Decision-making styles and their associations with decision-making competencies and mental health

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Abstract

This study investigates the psychometric characteristics of the General Decision-Making Scale (GDMS) on a sample of Slovak high-school and university students. Secondly, it addresses the relationship between decision-making styles and a) decision making competencies and b) mental health as validity criteria. Participants were 427 Slovak high school and university students (64.6% females). The GDMS showed a good internal consistency and its original factor structure was confirmed. Low but significant relationships between the decision-making styles were found. Two decision-making styles served as significant predictors of the general decision-making competency (avoidant and spontaneous) and another two were found to predict mental health. The intuitive decision-making style was a protective factor and the avoidant style was a risk factor.

Keywords: decision-making styles, decision-making competence, mental health, well-being, stress, depression

1   Introduction

Scott & Bruce (1995) have identified two main approaches to decision-making style. Firstly, decision-making styles can be understood as a habitual pattern which individuals use in decision-making. Secondly, decision-making styles can be understood as individuals' characteristic mode of perceiving and responding to decision-making tasks. In their later work, the same authors defined decision-making styles as "the learned habitual response pattern exhibited by an individual when confronted with a decision situation. It is not a personality trait, but a habit-based propensity to react in a certain way in a specific decision context."(Scott & Bruce, 1995, p. 820). The two terms—decision-making styles and cognitive styles—are often used synonymously. (Appelt et al. (2011) state that instruments originally constructed to measure cognitive styles are often used to measure decision-making styles.) In the end, both cognitive styles and decision-making styles describe processes involved in decision-making or (more generally) thinking, and even Scott & Bruce (1985) found the question of general cognitive abilities underlying decision-making styles still open to dis-

pute. Kozhevnikov (2007) views decision-making styles as a sub-component of cognitive styles.

Five decision-making styles have been identified as a result of a project based on four separate populations and described in behavioral terms (Scott & Bruce, 1995). The first of them, the rational style, is characterized by the search for and logical evaluation of alternatives. The intuitive style is characterized by attention to detail and a tendency to rely on feeling while the dependent one is characterized by the search for and reliance on the advice of others. The avoidant style is the tendency to avoid decisions whenever possible and spontaneous style is characterized by a sense of immediacy and desire to complete the decision-making process as soon as possible.

As a result of this theoretical framework and psychometric evaluation, a 25-item General Decision-Making Style Inventory has been created with five items measuring each of the five styles (Scott & Bruce, 1995). The inventory has been validated in Canada, Sweden, the United Kingdom and Italy (Loo, 2000; Thunholm, 2004; Spicer & Sadler-Smith, 2005; Gambetti et al., 2008) with the instrument showing good psychometric characteristics and the authors in different countries confirming its factor structure. Convergent validity was investigated by analyzing the relationships between sensation seeking, locus of control and decision-making styles (Gambetti et al., 2008). Construct validity was assessed by exploring the associations between decision-making styles and values (Loo, 2000). Inspired by the conflict theory of decision-making (Janis & Mann, 1977), Mann et al. (1997) propose four coping patterns in decision-making situations—vigilance, hypervigilance, buck-passing and procrastination, which are in some aspects similar to the styles introduced by Scott

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and Bruce. Other approaches have been more general and have suggested the existence of only two decision-making styles (Pacini & Epstein, 1999)—the rational and the experiential—as part of a dual process theory of information processing.

Do some of the decision-making styles lead to better decisions than others? The relationships between decision-making styles and the other stable decision-making characteristic—decision-making competencies—seem to be low. Parker, Bruine de Bruin & Fischoff (2007) have reported a very weak positive correlation between the rational style and the total decision-making competencies score, while the avoiding and spontaneous decision-making style were weakly negatively related to the decision-making competencies. While the relationship between decision-making styles and other cognitive characteristics has been investigated, little attention has been given to their connection with real-life outcomes and to their predictive validity. However, an association of all decision-making styles except for the intuitive style has been reported in relation to life outcomes (Galotti, Ciner, Altenbaumer, Geerts, Rupp & Woulfe, 2006), but Parker et al. (2007) found the four decision-making styles, with the exception of the dependent style, to be related (rational and intuitive positively, avoidant and spontaneous negatively) with decision outcomes.

