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Spanish validation of General Decision-Making Style scale: Sex invariance, sex differences and relationships with personality and coping styles

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Abstract

The General Decision-Making Styles (GDMS) scale measures five decision-making styles: rational, intuitive, dependent, avoidant and spontaneous. GDMS has been related to coping and some personality factors and sex-differences has been described. In spite of its usefulness, there is not a validated Spanish translation. The aim of this study is to translate to Spanish and provide psychometric evidence considering sex differences and the relationships between GDMS, personality and coping variables. Two samples were used for this study; the first sample composed by 300 participants who completed the GDMS and the Rational-Experiential Inventory (REI), and the second sample of 361 participants who completed the GDMS, the Ten Item Personality Trait Inventory and the brief COPE scales. Participants from second sample filled in GDMS a second time (137 participants) after eight weeks from the first data collection. Confirmatory factor analyses showed a five-factor composition of GDMS with equivalence across sex using invariance analyses. Moreover, GDMS showed acceptable internal consistency and temporal stability. Finally, rational and intuitive styles were related to healthier coping patterns and emotional stability, while dependent, avoidant and spontaneous styles were associated with unhealthy coping patterns and emotional instability.

Keywords: decision making styles, sex differences, measurement invariance, Spanish translation, individual differences

1 Introduction

Researchers have proved the utility of decision-making styles in the prediction of some important daily life decisions: choosing a career (Gati, Landman, Davidovitch, Asulin-Peretz & Gadassi, 2010; Singh & Greenhaus, 2004), choose a major college (Galotti et al., 2006) or the satisfaction with a job (Crossley & Highhouse, 2005). Decision-making styles have been defined 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 (p. 820).*" (Scott & Bruce, 1995). Thus, the definition of decision making style was built on the idea that each individual has an habitual pattern of interpreting and responding to decision-making tasks (Driver, 1979; Harren, 1979). Decision making styles are related to cognitive styles because decisions depend on how people process environmental information (Hunt, Krzystofiak, Meindl & Yousry, 1989).

Janis and Mann's (1977) conflict model proposes that decision style depends on features of the situation (e.g., whether there is time pressure). However, Scott & Bruce (1995) described decision styles as learned habits where the key factor is the number of alternatives identified and the information gathered during a decision (Driver, Brousseau & Hunsaker, 1993). In this sense, according to Curry's (1983) "onion theory of personality", decision-making styles can be conceptualized as "surface" individual differences. Thus, individual differences are represented as the layers of an onion, being the more stable characteristics on the layers closest to the center of the onion (e.g., personality traits). On the other side, "surface" characteristics, although have some stability, are more malleable and adaptive to situations (Curry, 1983). Thus, the use of a particular decision-making style depends on both the situation and the "central" individual differences of people (Thunholm, 2004).

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Scott and Bruce (1995) developed the General Decision Making Style questionnaire (GDMS) for evaluate decision making styles, an instrument of 25 items and five scales: *rational style*, characterized by logical approach to decisions by searching information and alternatives and a carefully thought out; *intuitive style*, where people make decisions depending on their hunches or feelings and the flow of the information; *dependent style*, in which people search advice and guidance from other people in their decision processes; *avoidant style*, characterized by procrastinating and avoiding decisions; and *spontaneous style*, characterized by making quick decisions without thinking twice. The first four scales (rational, intuitive, dependent and avoidant) were theorized by Scott and Bruce (1995), but, during the evaluation of the instrument the fifth factor structure including the spontaneous style emerged. Past research has confirmed, using Exploratory factor analysis (EFA), Confirmatory factor analysis (CFA) and measurement invariance (MI), that GDMS has valid psychometric properties (see Table 1 for a summary of the adaptations/translations). In fact, GDMS shows similar construct validity with both varimax and oblimin rotation. However, because of the scale inter-correlations, and because of some "problematic" items that show cross-load between scales and low inter-item correlation, the oblimin rotation (which does not assume independence) is preferable. In spite of the definition of decision-making styles as learned habits or propensity to respond to a decision-making situation (Scott & Bruce, 1995), only Spicer & Sandler-Smith (2005) have performed a four weeks test-retest reliability to test temporal stability, showing an acceptable temporal stability for all the scales. However, the low sample on retest (82 respondents) and the short period between test-retest suggest that further test-retest analyses are needed.

The GDMS has been adapted to different languages: Swedish (Thunholm, 2004), Italian (Baiocco, Laghi & D'Alessio, 2009; Gambetti, Fabbri, Bensi & Tonetti, 2008), Dutch (Curşeu & Schruijer, 2012), Slovak (Bavolar & Orosová, 2015), French (Girard, Reeve & Bonaccio, 2016) and a German adaptation for patients on clinical decision making (Fischer, Soyez & Gurtner, 2015). A Spanish translation was also found (del Campo, Pauser, Steiner & Vetschera, 2016), but its psychometric properties had not been completely probed. Although, there are several scales to evaluate decision making styles[1], GDMS is the most widely used scale in the literature, so a Spanish validation is needed.

