareness*, *Non-judging of inner*

experience, and *Non-reactivity to inner experience*. The facet *Observing* refers to noticing or attending to both internal and external experiences, i.e. sensations, emotions, cognitions, sounds, sights (i.e. “When I’m walking, I deliberately notice the sensations of my body moving.”), (Baer et al., 2008). *Describing* includes giving words to internal experiences, describing internal experiences (i.e. “I’m good at finding words to describe my feelings.”). Next facet, *Acting with awareness* refers to attending to one’s activities in the moment, being present (i.e. “When I do things, my mind wanders off and I’m easily distracted.”). *Non-judging of inner experience* involves having a nonevaluative stance toward all the thoughts and feelings one might experience (i.e. “I criticize myself for having irrational or inappropriate emotions.”). The last facet, *Non-reactivity to inner experience* refers to predisposition of allowing thoughts and feelings to come and go, without getting stuck in them (i.e. “I perceive my feelings and emotions without having to react to them.”), (Baer et al., 2008).

FFMQ consists of 39 items and each item scores between 1 and 5 (1 being never or very rarely true and 5 being very often or always true). Scores are calculated by adding the scores on the individual items. Facets score range from 8 to 40 (except for the *Nonreactivity* facet, which only ranges from 7 to 35, because it has an item less), with lower scores indicating less mindfulness and higher score indicating higher mindfulness.

Baer and others (2008) analyzed the internal consistency of FFMQ facets, and alpha coefficients for all five of the facets were adequate-to-good (.72 to .92), except for the “*Nonreactivity to internal experience*” facet, where the alpha coefficient was .67. Another study by Baer and others (2006) found that FFMQ has reasonable psychometric properties and that it is the only questionnaire that has all five of the mindfulness facets.

Decision making The Decision Outcome Inventory (DOI; Bruine de Bruin et al., 2007) was used to assess decision quality of participants. DOI is a self-report questionnaire that measures individual differences in real-world decision making. DOI was developed to test the external validity of Adult Decision-Making Competence (A-DMC; Bruine de Bruin et al., 2007), another decision making measure which was developed from Youth Decision-Making Competence (Y-DMC; Parker & Fischhoff, 2005). DOI has 41 decision outcomes which are divided into 34 item-pairs and six individual items. Item-pairs have a preceding screening question, asking if an individual was involved in a decision about a certain event (i.e. rented a movie) and the question related to it is if one has experienced a negative outcome of that decision (i.e. returned a movie without watching it at all). Individual

questions ask if an individual has encountered certain outcome, positive or negative, that is related to decision making (e.g. been in jail cell overnight for any reason). The overall DOI score is calculated by weighting negative decision outcomes with the proportions of participants who reported that they did not experience the outcome (e.g. quit a job after a week), although they had the possibility (e.g. had any kind of job). The average score is in the end subtracted by zero so the higher score represent better decision outcomes. By weighing these scores, the overall DOI score assumes that less frequent outcomes are more severe than the more frequent outcomes.

DOI was developed by Bruine de Bruine and colleagues (2007), to provide a direct measure of real-world decision outcomes. It showed good internal consistency, with a single-factor solution having high loadings of almost all items of A-DMC. Reliability of DOI was good, Cronbach's $\alpha=.87$ (Juanchich, Dewberry, Sirota, & Naredran, 2016).

Some changes were done to DOI in the present study to make it more relatable to our participants' everyday life. As we expected most of our participants to be from Europe because of how the questionnaires were shared, we made changes in accordance to our expectations. We changed the money currency from US Dollar to Euro, which affected four pair-items. We also rephrased an item that used an abbreviation that might be unknown to our participants ("Received a DUI for drunk driving" to "Received a fine for drunk driving").

Socio-demographic variables

Socio-demographic variables included age, gender, education level, and occupation. We included those variables to control any effect they might have on decision making outcome.