Many important decision outcomes involve health. The present study focuses specifically on mental health. The World Health Organization (2014) defines mental health is the state of well-being in which individuals realize their own potential, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to their community. Its role in health is even stressed in the WHO's definition of health as a state of complete physical, mental and social well-being (World Health Organization, 1948). It is important to examinenot only the negative aspects of mental health such as mental disorders but also other aspects of psychological well-being (for example stress or coping) and their associations with other characteristics (such as possible risk or protective factors). The term mental health as it is used in the present article refers to the group of various aspects of mental health with some common characteristics. There is no specific mental health diagnostic test and it is identified "only as collection of symptoms and outward signs (i.e., syndromes) of the underlying state of condition" (Keyes et al., 2008). Three mental health indicators are used in this study: well-being, stress and depression.

In one of the few studies to explore the association of decision-making styles and mental health, the Melbourne Decision-Making Questionnaire was used (Yilmaz et al., 2013). It found medium or low correlations in a university student sample between subjective well-being and all four investigated decision-making styles—positive with

vigilance and negative with buck passing, procrastination and hyper vigilance. In another study which looked at Turkish adolescents a positive correlation of subjective well-being with vigilance was found while negative associations with panic, complacency and cop-out were reported (Cenkseven Önder & Çolakkadıoğlu, 2013). In addition, a significant relationship of the decision-making styles from the Melbourne Decision-Making Questionnaire was found with coping with stress and life events (Deniz, 2006). The avoidant decision-making style was found to be negatively related to well-being—while other correlations were not significant. Life satisfaction was negatively related to buckpassing, procrastination and hypervigilance and positively related to vigilance. The association between decision-making styles and stress (measured through saliva cortisol release) was investigated in Swedish military officers (Salo & Alwood, 2011). It was found that the avoidant style was related to distress not only after, but even before a decision, suggesting a generally higher level of cortisol secretion (Salo & Alwood, 2011).

The association of depression and decision-making is also included in the DSM manual with indecisiveness listed as one of the core characteristics of depression (American Psychiatric Association, 2000). In general, "individuals with greater depressive symptoms make less productive decisions and engage fewer adaptive decision-making strategies" (Leykin, Roberts & DeRubeis, 2011, p. 337). Leykin & DeRubeis (2010) found significant correlations between five out of the seven extracted decision-making styles with depression (measured by the Beck Depression Inventory-II). Only the spontaneous and the dependent styles were not associated with depression. Depression was found to be positively correlated with the avoidant style, brooding and anxious style and was negatively associated with the vigilant and intuitive decision-making styles.

This theoretical overview has led to the three main aims of the present research. Firstly, we investigated the psychometric characteristics of the GDMS, namely the factor structure of the GDMS, its inner consistency and sub-scale intercorrelations. Secondly, we studied the relationships between decision-making styles and decision-making competencies. Thirdly, we explored the associations between the decision-making styles and the three indicators of mental health: well-being, perceived stress and depression. Decision-making competencies and mental health indicators were included to assess concurrent and predictive validity of the GDMS. These types of validity are important and yet have not been sufficiently studied (for exceptions see Galotti et al., 2006; Dewberry, Juanchich &Narendrab, 2013). Studies which have used GDMS have mostly reported the factor structure and inner consistency (Cronbach's alpha) of this instrument.

2 Materials and methods

2.1 Sample

We used two samples, which together amounted to a total of 427 high school and university students (64.6% females, age 18–36, mean age 21.43, SD = 2.12). This whole sample was used to assess the inner consistency and factor structure of the GDMS. The first sample (213 high school and university students from different schools in Košice, Eastern Slovakia, 47% females, age 18–26, mean age 21.47, SD = 2.56) was used to examine the relationships between decision-making styles and decision-making competencies. The participants were asked to fill in the questionnaires during their classes in 2012. The second sample (n = 212, 82.5% females, age 19–36, mean age 21.39, SD = 1.57) consisted of other students from universities in Košice. The collection of these data was part of the SLiCE (Student Life Cohort in Europe) research project. The data came from the second round of this study. The selected universities provided e-mail addresses of all first year students and they were asked to participate in the first round of the study. From 4062 students 814 provided data by completing an online questionnaire (response rate = 20.03%) and 237 participated also in the second round (response rate = 29.12% from the first round, 5.83% from all asked students). In total, 212 respondents provided data on all studied variables—decision-making styles, well-being, perceived stress and depression.

