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Psychometric Study of Two Decision-Making Measures: The Melbourne Decision-Making Questionnaire versus the General Decision-Making Style Questionnaire

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Abstract: This study compares the Melbourne Decision-Making Questionnaire (MDMQ) and the General Decision-Making Style questionnaire (GDMS), two of the most widely used decision-making questionnaires in the literature, in a large age- and sex-weighted general population sample of 714 men (45.7%) and 848 women (54.3%) between 18 and 90 years old. The objective was to evaluate the convergent and construct validity between several aspects of these decision-making style questionnaires. The results indicate that the two questionnaires replicate the factorial structure of four and five factors reported in the original studies, respectively, through exploratory and confirmatory procedures in our cross-cultural context. The domains of both questionnaires that represent a strong or large correlation are Vigilance with Rational (0.50), and Hypervigilance, Buck-passing, and Procrastination with Avoidant (0.45, 0.52, and 0.60). A Structural Equations Model (SEM) between both questionnaires indicates that both latent factors formed by the domains of the MDMQ and the GDMS obtain a correlation of 0.96. It is concluded that the two questionnaires measure similar aspects of the decision-making construct.

Keywords: decision making; convergence validity; MDMQ; GDMS



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1. Introduction

Decision-making activity is universal. People face recurring problems and opportunities that require meaningful and competitive choices [1]. Research about how people make their decisions informs us about individual patterns and styles and lays the foundation for the development of strategies that can improve the quality of decisions. At the end of the 1970s, a psychological theory that sought to address social conflict through decision making was put forward. Janis and Mann [2] proposed that decision making is sustained by the presence or absence of conditions from which a coping pattern emerges, including (a) awareness of serious risks, (b) hope of finding the best alternative, and (c) belief that one can deliberate in time before adopting a decision. Other researchers have continued this search for answers to the individual decision-making process by generating models and attending to related individual variables such as age [3,4], gender [5,6], culture [1], and other psychological variables such as life satisfaction, self-esteem, personality [7–11], etc. The research data have been obtained through questionnaires that measure different modalities of the general construct of decision making.

The decision-making construct has generated several self-report questionnaires. Some examples are the Decision-Making Style Inventory (DMI) [12], the Decision Outcome Inventory (DOI) [13], the Decision Styles Questionnaire (DSQ) [14], the Decision Styles Scale (DSS) [15], the Desire for Self-Control Scale (DSCS) [16], the Rational and Intuitive Decision Style Scale (RI-DSS) [15], and the Proactive Decision-Making Scale (PDMS) [17]. The PDMS incorporates six domains, including four proactive cognitive skills, the systematic identification of goals, a systematic search for information, the systematic identification of alternatives and the use of a decision radar, and two proactive personality traits, showing initiative and striving to improve.

However, the most used in the literature are the Melbourne Decision-Making Questionnaire (MDMQ [2] and the General Decision-Making Style questionnaire (GDMS) [7,18]. Both questionnaires have short versions of 22 items each and measure several aspects of the decision-making construct. The MDMQ is a version of the Flinders Decision-Making Questionnaire [19]. The MDMQ assesses four decision-making domains, including Vigilance and three non-vigilant styles: Hypervigilance, Buck-passing, and Procrastination. Vigilance would be the style in which people search for objectives of decision making based on rational, relevant solutions and consider different alternatives. The Hypervigilance style involves making quick decisions to avoid anxiety. Buck-passing includes the attribution of responsibility for one's own decisions. Procrastination corresponds to the style or pattern of behavior related to postponing decisions until later [2]. The GDMS consists of five decision-making domains: Rational, Intuitive, Dependent, Avoidant, and Spontaneous. The Rational style involves the use of a logical, reasoned, and structured approach. The Intuitive style involves trust in hunches, intuition, or subjective impressions. The Dependent style involves seeking help and advice before a decision. The Avoidant style involves postponing decision making. The Spontaneous style assumes a need for immediacy and the desire to overcome the challenge of a decision as soon as possible [18].

Although both instruments are based on the general decision-making construct, the MDMQ was designed to assess conflict theory and stress-coping patterns and is related to personality and emotions [10,19]. On the other hand, the GDMS is based more on behavioral styles, reactions, and habits in specific contexts and depends less on personality, focusing more on adaptive, rational, or intuitive aspects [18].