Procedure

Participants were approached either through mail or through social platform (Facebook). The link to the questionnaire was shared mostly through social networks, such as Facebook group pages about mindfulness and meditation, mainly because of the potential interest in topic. The recruitment was from April 2016 to July 2016. Participants were presented with a questionnaire that included information about the research, socio-demographic questions and both questionnaires for mindfulness and decision making. It took about 15 minutes to complete the questionnaire. Before taking a part in the study, participants were informed about the purpose and had to give their consent to participate in it. Contact details were

provided, in case they had any questions or concern. There were no rewards or compensations for participating in the study.

The participants had to first fill in the sociodemographic questions, then they proceeded with FFMQ, which assessed one's mindfulness, and the last questionnaire was DOI, the Decision Outcome Inventory. Completing the decision making questionnaire meant the end of the experiment.

Ethical considerations

The research was in line with all ethical requirements on Ethics of Research Involving Humans. The study did not deal with sensitive personal data, did not use a method that involved a physical intervention on research participants, did not use a method that sought to affect the subject physically or mentally, did not pose a risk of mental or physical harm, or used a biological material taken from a living person that can be traced back to that person.

All participants were at least 18 years of age. All questionnaires that were used in the research were standardized and validated. Prior to answering the questionnaire, the participants were given information about the research, they were informed about the possibility to stop with answering at any point if they wished so, and were asked to give their consent with knowing that responses will not be recognized by individual. It was also noted that the participation was voluntary.

Data handling and data transformation

For all the analyses that was done, IBM SPSS (version 20.0) was used. To identify, if there were any univariate outliers, standardized z-scores were used. Two cases were identified, one on the mindfulness scale and one on the decision making scale. To identify any multivariate outliers, the Mahalanobis distance with criterion $p < .001$ was used, however, no outliers were found. Two univariate outliers were removed from the study, so we were left with 202 participants. After the removal of two outliers, test of normality showed non-normally distributed data, DOI score displayed negative skewness, so the exponential transformation of data was done. Boxplot after data transformation still showed three outliers, which were removed, after that the test of normality and numbers of skewness/kurtosis were better and in the normal range. In the end, total of 5 outliers were removed, so we were left with 199 participants.

Descriptive statistics and correlational analyses

Descriptive statistics and frequency analysis were done to describe the sample we have. To define the relationship between the sociodemographic variables, all the five mindfulness facets and decision outcomes, correlation analysis was done. After the transformation and outlier removal, the test of normality showed acceptable results, so for all analyses that were done, parametric tests were used.

Hierarchical multiple regression

Lastly, hierarchical multiple regression was done to detect and describe predictors that could explain variance in decision making competence. In the first step, we entered all sociodemographic variables (gender, age, education, and occupation), and in the second one we included all five facets of FFMQ. Before running the analysis, all assumptions for multiple regression were checked and confirmed.

Results

Characteristics. Demographic characteristics and information about participants are shown in Table 1. The majority of sample included women, aged between 18 to 34 years that have Bachelor's degree and are studying.

Table 1

Characteristics of participants

Characteristics	Count	Percentage (%)
Gender		
Man	63	31.7
Woman	136	68.3
Age		
18 – 34 years	180	90.5
35 – 50 years	16	8.0
51 years →	3	1.5
Education		
Grammar School	1	0.5
High school or equivalent	50	25.1

Bachelor's degree	99	49.7
Master's degree	45	22.6
Doctoral degree	2	1.0
Other	2	1.0
Occupation		
Unemployed	3	1.5
Student	92	46.2
Employed part time	8	4.0
Studying and working part time	28	14.1
Retired	1	0.5
Studying and working full time	11	5.5
Employed full time	52	26.1
Other	4	2.0

Descriptive statistics. We can find descriptive statistics for all the measures that were used in the study in Table 2. More specifically, the table below shows the number of participants, mean, standard deviation and range for all the measures, as well as the internal consistency for all the facets of FFMQ, the questionnaire which we used to assess mindfulness. All of those facets showed high internal consistency. Cronbach's alpha was above .70 for all component measures of FFMQ. The highest internal consistency is for facet *Non-judging of inner experience* ($\alpha=.91$), while the lowest is for facet *Observing* ($\alpha=.72$).