[1]These include: the Decision Making Style Inventory (DSI: Nygren, 2000) a 45 items inventory that evaluates analytical, intuitive and regret-avoidant factors; the Melbourne Decision Making Questionnaire (Melbourne DMQ: Mann, Burnett, Radford & Ford, 1997) a 22 items scale that evaluates vigilance, hypervigilance, buck-passing and procrastination styles; the Decision Styles Scale (DSS: Hamilton, Shih & Mohammed, 2016) a 10 items inventory to evaluate rational or intuitive decision making, and finally, the Decision Styles Questionnaire (DSQ: Leykin & Derubeis, 2010) a 43 items scale that evaluates anxiety, avoidance, brooding, dependent, vigilant, intuition, and spontaneity styles. See also http://sjdm.org/dmidi.

1.1 Decision-making styles and coping styles, thinking styles and personality

Decision-making styles have been related to personality and cognitive variables. For example, coping styles for conflict management (e.g., avoid conflict, looking for social interactions. . .) were related to decision-making styles (Loo, 2000). Also, decision-making styles are considered as factors of resilience/vulnerability to stress. Indeed, high scores in the avoidant style are related to higher levels of cortisol under a stressful task (Thunholm, 2008). Regarding thinking styles, rational style is associated with high analytical and sequential thinking style while intuitive style is associated with holistic and intuitive thinking (Gambetti et al., 2008). Past validations of GDMS related decision-making styles to trait variables, as mental health, self-esteem or locus of control. A summary of all these studies can be found on Table 1.

Furthermore, GDMS has been related to the Big Five personality traits (Bavolar & Bačíková-Slešková, 2018; Dewberry, Juanchich & Narendran, 2013; Wood & Highhouse, 2014). *Rational* and *intuitive* styles were consistently associated with high openness, conscientiousness and less neuroticism. Moreover, *intuitive* style has been related to high agreeableness and extraversion. *Dependent* style was related to high agreeableness and neuroticism. *Avoidant* and *spontaneous* styles were associated with high neuroticism and low conscientiousness and agreeableness. But differently with extraversion, where *avoidant* style was negatively related to while *spontaneous* style was positively associated with extraversion.

1.2 Sex differences in decision-making styles

Different results have been found for sex differences. Some studies did not find any (Baiocco et al., 2009; Loo, 2000). However, Delaney et al. (2015), using cluster analyses for creating different decision style profiles, found that women have lower predisposition to an affective/experiential profile whereas they had higher predisposition to a *dependent* style in comparison to men. The predisposition of women to *dependent* style compared to men was found using police investigators; this study also found that men employed the *rational* style more than women (Salo & Allwood, 2011). Although some literature shows sex differences, no study (that we know of) provided sex invariance evidence for GDMS, an important issue for ensuring that these sex-differences are not due to the absence of equivalence in the psychometric properties of GDMS between men and women.

2 Main study

Thus, our main purpose was to validate a Spanish adaptation of the GDMS. Additionally, we used this adaptation to examine correlations with sex, personality and coping patterns.

TABLE 1: Summary of the validation and adaptations for the General Decision Making Style questionnaire