As mentioned, both questionnaires have been related to different psychological variables independently, so we will appraise the similarities and differences. As far as we know, there are no studies that relate both questionnaires with the same sample. Vigilance in the MDMQ has been related to positive affect, life satisfaction, and self-esteem [19]. Procrastination (non-vigilant style) negatively correlates with self-esteem [1,20]. Within the framework of the five-factor model of personality (FFM), Extraversion, Conscientiousness, Agreeableness, and Openness to Experience negatively correlated with Vigilance using the MDMQ. On the contrary, the relationship was positive with Neuroticism and negative with the other three non-vigilant domains [9,21].

A recent MDMQ study in the Spanish socio-cultural field has related the domains of this questionnaire with personality, evaluated using the Zuckerman alternative five-factor personality model (AFFM). Neuroticism and low Extraversion were significantly related to non-vigilant styles. Women obtained significantly lower scores in Vigilance and higher scores in Hypervigilance, Buck-passing, and Procrastination than men. The most predictive personality domains with respect to the MDMQ scales were Aggressiveness (negatively) and Activity for Vigilance, and Neuroticism for Hypervigilance, Buck-passing, and Procrastination [10].

In reference to the GDMS, Scott and Bruce [18] described decision styles as learned habits where the key factor is the number of alternatives identified and the information collected during decision making [22]. However, the GDMS has also been related to the FFM. Conscientiousness and Agreeableness have been positively related to the Rational, Extraversion to Intuitive. Conscientiousness also is positively related to Avoidant, and Agreeableness to Spontaneous styles (both in negative) [8]. Taking the AFFM as a reference,

Avoidance was positively correlated with Aggressiveness and Neuroticism, and negatively with Activity and Extraversion. The Dependent style was positively correlated with Neuroticism. The Intuitive style was positively correlated with Extraversion and Sensation Seeking [11].

Individual differences play a role in decision making. The cognitive aspects of personality, defined as the ability to adapt and assimilate information, do not seem to act directly with the environment and are relatively permanent dimensions of personality [23]. Therefore, depending on the content of the domains of both questionnaires, differences and similarities are expected around a more general construct of decision making.

The main purposes of this study were to (a) examine the psychometric properties of the MDMQ and the GDMS, particularly their exploratory and confirmatory factor structure and scale reliability; (b) explore the relationships between the different domains of both questionnaires to identify similarities and differences; and (c) jointly analyze the domains of both questionnaires using a structural equation model, generating two correlated latent variables.

2. Method

2.1. Participants and Procedure

The sample comprised a total of 1562 anonymous Caucasian adults from the general population, divided into a group of 714 men (45.7%) and 848 women (54.3%). All participants were healthy. Males reported a slightly higher average age than females (41.16 vs. 39.06; *t*-test: 2.43; *p* < 0.025). The sample range was between 18 and 90 years old. Participants responded to a self-report questionnaire with paper and pencil and were recruited by university students performing data analysis practice. Students were instructed to invite men and women in the age ranges 18–30, 31–40, 41–50, 51–60, and over 61 to respond anonymously, to obtain the most representative sample possible of the community population. The sampling strategy was purposive. All participants authorized in writing the use of their anonymous data for data analysis practice and for subsequent research. The students also signed a document transferring the use of data for research in the framework of a broader investigation authorized by the university's ethics committee (file number CEIC-2160).

2.2. Measures

2.2.1. Melbourne Decision-Making Questionnaire (MDMQ)

The MDMQ is a self-report inventory designed to measure the four main coping patterns identified in the conflict theory model of decision-making [20]. Different factor analyses carried out in different cross-cultural contexts report a four-factor structure by confirmatory factor analysis (CFA): Vigilance, Hypervigilance, Buck-passing, and Procrastination [1,5,24–28]. The current version of the MDMQ is a 22-item questionnaire with a Likert response format of 3 points. Each item consists of three answers that are scored as follows: true, sometimes true, and not true. The Spanish version used in this research was validated by Urieta et al. [10]. For the present sample, the Cronbach's alpha reliability coefficients were 0.74 (Vigilance), 0.71 (Hypervigilance), 0.79 (Buck-passing), and 0.78 (Procrastination) (Table 1). The following are some examples of items for the MDMQ: Vigilance (I like to consider all the alternatives), Buck-passing (I prefer to leave decisions to others), Hypervigilance (I waste a lot of time on trivial matters before getting to the final decision), and Procrastination (I feel as if I'm under tremendous time pressure when making decisions).