Table 2

Descriptive statistics for the measures use

Domain	Measure	N	Mean	SD	95% CI	Alpha
Decision competence	DOI	199	.89	.05	[.88 .90]	
	Observe	199	27.27	4.94	[26.58 27.96]	.72
Mindfulness (FFMQ)	Describe	199	29.01	6.06	[28.16 29.85]	.89

Act with Awareness	199	26.71	5.78	[25.9	27.52]	.85
Nonjudge	199	26.53	7.37	[25.5	27.56]	.91
Nonreact	199	21.32	5.03	[20.61	22.02]	.82

Outcome frequencies. Participants reported decisions that could have produced 64.6% ($SD = 8.1$) of all possible DOI's outcomes. Six of those outcomes are counted as possible for all that participated in the study, because those items did not have a preceding question (such as "been in a public fight or screaming argument"). In total, participants reported 25.7% ($SD = 9.6$) of negative outcomes they could have experienced. The least common outcome reported is "declared bankruptcy" which was not reported by a single participant. The most common outcome, on the other hand, is "threw out food or groceries you had bought because they went bad". It was reported by 85.4% out of the 100% of participants that reported shopping for food or groceries. Appendix B shows the DOI questionnaire as well as the more detailed results of all decision outcomes, specifically, it shows the percentage of participants who had made the decision that created the possibility of experiencing negative outcome and also the percentage of participants that reported experiencing the negative outcome.

Sociodemographic variables and decision outcome. There were no significant correlations between sociodemographic variables and decision, but only gender and occupation are positively correlated with the outcome on DOI. Age and education were negatively connected with decision-outcome, which is not in line with findings of Parker and others (2015), who claim that younger participants and those with lower SES will have a worse outcome on decision making questionnaire.

Link between FFMQ and DOI. Table 3 shows the correlations of DOI and all facets of FFMQ. The p value was set at .05. Only one facet was significantly correlated to DOI, facet *Nonjudging of inner experience*. Other, except for one, were positively correlated with the decision making measure, but not significantly. The only FFMQ facet that was negatively linked to DOI was *Describe*, but that correlation was not significant.

All of the facets in FFMQ were positively intercorrelated with each other, but not all connections were significant. Facet *Describe*, *Acting with awareness*, *Non-reactivity to inner experience* are significantly correlated with all others facets in FFMQ. Facet *Observe* is not significantly correlated with *Non-judging of inner experience*, which is the only non-significant correlation. This result, however, already appeared in a couple of other studies (e.g. Baer et al., 2006; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011), where those two facets were not intercorrelated.

Table 3

Correlations among the measures in the study

Measure	1	2	3	4	5	6
DOI	-					
Observe	.014	-				
Describe	-.006	.232**	-			
Actaware	.097	.235**	.428**	-		
Nonjudge	.140*	.117	.327**	.365**	-	
Nonreact	.030	.146*	.176*	.352**	.343**	-

Note. DOI = Decision Outcome Inventory, Actaware = act with awareness.

Predictive validity of FFMQ on DOI. Hierarchical multiple regression was done to see if any of the subscales of FFMQ have predictive power on DOI score. Before the hierarchical multiple regression was done, all assumptions of multiple regression were checked. We tested for independence of residuals, linear relationship, homoscedasticity, multicollinearity, outliers and the distribution of residuals. For independence of residuals, Durbin-Watson was used, and the results were in the normal range. Inspection of scatter plots did not indicate homoscedasticity, and the tolerance values did not show any multicollinearity. Test of normality for residuals did not show any extreme results. In the first entry, we selected four variables which we wanted to control for and make sure they don't affect the size of predictable variables. Those four variables were gender, age, education and occupation. In the second step, all five facets of FFMQ (*Describe*, *Observe*, *Awareness*, *Nonjudge* and *Nonreact*) were entered. The first model, which included socio-demographic variables (gender, age, education and occupation) displayed 2.8% of the total variance in the DOI score, however the results indicated that the affect was not significant.