Sample	Factorial analysis	Problematic items	Conv/Disc validation
Scott & Bruce (1995), English		Locus of control and Innovativeness	
1. 1441 male military 2. 84 students (44 % women) 3. 229 students (39 % women) 4. 189 engineers (8 % women)	EFA Principal components Varimax rotation	S5	R ↑ Internal locus of control ↓ Innovativeness I ↑ Innovativeness D ↑ External locus of control ↓ Innovativeness A ↑ External locus of control S ↓ Internal locus of control
Loo (2000), English		Conflictive-management style and Social desirability	
223 students (42 % women)	EFA Principal components Varimax rotation CFA Maximum likelihood Correlated and uncorrelated	I2 D4 S5	D ↑ Social interactions/Relations A ↑ Avoidant conflict-management S ↓ Accommodating conflict-management
Thunholm (2004), Swedish		Self-esteem, Self-regulation, Educative ability and Social desirability	
233 military (2 % women)	CFA Maximum likelihood Correlated		R ↑ Self-esteem and Social desirability D and A ↓ Self-esteem and Self-regulation
Spicer & Sandler-Smith (2005), English			
1. 200 students (44 % women) 2. 200 students (54 % women)	EFA Principal components Varimax rotation CFA Maximum likelihood Correlated	R4 S5	
Baiocco et al. (2007), Italian		Regulatory Self-efficacy and Locus of Control	
500 adolescents (57% women)	EFA Principal components Oblimin rotation CFA Maximum likelihood Correlated	I2 A4 D5 S5	R ↓ External locus of control ↑ Self-efficacy D ↑ External locus of control ↓ Self-efficacy A ↑ External locus of control ↓ Self-efficacy S ↑ External locus of control ↓ Self-efficacy
Baiocco et al. (2009), Italian		Sensation seeking and Locus of control	
700 adolescents (53 % women)	EFA Principal components Oblimin rotation CFA Maximum likelihood Correlated	Not	R ↑ Internal locus of control ↓ Sensation seeking I ↑ Sensation seeking D ↑ External locus of control ↑ Sensation seeking A ↑ External locus of control S ↑ External locus of control ↑ Sensation seeking
Curşeu & Schruijer (2012), Dutch		Rationality and Indecisiveness in decision-making	
102 students (100% women)	EFA Principal components Varimax rotation CFA Maximum likelihood Correlated	D2 and D4 S3 and S5	R ↑ Rationality ↓ Indecisiveness A ↑ Indecisiveness
Fischer et al. (2015)*, German		Sociodemographic, Decision regret and Treatment success	
1. 212 patients 2. 176 patients	CFA Maximum likelihood Correlated	R2, R3, R4 I3, I4 D5 A3 S all	I ↓ Decision regret D ↑ Young (age)
Bavolar & Orosová (2015), Slovak		Decision making competences and Mental health	
1. 427 students (47 % women) 2. 212 students (83 % women)	EFA Principal components Oblimin rotation CFA Maximum likelihood Correlated	S5	I ↑ Mental health A ↓ DM competences ↓ Mental health S ↓ DM competences
Girard et al. (2016), French English			
1. 325 students (84 % women) 2. 345 students (77 % women)	EFA Maximum likelihood Oblimin rotation CFA and Invariance ML Correlated	I4 S5	
del Campo et al. (2016), Spanish (students, staff), German (Austrian students, staff)			
1. 142 Spanish (51 % women) 2. 179 Austrian (63 % women)	EFA Principal components Oblimin rotation	I4 D5 S5	

Note: If some information were not in the cited articles we asked the authors in order to obtain the information; Problematic items = Items who cross-load in some scales or had low inter-items correlations.

In order to achieve these objectives, two samples were collected: the first sample composed by 300 participants who completed the GDMS and the Rational-Experiential Inventory (REI), and a second sample of 361 participants who completed the GDMS, the Ten item personality trait inventory and the brief COPE scales. The second sample filled in GDMS a second time (137 participants) after eight weeks in order study the temporal stability of the scale.

2.1 Method

2.1.1 Participants

First Sample: 300 (158 women) Spanish students from different faculties of the University of Valencia participated in this study (Mean age 21.84; SD = 2.45; range = 18–34 years). Participants were recruited using informative posters. Participation was voluntary and informant consent was obtained.

Second Sample: The sample was composed of 361 (236 women) Spanish students from different faculties of the University of Valencia and the University Miguel Hernandez (Mean age 20.94; SD = 3.84; range = 18–53 years). Participants were recruited during their academic course and completed questionnaires during 15 minutes. Participation was voluntary and informant consent was obtained before participation. In other to take the test-retest reliability, the same tests were filled in after exactly two months from the first evaluation. From the original sample 137 students (37.9 %) completed the retest.

2.1.2 General decision-making style

We translated the GDMS (Scott and Bruce, 1995) to Spanish from English version; subsequently a native English, translated the scale back into English. No special problems were detected in the back-translated version. Past research showed that one item from the spontaneous style as a "problematic" item in some of the validations (see Table 1), showing cross-load with the intuitive style consistently ("When making decisions, I do what seems natural at the moment"). Although, other items also showed cross-load problems, only this item was consistently problematic, and for that reason we decided to eliminate that item from our adaptation. Therefore, at the first step, our GDMS adaptation had 24 items, one item less than the original version (Scott & Bruce, 1995). Four of the scales had 5 items and only the spontaneous one had 4 items rated on a 5-point Likert-type scale ranged from "strongly disagree" to "strongly agree". The questionnaire heading was: "Listed below are statements describing how individuals go about making important decisions." Spanish and English version of GDMS can be found in Appendix 2.

2.1.3 Instruments

First Sample: In the first sample, we use the Rational-Experiential Inventory to test convergent validity.

Rational-Experiential Inventory: We used the 40-items Rational-Experiential Inventory (REI: Pacini & Epstein, 1999) in its Spanish version (Peñarroja et al., 2017). This scale measure rational or experiential thinking style and subdivide each scale in ability or engagement. The ability subscale reflects the belief in his/her abilities in using the rational or the experiential thinking. The engagement scale reflects preferences to engage in the rational or the experiential style. Cronbach's alpha (α) from our sample was: rational engagement (α = .79), rational ability (α = .78), experiential engagement (α = .85) and experiential ability (α = .77).