Table 1. Descriptive, distribution frequency values, internal consistency, and correlations.

(n = 1562)	M	SD	S	K	α	9	8	7	6	5	4	3	2	1
MDMQ														
1. Vigilance	9.28	2.20	−0.94	0.99	0.74	−0.31	−0.17	0.00	−0.01	0.50	−0.17	−0.15	0.07	1
2. Hypervigilance	4.74	2.34	0.17	−0.38	0.71	0.04	0.45	0.29	−0.11	−0.01	0.47	0.41	1	
3. Buck-passing	5.05	2.67	0.37	−0.10	0.79	0.06	0.52	0.32	−0.17	−0.12	0.46	1		
4. Procrastination	3.21	2.34	0.64	0.01	0.78	0.14	0.60	0.24	−0.06	−0.14	1			
GDMS														
5. Rational	3.99	0.65	−0.63	0.80	0.84	−0.44	−0.19	0.11	0.06	1				
6. Intuitive	3.68	0.87	−0.51	0.13	0.89	0.20	−0.07	0.04	1					
7. Dependent	3.47	0.82	−0.42	0.00	0.83	−0.01	0.32	1						
8. Avoidant	2.37	0.97	0.53	−0.38	0.92	0.23	1							
9. Spontaneous	2.31	0.89	0.61	0.02	0.87	1								

Note: M: mean; SD: standard deviation; S: skewness; K: kurtosis; α : Cronbach's alpha. Cohen's standard medium effect size corresponds to $r \pm 0.37$, but a correlation coefficient of 0.50 or larger is thought to represent a strong or large correlation.

2.2.2. General Decision-Making Style Questionnaire (GDMS)

The GDMS was developed by Scott and Bruce [18] to evaluate decision-making styles. The GDMS has been adapted in multiple cross-cultural contexts with similar psychometric properties [29–34]. Alacreu-Crespo et al. [8] adapted the GDMS in Spain, and the psychometric properties were replicated recently [11]. This version contains 22 items with a Likert-type response of 5 points (1: strongly disagree to 5: strongly agree). Spanish researchers removed three items from the test based on the internal structure results in previous studies and their own analysis (e.g., [31]). The factor structure offers five domains representing five decision-making styles: Rational, Intuitive, Dependent, Avoidant, and Spontaneous. The confirmatory factor analysis supported the five-factor structure of the GDMS, finding acceptable internal consistency and temporal stability [8]. The Cronbach's alpha internal consistency values in the current study ranged from 0.83 to 0.92. (Table 1). The following are some examples of items for the GDMS: Rational (I plan my important decisions carefully), Intuitive (When making decisions, I rely upon my instincts), Dependent (I often need the assistance of other people when making important decisions), Avoidant (I avoid making important decisions until the pressure is on), and Spontaneous (I generally make snap decisions).

3. Results

3.1. Descriptive Domains, Distribution Frequency Values, Internal Consistency, and Inter-Correlations

Table 1 shows the descriptive domains of the MDMQ and the GDMS for a population of men and women of similar ages to the general Spanish population. The internal consistency alpha is satisfactory for all domains of both questionnaires and is similar to the original studies. The distribution values are normal since the skewness and kurtosis remain at values close to zero and do not exceed ± 1 [35–37]. Considering the large number of participants, the correlations must be corrected for effect size [38]. Correlations with values of 0.37 or more obtain a medium effect, and those with values greater than 0.50 a strong effect. Vigilance from the MDMQ correlates with Rational from the GDMS (0.50), and Hypervigilance with Avoidant (0.45), Procrastination (0.47), and Buck-passing (0.41). Rational correlates negatively with Spontaneous (−0.44). Avoidant correlates with Buck-passing (0.52) and Procrastination (0.60). Buck-passing correlates with Procrastination (0.46).

3.2. Exploratory Matrix Structure of the MDMQ and the GDMS

The optimal implementation of Parallel Analysis (PA) advised four and five factors for MDMQ and GDMS [39,40]. The method to obtain random correlation matrices was Permutation of the raw data [41]. The number of random correlation matrices was 500 (Table 2).

Table 2. Parallel Analysis (PA) for MDMQ and GDMS.