The second entry which included FFMQ facets beside socio-demographic variables, explained additional 3.3% of variance, making the total of 6.1% of variance explained by both models. None of those were statistically significant.

Table 4

Summary of Hierarchical Regression Analysis for Variables Predicting Decision Outcome Inventory (N=199)

Variable	Model 1				Model 2			
	B	SE B	β	95% CI	B	SE B	β	95% CI
Gender	.014	.008	.136	[-.001 .029]	.017	.008	.160	[.001 .033]
Age	.000	.001	-.017	[-.001 .001]	.000	.001	-.046	[-.002 .001]
Education	-.007	.005	-.108	[-.016 .003]	-.006	.005	-.094	[-.015 .004]
Occupation	.002	.002	.079	[-.002 .005]	.002	.002	.075	[-.002 .005]
Observe					.000	.001	-.019	[-.002 .001]
Describe					-.001	.001	-.094	[-.002 .001]
Awareness					.001	.001	.095	[-.001 .002]
Nonjudge					.001	.001	.157	[.000 .002]
Nonreact					---	.001	-.005	[-.002 .002]
R^2		.028				.061		
F for change in R^2		1.386				1.374		

* $p < .05$ ** $p < .01$.

Discussion

Main findings linked to previous studies

Based on the results that were found by the previous research, the present study aimed to explore two questions. First, we examined how age and socio-economic status (education and occupation) relate to real-world decision making. Second, we examined the link of various

mindfulness facets and real-world decision making competence. There was not a lot of research done on mindfulness in connection to decision making before, but similar studies showed that mindfulness could potentially facilitate decision making (Shapiro et al., 2012). Previous studies also showed that negative decision outcomes are more common in younger individuals and people that have lower socio-economic status (Parker et al., 2015). The results in the present study did not confirm those findings, and even though the correlation was not statistically significant, the decision making outcome was negatively correlated with age and education. Results also showed that only one facet of mindfulness was statistically significantly related to decision making outcome. Hierarchical regression did not show any statistically significant predicting effects of mindfulness on decision making. Our hypotheses were therefore not confirmed.

Sociodemographic variables. Parker and others (2015) found that being young and poor will result in worse decision outcomes. They reason it with a claim that younger participants had less opportunities to learn how to make decisions whereas people with lower SES might experience more dangerous situations that can present higher chances of negative outcomes. Our results were not in line with their findings, and although the results were not statistically significant, they showed a negative correlation between decision outcomes score and age/education. This could be explained with that older participants had more opportunities to experience certain negative outcomes in their life (such as divorce, bankruptcy) while younger individuals are still in the beginning of their adulthood and therefore did not yet have an opportunity to experience certain events mentioned in Decision Outcome Inventory. Another important thing to note is the number of older participants we had. Only 19 participants out of 199 in total, were older than 35 years, so we cannot generalize the findings because the sample of older participants was so small. Because of both small, non-significant correlation between education/occupation and DOI, and relatively homogenous sample we had, any conclusion about the relationship of SES and DOI is impossible.

Intercorrelations between mindfulness facets. Correlational analysis between the facets of FFMQ showed that almost all mindfulness facets were significantly intercorrelated with each other, which was in line with expectation. Facet *Observe* was not significantly linked to the facet *Nonjudging of inner experience*, which was not unexpected, as other studies (Baer et al., 2006; Bohlmeijer et al., 2011) have already reported about the same

finding. Facet *Observing* refers to attending to one's internal and external experience, while on the other hand, facet *Nonjudging of inner experience* focuses more on having a neutral stance toward all emotions and thoughts and not reacting to them. These two facets emphasize different aspect of mindfulness, and therefore are not expected to correlate with each other.