Second Sample: In the second sample we employed the Ten Item Personality Inventory and the Brief Cope to test the possible relationships with personality traits and healthy/unhealthy coping styles to stress.

Ten Item Personality Inventory: We used the Spanish version of the Ten Item Personality Inventory (TIPI: Romero, Villar, Gómez-Fraguela & López-Romero, 2012), which assess personality traits based on the five factor theory of personality (Costa & McCrae, 1992). The scale had a total of 10 items consisting of a pair of descriptors and scored from 1 (strongly disagree) to 7 (strongly agree). Each Big-Five dimension was represented by two items, Cronbach's α from our sample was: E = Extraversion (α = .68), A = Agreeableness (α = .22), ES = Emotional Stability (α = .66), O = Openness (α = .48), C = Conscientiousness (α = .44). This version shows reasonable psychometric properties in terms of test-retest reliability and convergence with the biggest five factor scales (TIPI: Romero, Villar, Gómez-Fraguela & López-Romero, 2012).

Brief COPE: A Spanish translation (Morán, Landero & González, 2010) of the brief COPE (Carver, 1997) was used to assess the habitual coping strategies. The scale had 28 items with four alternatives of response from 1 (I usually don't do this at all) to 4 (I usually do this a lot) and it is divided in first order 14 sub-scales. Cronbach's α from our sample was: Active coping (α = .54), Planning (α = .52), Emotional support (α = .72), Instrumental support (α = .71), Religion (α = .79), Positive reframing (α = .65), Acceptance (α = .43), Denial (α = .63), Humor (α = .81), Self-distraction (α = .62), Self-blame (α = .60), Behavioral disengagement (α = .66), Venting (α = .51) and Substance use (α = .91).

2.1.4 Statistical analysis

Confirmatory factor analyses (CFA) were performed using maximum likehood estimation with robust corrections (MLR) due to the ordinal nature of the data (Finney & DiStefano, 2006). Because of the lack of consensus in empirical research about the inter-correlation between GDMS scales, two models were tested: (1) an orthogonal 5 factor model (MO), assuming totally independence between scales; and (2) a correlated 5 factor model (MC), assuming inter-correlation between scales. To evaluate model fit we considered the Satorra-Bentler Scaled Chi-square (SB-χ2) (Satorra & Bentler, 2001) and other robust indexes: the comparative fit index (CFI), where values > .95 implies good fit and values > .90 implies acceptable fit (Marsh & Hau, 1996); and the root mean square error of approximation (RMSEA) (Hu & Bentler, 1999) with an confidence interval of 90%, where < .05 values implies good fit, values between .05 and .08 implies acceptable fit and values > .08 implies marginal or poor fit (Browne & Cudeck, 1992).

When the structure of CFA was settled, a model testing approach was employed using multi-sample CFA to examine the invariance from GDMS across sex (Men/Women). First, the five-factor structure was separately tested on each group separately (Models M0a and M0b). After the determination of good fit for each group, both models were integrated into a configural model in which the same factor structure for both groups was tested simultaneously, providing a baseline model (M1). Later, increasingly constrained models were applied to examine the equality of measurement: equal factor loadings across groups (M2), equal factor variances and covariances (M3), the intercepts of items to be the same across groups (M4) and, finally, the equality of error variances and covariances (M5). Taking into account that measurement invariance is required for group comparison, it is necessary only to obtain empirical evidence of factor loadings and intercepts in order to compare means of underlying factors across groups (Millsap & Olivera-Aguilar, 2012; Wang & Wang, 2012), but adding the factor variances-covariances and the error variances-covariances restrictions can improve the hypothesis of equivalence across sex (Byrne, 2006). To test the invariance hypothesis, changes in the SB-χ2 (ΔSB-χ2) between unconstrained and constrained models were tested. However, given the well-known limitations of this statistical approach (Cheung & Rensvold, 2002), we also calculated the change in CFI (ΔCFI), where values less than or equal to .01 are indicative of measurement invariance. Moreover, the change in RMSEA (ΔRMSEA) was also considered. An increase of ΔRMSEA no more than .015 provides support to the most parsimonious model (Chen, 2007). Finally, we performed a t test to check sex-differences in the GDMS scales.