MDMQ ¹				GDMS ²			
Component	Real Data	Mean RAND	95 PCT RAND	Component	Real Data	Mean RAND	95 PCT RAND
Eigenvalues				Eigenvalues			
1	5.27422 *	1.21685	1.24935	1	5.29357 *	1.21785	1.25389
2	2.77683 *	1.18202	1.20613	2	3.98406 *	1.18216	1.20514
3	1.63456 *	1.15615	1.17912	3	1.88839 *	1.15578	1.17578
4	1.28210 *	1.13212	1.15250	4	1.88839 *	1.13285	1.15060
5	0.95638	1.11097	1.12864	5	1.41550 *	1.11058	1.12707
...	...	...	...	6	0.68454	1.09074	1.10641
...	...	...	...	...	...	...	...
22	0.35966	0.80128	0.82461	22	0.14727	0.80160	0.82372
* Advised number of factors: 4				* Advised number of factors: 5			

Note: MDMQ ¹: Melbourne Decision-Making Questionnaire; GDMS ²: General Decision-Making Style questionnaire; RAND: random; PCT: percentile.

Table 3 shows a comparative principal component analysis (PCA) of the MDMQ and the GDMS (both with 22 items) and the communalities of the two matrices. After analyzing several factor extraction and rotation methods, we chose PCA with LOSEFER empirical correction [42] and oblique Promax rotation using FACTOR analysis software (Version: 12.04.05) [43]. The PCA allowed the content of broad information to be summarized, making it possible to analyze and visualize it more easily. We used oblique Promax rotation because it allows factors to be correlated. This rotation can be computed more quickly than a direct oblimin rotation, making it useful for large data sets.

Table 3. Principal component analysis with oblique Promax rotation structure matrices of the MDMQ and the GDMS items.

MDMQ ¹						GDMS ²					
Item	I	II	III	IV	H ²	I	II	III	IV	V	H ²
1	0.71	−0.02	−0.07	0.02	0.51	0.73	0.01	0.10	−0.10	−0.17	0.58
2	0.64	0.10	0.00	0.03	0.42	0.78	0.03	0.02	−0.09	−0.12	0.63
3	0.72	−0.10	−0.03	−0.07	0.53	0.75	0.03	−0.01	−0.11	−0.14	0.60
4	0.68	0.07	−0.07	−0.07	0.48	0.80	−0.02	0.07	0.03	−0.23	0.69
5	0.55	−0.10	−0.13	−0.22	0.38	0.75	0.08	0.06	−0.10	−0.12	0.60
6	0.62	0.24	0.05	−0.08	0.45	0.07	0.92	−0.03	−0.05	0.09	0.85
7	−0.05	0.67	0.15	0.15	0.49	0.03	0.93	0.00	−0.04	0.09	0.88
8	0.01	0.68	0.14	0.18	0.51	0.03	0.83	0.11	−0.03	0.12	0.72
9	0.15	0.68	0.07	0.07	0.49	−0.02	0.01	0.73	0.23	−0.02	0.59
10	0.00	0.53	0.31	0.04	0.38	0.03	−0.03	0.74	0.12	−0.13	0.58
11	0.07	0.63	0.07	0.16	0.43	0.07	0.06	0.76	0.07	0.03	0.59
12	−0.09	0.12	0.64	0.39	0.58	0.09	−0.01	0.79	0.07	0.01	0.64
13	−0.10	0.15	0.62	0.30	0.50	0.06	0.06	0.78	0.16	0.06	0.64
14	−0.10	0.08	0.77	0.17	0.64	−0.10	−0.08	0.19	0.82	0.04	0.73
15	−0.09	0.26	0.66	0.19	0.55	−0.05	−0.04	0.15	0.89	0.04	0.82
16	−0.06	0.06	0.74	0.10	0.56	−0.07	−0.04	0.16	0.90	0.05	0.85
17	0.10	0.13	0.51	−0.12	0.30	−0.12	0.02	0.05	0.81	0.19	0.70
18	0.00	0.37	0.04	0.41	0.39	−0.08	−0.02	0.17	0.84	0.10	0.76
19	−0.10	0.32	0.07	0.63	0.52	−0.21	0.05	−0.03	0.18	0.79	0.70
20	−0.04	0.16	0.14	0.75	0.60	−0.24	0.13	0.06	0.19	0.82	0.79
21	−0.15	0.14	0.15	0.74	0.62	−0.14	0.11	−0.08	−0.07	0.80	0.68
22	−0.06	0.08	0.26	0.75	0.64	−0.23	0.09	0.03	0.14	0.83	0.77