2.2 Measures

2.2.1 Decision-making styles

Decision-making styles were assessed by the General Decision-making Styles questionnaire (Scott & Bruce, 1995) with five subscales examining the five decision-making styles—rational, intuitive, dependent, avoidant and spontaneous. The measure contains 25 questions—with five in each subscale and all measured on a scale between strongly disagree (1) to strongly agree (5). Higher scores in each subscale (the sum of the items) mean that this style is used more frequently. The five factor structure of the decision-making styles model has been confirmed in Canada, Sweden, the United Kingdom and Italy (Loo, 2000; Thunholm, 2004; Spicer & Sadler-Smith, 2005; Gambetti et al., 2008). The Slovak version was translated from English by a native English speaking translator and back-translated.

2.2.2 Decision-making competencies

The Adult Decision-Making Competence (A-DMC) was used in the first sample to assess decision-making competencies. The measure was originally published in the USA (Bruine de Bruin et al., 2007). Since then, a Swedish (Marklund, 2008), Italian (Del Missier et al., 2010) and Slovak version (Bavoľár, 2013) have also been introduced. Six decision-making competencies are examined: Resistance to Framing, Recognizing Social Norms, Under/Over-confidence, Applying Decision Rules, Consistency in Risk Perception and Resistance to Sunk Costs. Higher scores in each component mean higher decision-making competencies. A joint score (unweighted average of standardized z scores) was also computed.

2.2.3 Mental health indicators

Three measures provided indicators of mental health in the second sample. The World Health Organization Well-being index (WHO-5, 1998) was used to identify psychological well-being. The measure of emotional well-being covers positive mood, vitality and general interests. The participants answer on a 6-point Likert scale from not present (0, at no the time) to constantly present (5, all of the time). A higher score means a better quality of life.

Stress was assessed by a short (4-items) version of the Perceived Stress Scale (Cohen et al., 1983). Four questions detect perceived stress with answers ranging from never (0) to very often (4). The cumulative index is the sum of the items (two of them are rescaled). A higher score means higher perceived stress.

The Beck Depression Inventory (Schmitt et al., 2003) is one of the most widely used instruments of assessing depression. A modified version of this instrument (Schmitt et al., 2006) with 20 questions ranging from never (1) to almost always (5) was used. (The question about suicide behavior was omitted.) A higher score indicates more depressive symptoms.

3 Results

3.1 GDMS characteristics

Table 1 shows descriptive statistics for the five decision-making styles, as well as descriptive statistics of other variables. The observed range of variables covers most of the potential range. A variety of descriptive statistics is provided, because of the rare use of the GDMS in Slovakia.

The correlations between decision-making styles, examined in the next step of the analysis, are very low with the exception of a medium negative relationship between the rational and the spontaneous style. Six out of ten correlations are statistically significant ranging from .21 to .31 in absolute values.

A confirmatory factor analysis was also conducted to confirm the 5-factor structure of the GDMS reported by its authors (Scott & Bruce, 1995) and a lot of other studies

Table 1: Descriptive statistics of variables.