Correlation between mindfulness facets and decision making outcome. Our research also focused on the link of various mindfulness facets and real-world decision making competence. Previous research indicated that mindfulness enhances decision making (Isen, 2001; Shapiro et al., 2012) and that higher state mindfulness should result in less conflicted decision making (Reynolds et al., 2015). Our hypothesis was derived from those results, and we speculated that all five facets of mindfulness will be positively related with decision making outcome and will also have predictive power on it. Correlation analysis showed the only significant link between mindfulness facets and decision making outcome was with facet "*Nonjudging of inner experience*". This facet can be seen as a way of operationalizing acceptance and nonjudgment (Baer et al., 2006). All other facets, except *Describe*, displayed a positive but non-significant correlation with DOI. Facet *Describe*, which refers to describing inner experiences and feelings with words, was the only facet that had a negative correlation with DOI but the link was not statistically significant, so we cannot make any certain conclusions and generalizations about it. From the results and significant link between DOI and "*Nonjudging of inner experience*", we can speculate that abstaining from judgements, when we have a certain experience, such as when we are feeling anxious, and not being critical about it, is significantly related to a better decision outcome score. This result is in line with some of the similar past studies (i.e. Bruine de Bruin et al., 2007; Dewberry et al., 2013; Faletič & Avsec, 2013), where they discovered that avoidant decision making style is linked to a worse decision making outcome. Avoidant decision style refers to avoiding making decisions, being anxious about it and ruminating about the errors after (Scott & Bruce, 1995), whereas FFMQ facet "*Nonjudging of inner experience*" refers to having a nonevaluative stance towards any feelings or thoughts one might have (Baer et al., 2006), which shows a different attitude towards decision making. We can conclude that people, that accept their thoughts and emotions with a neutral attitude, show a better decision making competence than people that are judgmental and anxious about their decisions.

Predictive validity of mindfulness. To further test for our hypothesis that the five mindfulness facets can predict decision making score, hierarchical multiple regression was done. We examined if mindfulness facets add to the explanation of variance beside the variance explained by socio-demographic variables. The first model of our hierarchical multiple regression included socio-demographic variables (gender, age, education and occupation), but as we can see in Table 5, these predictors were not statistically significant. Facets of FFMQ were added in the second step, and all of those facets together explained some additional variance, but none of the mindfulness facets or all of them together were a good predictor of decision making outcome, so our hypothesis was not confirmed, and we cannot conclude that mindfulness facets have any predictive validity on decision making outcome. Further studies are needed to verify the result and provide more information.

Strengths, limitations and directions for future research

The strong point of the present study is that it explores everyday decision making, while most research on decision making is done in isolation that present a number of limitations, mentioned already in the Introduction. This study is also the first research to our knowledge to examine the mindfulness and real-world decision making. It provides first information on the both constructs and gives a new insight on the links between them.

There were some limitations with the present study. The design of the research was cross-sectional and self-reports were used for assessing both mindfulness and decision making outcome. Self-report data could be vulnerable to respondent bias. Participants were recruited through Internet, which represents the possibility of selection bias in regard to underrepresentation of specific groups of people. The present study also focused on individual differences, and in this respect the sample could be regarded as relatively homogeneous (considering gender, age, education and occupation). Future research should try to use a larger, more heterogeneous sample. Research in the future should also try to include different assessments of mindfulness beside self-reports. It would also be better to use more measures on decision making outcomes, to assess the entire complexity of decision making, and provide an even better understanding of decision competence.

When trying to assess the socio-economic status of participants, we used education and occupation, which could be problematic when trying to sort it out hierarchically. A better option would be to also assess individual's yearly income so it would be clearer to sort.

To explore decision making outcome we used DOI, which assesses situations and events that have happened over the last 10 years. Some of the outcomes can be irrelevant for younger participants (e.g. divorcing while they are at the moment still in high school). There are also some items that are not relevant anymore. Therefore, it would also be good to update DOI with new items that are more relevant and relatable for this time. Some of the outcomes, that DOI considers negative, might as well be actually good. For example, sometimes a divorce is the best decision for a marriage that is not working anymore.