Note: Melbourne Decision-Making Questionnaire (MDMQ ¹) = (F-I: Vigilance; F-II: Hypervigilance; F-III: Buck-passing; F-IV: Procrastination). General Decision-Making Style questionnaire (GDMS ²) = (F-I: Rational; F-II: Intuitive; F-III: Dependent; F-IV: Avoidant; F-V: Spontaneous; H²: Communality). Loadings equal to or higher than 0.40 are in boldface.

For the MDMQ, we obtained a Bartlett's statistic of 9219.786 (df: 231; $p < 0.000010$) and a Kaiser–Meyer–Olkin (KMO) test result of 0.89 (good) [43]. We obtained the following

robust goodness-of-fit statistics after LOSEFER correction: Root-Mean-Square Error of Approximation (RMSEA): 0.033 and Bootstrap 95% confidence interval: 0.033–0.034. The close-fit test and power analysis result after LOSEFER correction was alpha: 0.050 [43]. The 22 items loaded adequately on their factor with weights between 0.41 and 0.75. There were no secondary factor loadings greater than 0.37.

Bartlett's statistic for the GDMS was 178.777. We obtained 231 degrees of freedom (df; $p < 0.000010$) and a Kaiser–Meyer–Olkin (KMO) test result of 0.87 (good) [44]. We obtained the following robust goodness-of-fit statistics after LOSEFER correction: Root-Mean-Square Error of Approximation (RMSEA): 0.030; Bootstrap 95% confidence interval: 0.030–0.031. The close-fit test and power analysis result after LOSEFER correction was alpha: 0.050 ([43]. The 22 items loaded adequately on their factor with weights between 0.73 and 0.93. There were no secondary factor loadings greater than 0.24.

A PCA with the same procedure was performed with the nine domains of the two questionnaires using the previous extraction and rotation methods. Parallel Analysis indicated that three factors should be retained. The factors were Avoidant (GDMS), Procrastination (MDMQ), Hypervigilance (MDMQ), Buck-passing (MDMQ), and Dependent (GDMS) (I); Rational (GDMS), Vigilance (MDMQ), and Spontaneous (negative) (GDMS) (II); and Intuitive and Spontaneous (GDMS) (III). Notice that Spontaneous loaded in a different sign in factor II and factor III (Table 4).

Table 4. Principal component analysis matrices with Promax rotation of the MDMQ and the GDMS domains.

	I	II	III
Avoidant	0.79	−0.24	0.00
Procrastination	0.76	−0.19	−0.02
Hypervigilance	0.74	0.10	−0.06
Buck-passing	0.74	−0.12	−0.20
Dependent	0.59	0.20	0.26
Rational	−0.03	0.84	0.12
Vigilance	−0.05	0.77	0.03
Spontaneous	0.10	− 0.67	0.40
Intuitive	−0.09	−0.01	0.92

Note: Loadings equal to or higher than 0.40 are in boldface.

3.3. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted with the MDMQ and GDMS using the Maximum Likelihood (ML) estimation method, which seems warranted given the size of the sample and the apparent normality of the variables. This analysis employed the AMOS 26 statistical package [44].

For MDMQ, the simple model obtained the following results: Chi-Squared (χ^2): 985.73; degrees of freedom (df): 202; χ^2/df : 4.88. The fit indicator values were as follows: goodness-of-fit index (GFI): 0.94; Tucker–Lewis Index (TLI): 0.90; comparative fit index (CFI): 0.91; and Root-Mean-Square Error of Approximation (RMSEA): 0.050. An Elevated Modification Index (MI) analysis showed that items 14–16 were highly correlated. The correlated error terms of the items were introduced in the analysis. The correlations between the latent variables (domains) and the standardized regression weights of the items are shown in Figure 1.

Figure 2 shows the GDMS confirmatory factor analysis (CFA) using the same method and procedure. The goodness-of-fit indices were as follows: Chi-Squared (χ^2): 1065.605; Degrees of freedom (df): 199; χ^2/df : 5.36; goodness-of-fit index (GFI): 0.94; Tucker–Lewis Index (TLI): 0.95; comparative fit index (CFI): 0.96; and Root-Mean-Square Error of Approximation (RMSEA): 0.053.