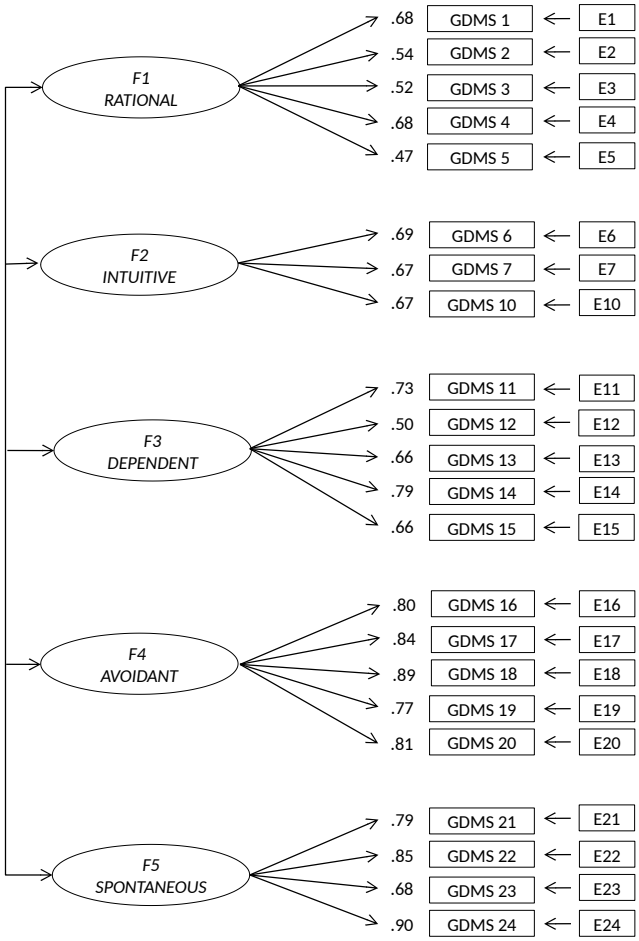

FIGURE 1: Correlated confirmatory factor analysis.

The internal consistency from the subscales was measured using Cronbach's α and composite reliability coefficients, providing information about this issue using both constrained and unconstrained method (Peterson & Kim, 2013). From the second sample, test-retest reliability was measured using intraclass correlations (ICC) using the two-way mixed effects model with absolute agreement (Koo & Li, 2016). Student's t or chi-square test were used to compare participants who complete the retest and participants who did not, for sex, age and decision making styles.

Finally, Pearson correlations were performed between the scales of GDMS with the REI scales in order to provide convergent validity, and with the TIPI and brief COPE scales to test the possible relationships with personality traits and healthy/unhealthy coping styles to stress.

All the analyses were performed using SPSS 20.0 and EQS 6.1 (Bentler, 2006).

TABLE 2: Confirmatory factor analyses and sex invariance models of GDMS.

Model	Model description	SB-χ2	df	ΔSB-χ2	Δdf	CFI	RMSEA [IC 90%]	ΔCFI	ΔRMSEA
Confirmatory factor analysis									
MO	5 Orthogonal Factors	739.37	252			.913	.054 [.050–.059]		
MC	5 Correlated Factors	403.99	199			.962	.040 [.034–.045]		
Invariance analysis									
M0a	Baseline Model Women	333.76	199			.960	.042 [.034–.050]		
M0b	Baseline Model Men	286.48	199			.957	.041 [.030–.051]		
M1	Configural Model	620.71	398			.959	.042 [.035–.048]		
M2	FL Invariance	645.03	420	22.09	22	.959	.041 [.034–.047]	< .001	.001
M3	FL + FVC Invariance	654.97	430	31.61	32	.959	.040 [.034–.046]	< .001	.002
M4	FL + FVC + INT Invariance	759.56	452	155.93*	54	.957	.042 [.035–.048]	.002	< .001
M5	FL + FVC + INT + EVC Invariance	778.18	474	157.25*	76	.959	.045 [.039–.050]	< .001	.003

Note: * p < .05; FL = Factor loadings, FVC = Factor variances-covariances, INT = Intercepts, EVC = Error variances-covariances.

2.2 Results

2.2.1 Factor structure, sex invariance and sex differences

We first checked the factor loadings of each item in their hypothesized scale. All items showed adequate values, ranging from .47 to .91, except two items from the intuitive scale ("I generally make decisions that feel right to me", and "When I make a decision, it is more important for me to feel the decision is right than to have a rational reason for it"), which showed factor loadings < .30 (.18 and .26, respectively). Those items were eliminated from the following analysis.

CFA results indicated that the correlated 5-factor (MC) is the model with better fit (SB-χ2 = 403.99, CFI = .962, RMSEA = .040; see Table 2) confirming the validity of the 5-factor model, assuming inter-correlation between GDMS scales (Figure 1).