Variable	possible range	actual range	mean	SD	median	skewness	Cronbach α
Decision-making styles							
rational	5–25	9–25	18.88	3.08	19	−.48	.76
intuitive	5–25	8–25	17.92	3.06	18	−.48	.75
dependent	5–25	5–25	15.75	3.81	15	.14	.79
avoidant	5–25	5–25	14.86	4.64	15	.19	.85
spontaneous	5–25	5–25	13.66	4.21	13	−.46	.82
Decision-making competencies							
RtF	0–5	1.79–5	3.99	.54	4.07	−.69	.72
RSN	−1–1	−.49–.90	.48	.24	.51	−.95	.52
U/OC	0–1	.53–1	.91	.08	.93	−1.59	.50
ADR	0–1	.07–1	.66	.23	.67	−.26	.81
CiRP	0–1	.25–1	.82	.16	.85	−1.14	.81
RtSC	1–6	2.50–6	4.47	.68	4.50	−.15	.58
Mental health indicators							
WHO-5	0–25	0–25	13.66	4.88	14	−.40	.86
stress	0–16	0–16	6.39	3.22	6	.38	.77
depression	20–100	20–93	44.48	14.33	43	.39	.92

Table 2: Correlation matrix of decision-making styles.

	intuitive	dependent	avoidant	spontaneous
rational	−.04	.23***	−.21***	−.49***
intuitive		.11	.02	.30***
dependent			.22***	.00
avoidant				.31**

*p < 0.05, **p < 0.01, ***p < 0.001.

Table 3: Fit indices for the five-factor structure of GDMS.

χ^2	df	p	χ^2/df	GFI	CFI	NFI	RMSEA
758.37	265	<0.001	2.862	0.867	0.871	0.816	0.066

(e.g., Gambetti et al., 2008, Spicer & Sadler-Smith, 2005). Because several indexes showed only a partial goodness of fit (Table 3; standardized factor score estimates are provided in Appendix A), an exploratory factor analysis was also conducted to assess the inner structure of the measure. The principal axis factoring method with direct oblimin rotation found five factors with an eigenvalue over 1 explaining 48.59% of the shared variance (factor loadings in Appendix B).

3.2 Decision-making styles and decision-making competencies

The next step of the analysis was an investigation of the relationships between decision-making styles and decision-making competencies. The highest correlations were found in the avoidant and the spontaneous style. Participants who reported using these styles more intensively had lower scores in Recognizing Social Norms, Applying Decision Rules, Consistency in Risk Perception and Resistance to Sunk Costs. Under/Over-confidence correlated negatively with the spontaneous style. A similar pattern was found by the intuitive style with negative correlations with Recognizing Social Norms and Consistency in Risk Perception. Only the rational style was positively related to some decision-making competencies, namely Under/Over-confidence and Applying Decision rules, although the correlations were low. Multiple linear regression with gender and decision-making styles as predictors of the total A-DMC score provides a more general view of the described pattern. It was found that the avoidant and spontaneous decision-making styles predicted decision-

Table 4: Correlations of decision-making styles and decision-making competencies.

Decision-making styles	Competencies					
	RtF	RSN	U/OC	ADR	CiRP	RtSC
rational	−.04	.10	.15*	.14*	.05	.19**
intuitive	−.13	−.18**	−.05	−.13	−.20**	−.04
dependent	.00	−.05	.11	−.02	−.11	−.19**
avoidant	−.12	−.29***	−.07	−.32***	−.45***	−.21**
spontaneous	−.10	−.25***	−.30***	−.31***	−.26***	−.21**

*p < 0.05, **p < 0.01, ***p < 0.001.

Table 5: Multiple linear regression predicting total decision-making competencies score.

Predictor variable	DMC z average
gender (M=1)	−0.16*
rational	−0.05
intuitive	−0.08
dependent	−0.03
avoidant	−0.26***
spontaneous	−0.29***
F-statistics	11.197***
df	6,208
adjusted R^2	.24

*p < 0.05, **p < 0.01, ***p < 0.001.

making competencies significantly, as did female gender.

3.3 Decision-making styles and mental health

Next, we examine the relationship between decision-making styles and mental-health indicators. Given that three scores of mental health indicators correlated mutually at a high level (stress and well-being: r = −0.51; stress and depression: r = 0.62; well-being and depression: r = −0.60), they were treated as a set of variables. Canonical correlation assessing the relationship between the decision-making styles and gender (males = 1) on the one hand and the three mental health indicators on the other hand was significant (full model: F = 3.526, p < 0.001). As the Functions 2 to 3 (F = .300, p = .981) and 3 to 3 (F = .078, p = .989) were not statistically significant, function 1 is sufficient to describe the relationship between these two sets of variables.