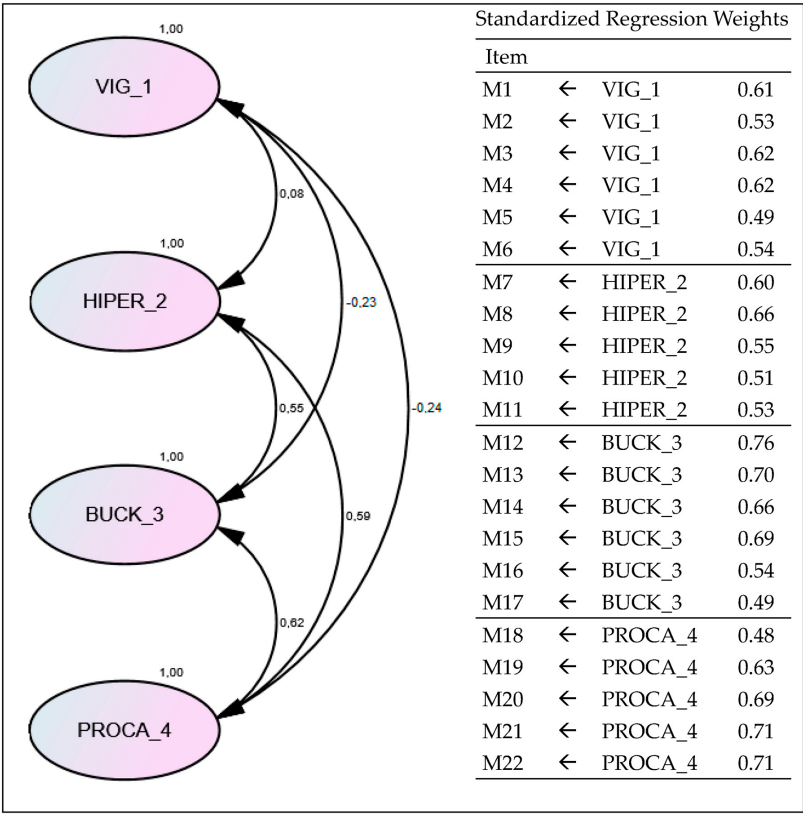


Figure 1. Confirmatory factor analysis of the MDMQ.

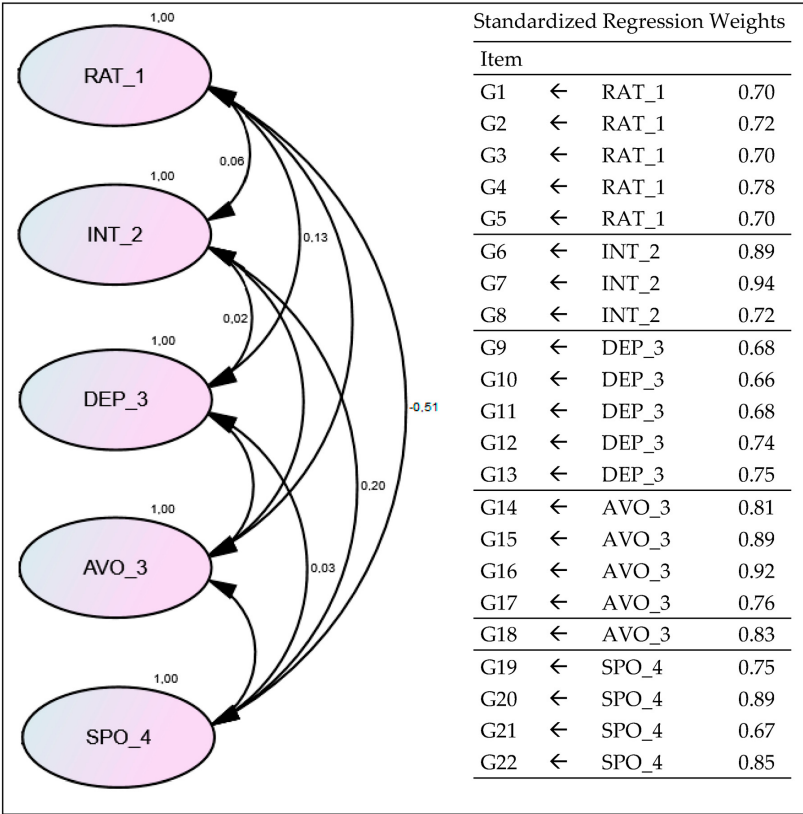


Figure 2. Confirmatory factor analysis of the GDMS.