Because of the scarce information and so little data on mindfulness' effect on decision making outcomes, there is definitely a need for more research in general on the mentioned topic in order to draw on stronger conclusions.

Conclusion

Mindfulness in relation to everyday decision making has so far been neglected and overlooked, even though it could provide crucial information on how to improve our life by making better decisions. Although our hypotheses were not confirmed, this study still contributes to the literature on mindfulness, decision making and the possible relationship between the both, so it has achieved its original purpose. Our results indicate an important link between being nonjudgmental and taking a nonevaluative stance towards our feelings and thoughts, and a better decision making outcome. This is in line with previous studies on decision styles and decision outcomes, where it is indicated that being anxious and avoidant when it comes to decision making, results in worse decision outcome. Our findings offer a new knowledge on the link of decision outcome and this specific mindfulness facet. Our study did not provide any evidence on the link between sociodemographic variables and decision outcomes, or on the predictive validity of mindfulness on decision making outcome, but it is important to note the limitations, mentioned above, that could represent a reason behind the lack of statistically significant results. Further research is needed to provide a more detailed understanding of factors that were presented in this study.

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Appendix A

DOI questionnaire and response frequencies

<u>In the last 10 years</u> , have you ever...	Percentage that made the decision	Percentage who experienced the negative outcome
1. a. Rented a movie	58.8	
b. Returned a movie you rented without having watched it at all		35.9
2. a. Bought new clothes or shoes	100	
b. Bought new clothes or shoes you never wore		54.3
3. a. Gone shopping for food or groceries	100	
b. Threw out food or groceries you had bought, because they went bad		85.4
4. a. Done your own laundry	97.5	
b. Ruined your clothes because you didn't follow the laundry instructions on the label		27.8
5. a. Been enrolled in any kind of school	93.0	
b. Been suspended from school for at least one day for any reason		3.8
6. a. Had any kind of job	95.5	
b. Quit a job after a week		9.5
7. a. Had a driver's license	89.4	
b. Had your driver's license taken away from you by the police		1.7
8. a. Driven a car	95.5	
b. Been accused of causing a car accident while driving		11.1
c. Gotten more than 5 parking tickets		5.3
d. Gotten more than 5 speeding tickets		0.5
e. Gotten lost or gone the wrong way for more than 10 minutes while driving		47.4

f.	Locked your keys in the car		5.3
9.	a.	Bought any kind of car	33.7
	b.	Had to spend at least 500€ to fix a car you had owned for less than half a year	19.4
10.	a.	Taken a trip by airplane	95.0
	b.	Missed a flight	10.1
11.	a.	Taken the train or the bus	97.5
	b.	Taken the wrong train or bus	52.1
12.	a.	Had any form of ID (driver's license, passport, birth certificate)	99.5
	b.	Had your ID replaced because you lost it	18.2
13.	a.	Lived in a rented apartment or other rental property	82.4
	b.	Been kicked out of an apartment or rental property before the lease ran out	1.2
14.	a.	Carried a key to your home	97.5
	b.	Had the key to your home replaced because you lost it	16.0
	c.	Locked yourself out of your home	39.7
15.	a.	Been responsible for electricity, cable, gas or water payments	62.3
	b.	Had your electricity, cable, gas or water shut off because you didn't pay on time	1.6
16.	a.	Been responsible for a mortgage or loan	20.6
	b.	Foreclosed a mortgage or loan	12.2
17.	a.	Been responsible for rent or mortgage payments	53.8
	b.	Paid a rent or mortgage payment at least 2 weeks too late	17.8
18.	a.	Used checks	12.1
	b.	Had a check bounce	16.7
19.	a.	Had a credit card	72.4
	b.	Had more than 5000€ in credit card debt	19.4