Before multi-group analyses, the correlated 5-factor model was separately tested for women (M0a) and men (M0b). Results showed a good fit to the data in both groups, and an adequate fit for the configural model (M1). Results obtained from the comparison between the four nested models tested with the configural model showed that: factor loadings did not differ across sex (M2, ΔCFI < .01, ΔRMSEA < .015); the dispersion of factor scores across sex was the same and they followed equal relational patterns (M3, ΔCFI < .01, ΔRMSEA < .015); the item scores across sex have the same scalar measurement (M4, ΔCFI < .01, ΔRMSEA < .015); and, finally, the item residual variances and covariances are the same across sex (M5, ΔCFI < .01, ΔRMSEA < .015) (see Table 2)

From the five decision making styles, the *dependent* style showed significant sex-differences ($t_{641} = -2.09$, p < .04, uncorrected for multiple tests), showing women higher scores in the *dependent* style in comparison to men (Table 3). Moreover, the *spontaneous* style also showed significant sex differences ($t_{641} = 3.22$, p < .001), showing men higher scores than women.

2.2.2 Internal consistency, test-retest reliability and inter-scale correlations

Table 3 shows descriptive, Cronbach's α and composite reliability as indicators of internal consistency, test-retest reliabilities, and the inter-scale correlations. Results regarding internal consistency showed adequate values, ranging from .72 to .91 for both Cronbach's α and composite reliability. Test-retest reliability using ICC showed a great significant temporal stability for all the scales (range ICC = .77 to .86, p < .001). There were significantly fewer women in the group of people who completed the retest than in the group who not ($\chi^2 = 3.91$, p < .048). However, there were no differences in age or decision-making styles at first test between people who completed the retest and who did not (all p's > .05; Appendix 1). Finally, correlations between the scales shows that *rational* style correlated negatively with *avoidant* and *spontaneous* styles, and positively with *dependent* style; also *intuitive* style correlated positively with *spontaneous* style, and *avoidant* style correlated positively with *dependent* and *spontaneous* styles.

2.2.3 Relations of GDMS with thinking styles

In this section we describe the relations with the total rational and experiential thinking styles, for more information about engagement and ability sub-scales see Table 4.

TABLE 3: Descriptive statistics, test-retest reliability, internal consistency and inter-scales correlations.

	Mean (SD)								Correlations			
	Men	Women	Total	Test1	Retest1	ICC[1]	α	CR	R	I	D	A
Rational	4.01 (.55)	4.01 (.58)	4.01 (.57)	3.99 (.55)	3.96 (.59)	.77 [.68,,84]	.72	.72	–			
Intuitive	3.61 (.78)	3.64 (.83)	3.63 (.81)	3.67 (.78)	3.68 (.78)	.81 [.74,,87]	.80	.82	−.07	–		
Dependent	3.45 (.78)	3.58 (.85)	3.53 (.81)	3.57 (.80)	3.61 (.80)	.83 [.76,,88]	.80	.81	.11	−.02	–	
Avoidant	2.56 (.99)	2.46 (1.08)	2.49 (1.04)	2.52 (1.01)	2.58 (1.05)	.86 [.80,,90]	.91	.91	−.16	−.09	.22	–
Spontaneous	2.70 (.92)	2.47 (.91)	2.57 (.92)	2.59 (.93)	2.51 (.91)	81 [.74,,87]	.87	.87	−.46	.46	−.01	.27

Note: SD = standard deviation; ICC = Intraclass correlation; CI = Confident interval 95 %; R=Rational; I=Intuitive; D=Dependent; A=Avoidant. ICC=Testt-retest; CR=composite reliability. All p-values of correlations are < .001 except .11, which is .05, and all correlations between .10 and −.10 which are >.05. [1] Analysis using second Sample.

The *rational* decision making style was positive and moderately related to rational thinking style and negatively weakly associated with experiential thinking style. The *intuitive* decision making style was positively associated to experiential thinking style. The *dependent* style was only weakly negatively related to rational style. The *avoidant* style was negatively related to rational style too. And, finally, the *spontaneous* style was positively associated with experiential style.

2.2.4 Relationships of GDMS with personality factors

Pearson correlations for study the relations of decision-making styles with five factor personality and coping styles were described in Table 4.

The *rational* scale was positive, but moderately, associated with agreeableness, conscientiousness and positively associated with emotional stability. The *intuitive* scale was moderated and positively related to extraversion and positively to openness. The *dependent* style was negative associated with emotional stability. The *avoidant* style was negatively associated with all the five factors. Finally, the *spontaneous* style was positively related to extraversion and negatively to emotional stability, agreeableness and conscientiousness.