3.4. MDMQ and GDMS Convergence Analysis

Convergent validity occurs when there is a very close relationship between two tests that measure the same or similar constructs [45]. Different statistical procedures are used to evaluate construct validity, from Pearson correlation, factor analysis, and multiple regression models to structural equation models (SEM). Structural equation models estimate the effect and relationships between multiple variables. They are less restrictive than regression models because they allow measurement errors to be included [46]. Structural equation models allow us to observe postulated connections between some latent variables. These latent variables are linked to observed variables whose values appear in a data set. Connections can be presented using diagrams and arrows that indicate the value of the connections. Two highly connected latent variables indicate that the observed variables of each latent variable have high convergence or construct validity [47].

Figure 3 shows an SEM diagram including the different domains of the MDMQ and the related GDMS. High correlations between the error terms (variance) indicate that the observed variables are positively or negatively connected. Based on the highest modification indices (MI), the Vigilance error terms are correlated with Rational (0.49), Spontaneous (−0.29), and Rational and Spontaneous (−0.42). The modification indices are 361.02, 212.46, and 315.69, respectively. The standardized regression weights show the connection of each domain of the MDMQ and the GDMS with its respective latent variable and the correlation between the two questionnaires (0.96). The goodness-of-fit indices are as follows: χ^2 : 228.029; degrees of freedom (df): 21; χ^2 /d.f.: 10.85; goodness-of-fit index: 0.97; Tucker–Lewis Index: 0.90; comparative fit index: 0.94; Root-Mean-Square Error of Approximation: 0.059.

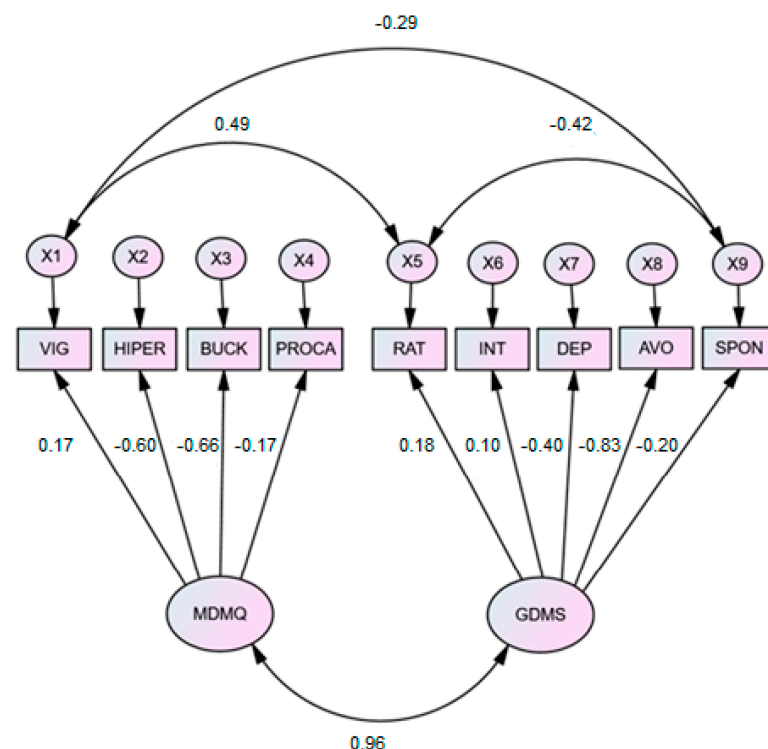


Figure 3. Path analysis diagram comparing the MDMQ with the GDMS.

4. Discussion

Decision making is an everyday process in which information is collected and alternatives are evaluated to choose the most appropriate among various possibilities. As mentioned in the introduction, researchers have designed different models to investigate human decision making. Decision making is a multidimensional construct in which different

aspects are measured, such as individual styles [14,15], decision outcomes [13], proactive decision making [17], etc. Age, gender, culture, and different individual psychological variables intervene in the decision-making process [1,3–6].