The standardized canonical coefficients for gender and decision-making styles were: gender, .01; rational, .03; intuitive, −.60; dependent, −.01; avoidant, .77; and spontaneous, −.03. The standardized canonical coefficients for dependent variables were: well-being −.30; stress, .42; and depression .45. The same results were obtained when all three mental health indicators were explored separately with multiple linear regression (Appendix C).

4 Discussion

The present study investigated the psychometric characteristics of General Decision-Making Style and the relationships of decision-making styles with decision-making competencies and with mental health. The exploratory factor analysis found five factors almost identical to the original factor structure, while the confirmatory factor analysis partly confirmed it. The internal consistency of all five GDMS subscales was high which indicates the usefulness of the Slovak version of the scale. The associations between the decision-making styles were found to have a similar pattern to the previous GDMS studies (Scott & Bruce, 1995, Loo, 2000; Thunholm, 2004; Spicer & Sadler/Smith, 2005; Gambetti et all, 2008), but with certain differences. The direction of the correlations was the same, which supports the generality of the decision-making styles model and the applicability of this measure in Slovakia. Previous results have shown inconsistent results regarding the relationship between the rational and intuitive decision-making styles. In the present study, they are independent. One of the strongest negative relationships was found between the spontaneous and the rational style, a result that has been supported by previous studies (Baiocco, Laghi & D'Alessio, 2009; Thunholm, 2004; Loo, 2000; Gambetti, 2008). The spontaneous style is sometimes considered to be a "particular type of high speed intuitive style utilized in decision-making conditions with time-pressure" (Baiocco et al., 2009, p. 973). This has been partly confirmed by the low positive correlation found between them. The negative association

between the avoidant and dependent styles suggests that dependence on others in decision-making can be accompanied by a lower tendency to avoid making decisions. Avoidance can be inevitable only with a lack of other people able to provide advice.

A higher reported use of the rational style correlated positively with the dependent style which is similar to the findings of previous studies (e.g., Baiocco et al., 2009; Loo, 2000). A possible explanation could be that an effort to seek advice from other people is a part of a rational process. Finally, a negative correlation was found between the rational and the avoidant style. While seemingly surprising, the people who tend to avoid decisions are also those who are spontaneous in decision-making. A possible explanation could be that in situations where it is necessary to decide, they want to do it as soon as possible. The interrelations found between decision-making styles highlight that individuals have a dominant style even if they tend to use more than one decision-making style (Thunholm, 2004).

We found mostly weak, but statistically significant relationships between the decision-making styles and decision-making competencies. It was mainly the spontaneous and avoidant decision-making styles that correlated negatively with the decision-making competencies, and this was also partly true for the intuitive decision-making style. While the reported use of the dependent style was weakly and negatively related to decision-making competence, there the only (but again low) significant positive correlation was were found in the rational style. The more general view using linear regression showed that mainly using the avoidant and spontaneous styles is associated with lower decision-making competence.

Another aim of the present research was the investigation of an association between decision-making styles and mental health as a means of assessing the predictive validity of the GDMS. Two of the five investigated decision-making styles seem to be useful predictors of mental health. While the rational, dependent and spontaneous decision-making styles were not significant predictors of the studied mental health indicators, the intuitive decision-making style was positively and avoidant decision-making style negatively associated with them.

The intuitive style can be described by attention to detail and a tendency to rely on feeling rather than rational judgment. People who reported a higher use of the intuitive decision-making style reported better subjective well-being and lower perceived stress and depression. On the other hand, reporting the use the avoidant decision-making style more frequently was associated with a lower reported level of well-being and higher perceived stress and depression. The intuitive style can have a protective function although its mechanism is unclear. While it is sometimes specified as the opposite of rational judgment, most stud-

ies report their independence. Although the rational style, which relies on logic, was hypothesized to be the main predictor of mental health, this was not supported by the data. Rather, the role of intuition seemed to be more important.

The avoidant style was found to be negatively correlated with mental health not only in the present study, but also in the research measuring stress by saliva cortisol release (Thunholm, 2004). That suggests its important role, although no causal inferences can be made. The avoidance of making decisions to lower stress connected with the decision-making process can probably have the opposite effect, given that some decisions are inevitable.