2.2.5 Relationships of GDMS with coping styles

Concerning coping styles, *rational* style from GDMS correlates positively with the coping active scale and the planning coping scale, also was positively but weakly related to the acceptance scale and negatively associated with humor, behavioral disengagement, venting and substance use coping styles. The *intuitive* scale correlated positively with active coping and positive reframing and negatively with self-blame and behavioral disengagement. *Dependent* style correlated strongly and positively with emotional support and instrumental support, and also weakly positively correlated with venting and negatively with humor. *Avoidant* scale strongly positively correlated to behavioral disengagement, and positively to denial, self-blame, substance use, self-distraction and religion; furthermore, *avoidant* GDMS style negatively correlated with active coping, planning and positive reframing. Finally, positive and significant correlations were found between *spontaneous* style and substance use, denial, behavioral disengagement, self-distraction, self-blame and humor; moreover, *spontaneous* style correlated negatively to planning.

2.3 Discussion

The principal aim of this research was to validate the Spanish translation of the GDMS and provide psychometric properties from this translation. For that, we aimed to confirm the 5-factor structure and provided invariance by sex evidence. Our results showed good construct validity for the correlated five factor structure of the Spanish adaptation of GDMS. This result appeared when two items of *intuitive* scale were eliminated leading the scale with a total of 22 items. Furthermore, the questionnaire structure is also invariant across sex, confirming the hypothesis of equivalence by sex. Moreover, the five scales showed acceptable internal consistency and test-retest reliability. Apart from this, other results showed that women scored higher in *dependent* style than men; this result may be related to studies that suggest that women use social support as a coping strategy (Taylor, 2006; Thoits, 1991). By contrast, men scored somewhat higher in *spontaneous* decision-making style. Finally, the correlations between GDMS subscales with personality the five factor model, coping styles and thinking styles, are consistent with past research.

We confirmed the 5-factor structure from the Spanish adaptation of GDMS showing that the model with better fit is the correlated model, which agrees with the previous research (Loo, 2000). The scale shows the same five factor structure as the original scale (Scott & Bruce, 1995), and the subsequent adaptations to other languages (Baiocco et

TABLE 4: Pearson correlations between GDMS scales with REI, TIPI and BriefCOPE scales.

		Rational	Intuitive	Dependent	Avoidant	Spontaneous
REI	Rational	.24***	−.004	−.16**	−.19***	−.08
	Rational ability	.28***	−.02	−.13**	−.17**	−.11
	Rational engagement	.19***	−.002	−.21***	−.29***	−.14*
	Experiential	−.14**	.64***	−.09	.03	.33***
	Experiential ability	−.09	.55***	−.10	−.03	.25***
	Experiential engagement	−.17**	.61***	−.06	.08	.36***
TIPI	Extraversion	−.01	.20***	−.02	−.18***	.14**
	Emotional stability	.15**	−.09	−.11*	−.22***	−.21***
	Agreeableness	.22***	−.05	.06	−.14**	−.22***
	Conscientiousness	.30***	.07	−.03	−.37***	−.16**
	Openness	.06	.15**	−.10	−.11*	.02
Brief COPE	Active coping	.32***	.19***	.01	−.36***	−.07
	Planning	.36***	−.002	−.01	−.17***	−.24***
	Emotional support	−.06	−.01	.45***	.02	−.02
	Instrumental support	−.02	−.01	.64***	.07	−.04
	Religion	.03	.02	−.04	.11*	.03
	Positive reframing	.04	.11*	−.01	−.12*	.01
	Acceptance	.11*	−.02	−.04	−.09	−.03
	Denial	−.04	−.02	.01	.23***	.23***
	Humor	−.13**	−.02	−.13**	.02	.11*
	Self-distraction	−.02	.09	.10	.12*	.16**
	Self-blame	−.07	−.12*	.04	.22***	.15**
	Behavioral disengagement	−.17***	−.16**	.03	.43***	.21***
	Venting	−.11*	−.05	.12*	.08	.07
	Substance use	−.21***	−.02	−.05	.19***	.24***

Note: *** p < .001; ** p < .01; * p < .05.

al., 2009; Bavolar & Orosová, 2015; Curşeu & Schruijer, 2012; Gambetti et al., 2008; Girard et al., 2016; Loo, 2000; Thunholm, 2004). However, this adaptation has 22 items instead of 25 items from the original scale. As we explained in the methods section, one of the items from *spontaneous* scale (item S5), was removed from the adaptation prior to the analyses because previous research showed the item is generally "problematic", showing cross-load systematically with the intuitive scale (Baiocco, Laghi, D´alesio, Gurrieri & Di Chiacchio, 2007; Bavolar & Orosová, 2015; Curşeu & Schruijer, 2012; del Campo et al., 2016; Gambetti et al., 2008; Girard et al., 2016; Loo, 2000; Scott & Bruce, 1995; Spicer & Sadler-Smith, 2005). This is reasonable because the highly similarity between both scales. Other studies also showed that there is another "problematic" items but, only S5 appear consistently in almost all the previous research. Moreover, once the CFA was performed two more items were removed from the *intuitive* scale because they showed factor loadings below to .30, as literature recommends. The meaning of both items seems to be slightly different from the other three items of the *intuitive* scale. In this sense, the removed items are asking what the feeling is after the decision making while the remaining items are focused on the information (hunches) that influence decision-making.