The present study was designed to jointly evaluate two of the most popular decision-making questionnaires, the MDMQ and GDMS, in a large sample of the general population with similar proportions of genders and age ranges and in the same sociocultural and racial contexts. The MDMQ was developed according to the general conflict theory of decision making under stress [2], and the GDMS related decision-making styles to trait variables, such as mental health, self-esteem, or locus of control [48].

The first objective was to explore the psychometric properties of both questionnaires in a joint sample. The results indicate robust construct validity assessed by both exploratory and confirmatory factorial procedures. The internal consistency of the different domains is satisfactory. These results are in line with both those reported in cross-cultural studies from different countries [19] and those carried out in a Spanish socio-cultural context [8,49].

The second objective was to explore the relationships between the different domains of both questionnaires to identify similarities and differences. The results indicate that the MDMQ presents two types of negatively related domains: one made up of Vigilance, and three of non-Vigilance (Hypervigilance, Buck-passing, and Procrastination). The GDMS presents some domains related negatively (Rational–Spontaneous) and others positively (Dependent–Avoidant or Avoidant–Spontaneous). The others seem to have little connection with each other. Exploratory factor analyses confirm the structure of four and five factors respectively, with low secondary factor loadings.

The relationships between the nine domains of the two questionnaires obtained in the correlational analyses are also visualized in the principal component analysis of three factors, where the three non-Vigilant domains of the MDMQ are placed in the same factor as Avoidant and Dependent of the GDMS, while Rational and Vigilance form a second factor together with Spontaneous (negative). Intuitive and Spontaneous load in the third factor. The relationships between the domains of the two questionnaires are also reproduced in the connections observed between the latent variables of each questionnaire presented in the first two figures.

The third objective was to analyze the domains of both questionnaires using a structural equation model generating two correlated latent variables, to observe the agreement between the two questionnaires considering that they incorporate domains that are positively and negatively related to each other. This procedure has been used to compare constructs measured by questionnaires that have demonstrated high overlapping through correlations or exploratory factor analysis [50,51]. The error terms of the domains were correlated with more extreme modification indices. As can be seen, the two latent variables obtain a high correlation, indicating that both questionnaires measure related aspects of the same construct.

This study has strengths and limitations. A strength is the large sample of healthy subjects of the same culture from the general population, with a similar proportion of women and men and age ranges. A limitation of this type of study is its cross-sectional nature, which could compromise the validity of the results in other different contexts. Future studies in different countries and languages would be appropriate to ascertain the effect of culture. Both questionnaires could also be compared with personality variables, self-esteem, locus of control, stress, or other mental health variables, to determine if any of them better predict these variables.

Both questionnaires have been adapted and validated to different cultures and languages, including the Spanish socio-cultural context [8,49], with excellent psychometric properties. The MDMQ has been adapted to English, Japanese, Mandarin, French, Turkish, Flemish, Slovak, Italian, Russian, German, Bengali, Brazilian Portuguese, Swedish, etc. [7]. The GDMS has also been adapted to diverse languages such as Swedish, Italian, Dutch, Slovak, German, etc. [49]. However, in some versions of both questionnaires, the factor structure was not replicated, and some item adjustments had to be made. According to

the review by Filipe et al. [7], most of the studies replicated the structure of the MDMQ in 4 factors with 22 items. However, some studies did not keep the same structure, for example, the Portuguese, Brazilian, and Swedish versions. Some of these versions differ in terms of the number of items. According to the review provided by Alacreu-Crespo et al. [8], the 22-item version of the GDMS maintained the original five factors in different countries. However, in the GDMS Spanish validation of 22 items, one of the items of the Spontaneous scale (item S5) was removed before the analyses because previous research showed that the item is generally “problematic”, overlapping with the scale of Intuition, as reported by other authors included in the review [8].

The MDMQ was developed to study the theory of conflict, choice, and commitment, while the GDMS was developed to study the use of reasoned, logical, and structured approaches to decision making. Both have excellent convergent validity and can be used interchangeably in research. Vigilance and Rational styles measure very similar psychological aspects, whereas Hypervigilance, Buck-passing, and Procrastination are like the Dependent style, while the Spontaneous style goes in the opposite direction to Rational Vigilance. However, from a global perspective, both questionnaires faithfully measure a general decision-making construct with some different nuances.

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