20.	a.	Invested in the stock market	18.1	
	b.	Lost more than 1000€ on a stock-market investment		22.2
21.	a.	Been to a bar, restaurant, or hotel	99.5	
	b.	Been kicked out of a bar, restaurant, or hotel by someone who works there		9.1
22.	a.	Loaned more than 50€ to someone	61.3	
	b.	Loaned more than 50€ to someone and never got it back		30.3
23.	a.	Had a romantic relationship that lasted for at least 1 year	76.9	
	b.	Cheated on your romantic partner of 1 year by having sex with someone else		5.9
24.	a.	Been married	10.1	
	b.	Been divorced		10.0
25.	a.	Had sex	92.0	
	b.	Been diagnosed with an STD		4.9
	c.	Had an unplanned pregnancy (or got someone pregnant, unplanned)		3.8
26.	a.	Had sex with a condom	86.4	
	b.	Had a condom break, tear, or slip off		41.9
27.	a.	Had an alcoholic drink	95.5	
	b.	Consumed so much alcohol you vomited		74.7
	c.	Received a fine for drunk driving		1.1
28.	a.	Been out in the sun	98.5	
	b.	Got blisters from sun burn		43.4
29.	a.	Been in a jail cell overnight for any reason		2.0
30.	a.	Been in a public fight or screaming argument		25.1
31.	a.	Declared bankruptcy		0.0

- | | | | |
|-----|----|-----------------------------------------------------------------------------------------------|------|
| 32. | a. | Forgotten a birthday of someone close to you and did not realize until the next day or later. | 59.8 |
| 33. | a. | Been diagnosed with type 2 diabetes | 0.5 |
| 34. | a. | Broke a bone because you fell, slipped, or misstepped | 15.6 |
-

Appendix B**Five Facet Mindfulness Questionnaire**

Please rate each of the following statements using the scale provided. Choose a number that best describes your own opinion of what is generally true for you.

1	2	3	4	5
never or very rarely true	rarely true	sometimes true	often true	very often or always true

- _____ 1. When I'm walking, I deliberately notice the sensations of my body moving.
- _____ 2. I'm good at finding words to describe my feelings.
- _____ 3. I criticize myself for having irrational or inappropriate emotions.
- _____ 4. I perceive my feelings and emotions without having to react to them.
- _____ 5. When I do things, my mind wanders off and I'm easily distracted.
- _____ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
- _____ 7. I can easily put my beliefs, opinions, and expectations into words.
- _____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.
- _____ 9. I watch my feelings without getting lost in them.
- _____ 10. I tell myself I shouldn't be feeling the way I'm feeling.
- _____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
- _____ 12. It's hard for me to find the words to describe what I'm thinking.
- _____ 13. I am easily distracted.
- _____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
- _____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
- _____ 16. I have trouble thinking of the right words to express how I feel about things
- _____ 17. I make judgments about whether my thoughts are good or bad.

- _____ 18. I find it difficult to stay focused on what's happening in the present.
- _____ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.
- _____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- _____ 21. In difficult situations, I can pause without immediately reacting.
- _____ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.
- _____ 23. It seems I am "running on automatic" without much awareness of what I'm doing.
- _____ 24. When I have distressing thoughts or images, I feel calm soon after.
- _____ 25. I tell myself that I shouldn't be thinking the way I'm thinking.
- _____ 26. I notice the smells and aromas of things.
- _____ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.
- _____ 28. I rush through activities without being really attentive to them.
- _____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
- _____ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
- _____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
- _____ 32. My natural tendency is to put my experiences into words.
- _____ 33. When I have distressing thoughts or images, I just notice them and let them go.
- _____ 34. I do jobs or tasks automatically without being aware of what I'm doing.
- _____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.
- _____ 36. I pay attention to how my emotions affect my thoughts and behavior.
- _____ 37. I can usually describe how I feel at the moment in considerable detail.
- _____ 38. I find myself doing things without paying attention.
- _____ 39. I disapprove of myself when I have irrational ideas.