The main limitation of the present study is the sample. Firstly, the research was conducted on a student sample which can evoke questions about the generality of the results. They are valid only for a specific age range and education level due to the limited variability of ability test scores which is typical in similar samples. However, in spite of this possible limitation, the study has produced results similar to other studies. In particular, a similar GDMS correlation matrix was found. Secondly, not all students provided their data and there can be a difference between those who responded and those who did not in all three clusters of the variables: decision-making styles, decision-making competencies or mental health characteristics. Another limitation regarding generalization of the results lies in the way in which the data were obtained. We used self-reported measures of decision-making styles and mental health, so consequently the observed relationships between them could simply reflect people's consistent view of themselves.

Nonetheless, the present findings show the usefulness of investigating manifestations of cognitive processes, such as cognitive styles and decision-making competencies, as well as decision making characteristics, in achieving better mental health. An analysis combining the joint effect of decision-making styles and decision-making competencies on mental health could provide a more general view, which was not possible due to the two separate samples in this study.

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Appendix A. Confirmatory factor analysis results: Standardized regression weights of the GDMS items.

rational		intuitive		dependent		avoidant		spontaneous	
item	score	item	score	item	score	item	score	item	score
1	.52	2	.74	3	.67	4	.69	5	.72
6	.56	7	.71	8	.65	9	.80	10	.82
11	.70	12	.61	13	.69	14	.81	15	.72
16	.66	17	.44	18	.65	19	.70	20	.82
21	.65	22	.60	23	.65	24	65	25	.34

Appendix B. Exploratory factor analysis results: Factor loadings of the GDMS items (factor loadings over .3 are in bold).

Item	1 (avoidant)	2 (spontaneous)	3 (dependent)	4 (intuitive)	5 (rational)
1 (R)	−.20	−.01	.18	.05	**.41**
2 (I)	.03	−.11	**.71**	.14	−.03
3 (D)	.00	**.67**	−.08	.16	−.10
4 (A)	−.02	.04	−.04	**.69**	−.02
5 (S)	**.61**	−.01	.07	.15	−.06
6 (R)	.06	−.06	−.04	−.05	**.75**
7 (I)	.16	−.05	**.60**	.02	.07
8 (D)	.09	**.66**	−.11	.07	−.03
9 (A)	.02	−.01	.01	**.81**	.09
10 (S)	**.75**	.03	.13	.02	−.05
11 (R)	−.30	.16	−.05	.08	**.46**
12 (I)	.03	.13	**.66**	−.10	.13
13 (D)	.04	**.68**	.10	−.04	.07
14 (A)	.02	.08	−.05	**.79**	.04
15 (S)	**.74**	.01	.04	−.04	.00
16 (R)	−.15	.29	.03	−.18	**.42**
17 (I)	−.04	.12	**.45**	.00	−.24
18 (D)	−.07	**.62**	.02	−.01	.05
19 (A)	.19	−.04	.04	**.67**	.05
20 (S)	**.80**	.07	−.07	.03	−.10
21 (R)	−.13	.13	−.08	−.05	**.52**
22 (I)	−.12	−.02	**.70**	−.11	.01
23 (D)	.03	**.65**	.09	−.03	.03
24 (A)	−.13	.04	.04	**.66**	−.13
25 (S)	.20	.03	**.41**	.08	.02
eigenvalue	3.67	2.68	2.54	2.90	2.47

Appendix C: Multiple linear regressions predicting well-being, stress and depression.

Predictor variable	well-being	stress	depression
gender (M=1)	−0.05	−.04	0.02
rational	−0.03	−.01	0.03
intuitive	0.25**	−.25**	−0.26***
dependent	−0.04	−.02	−0.02
avoidant	−0.29***	.33***	0.35***
spontaneous	0.01	−.03	−0.01
F-statistics	6.319***	7.605***	8.355***
df	6,205	6,205	6,205
adjusted R^2	.13	.16	.17

*p < 0.05, **p < 0.01, ***p < 0.001.