Regarding invariance, to the best of our knowledge this is the first time that GDMS showed invariance for sex. A previous study showed invariance between two different languages English and French (Girard et al., 2016), but our results provided both metric and scalar invariance evidence for sex. The scale surpasses the usual criteria for factor variance-covariance invariance and error variances-covariances invariance. Indeed, error variances-covariances is a really

improbable and heavy restriction (Meredith & Horn, 2001). Therefore, GDMS showed equivalence across sex surpassing both the basic and the more robust restrictions. These results imply that the sex-differences found in previous studies were not due to the scale. Thus, past research on sex-differences has reported that *dependent* style is more used by women than men, and *rational* style or a combination of *spontaneous* and *intuitive* style as more used by men than women (Delaney et al., 2015; Salo & Allwood, 2011). In this regard, our results for sex-differences provided more evidence for the *dependent* style and *spontaneous* style along the same line as previous research.

Despite the modifications in the sub-scales correction, results showed acceptable internal consistency for all scales. Moreover, results showed high test-retest reliability. In this regard, this adaptation seems to measure the decision-making styles in Spanish speaking populations. Moreover, we provided evidence about temporal stability with a sample of 137 participants in the retest (two months after the first measure), one month more than Spicer & Sandler-Smith (2005) study.

Regarding convergent validity, like the results from Gambetti et al. (2008) with the Style of Learning and Thinking test (SOLAT: Albaili, 1993), our results showed that *rational* decision making style correlates positively with rational thinking style and negatively with the experiential thinking style. And *intuitive* decision-making style showed the reverse direction in its relationships with thinking styles. Moreover, our results showed that higher scores in *dependent* and *avoidant* styles predicted lower scores in rational thinking style. In addition, scoring more on *spontaneous* style correlates with more experiential thinking style, possibly because of the strong relationship between *intuitive* and *spontaneous* decision-making style, and because *spontaneous* style is based on fast decisions based sometimes in hunches.

Having a good measure of how people usually decide, as decision making styles, is helpful for research and for psychological practice. Different studies have shown that decision making styles are good predictors of real life decision-making with long term consequences which could influence peoples' life (Galotti et al., 2006; Gati, Gadassi & Mashiah-Cohen, 2012; Gati et al., 2010; Singh & Greenhaus, 2004). In fact, decision making styles seem to influence the way people perceive and cope with stressful situations (Allwood & Salo, 2012; Salo & Allwood, 2011; Thunholm, 2008), and are good predictors of general mental health (Bavolar & Orosová, 2015) and health-risk behaviors (Bavolar & Bačíková-Slešková, 2018). In this sense, our results suggest that the *rational* and *intuitive* styles as "the healthier styles". To support this, both styles showed positive relationships with emotional stability, and active and healthier coping styles (e.g., active coping, positive reframing, or planning). This confirms the results from previous research: relating *rational* style to high self-efficacy and self-esteem (Baiocco et al., 2007; Thunholm, 2004) and low stress in public officials (Allwood & Salo, 2012); showing *intuitive* style as a style associated with less regret after a medical decision and better mental health (Bavolar & Orosová, 2015); and showing both relationships with less neuroticism and high conscientiousness (Bavolar & Bačíková-Slešková, 2018; Wood & Highhouse, 2014).

By contrast, *dependent*, *avoidant* and *spontaneous* styles were related to less emotional stability. In this sense, dependent and avoidant style have been associated with low self-esteem and self-efficacy (Baiocco et al., 2007; Thunholm, 2004), high levels of perceived stress and sleep disturbance (Allwood & Salo, 2012; Salo & Allwood, 2011) and high neuroticism (Bavolar & Bačíková-Slešková, 2018; Dewberry et al., 2013; Wood & Highhouse, 2014). It is probable that using more those decision-making styles would be worse for mental health. Concretely, *avoidant* and *spontaneous* styles showed associations with passive coping styles or maladjusted behaviors (drug use, denial, or self-blame), and less conscientiousness and agreeableness. In support of this hypothesis, *avoidant* style was related in previous research to worse mental health (Bavolar & Orosová, 2015) and higher levels of cortisol after a real-life stressful decision environment (Thunholm, 2008).

Finally, it is important to highlight sex differences from *dependent* and *spontaneous* decision styles. The relationship between *dependent* style with emotional instability could be due to the prevalence in women of higher scores in neuroticism (Weisberg, De Young & Hirsh, 2011). Also, a *dependent* style would be based on an evolutionary characteristic for women to perform more "tend-and-befriend" behaviors under stressful situations (Taylor, 2006). By contrast, the higher tendency of men to engage in *spontaneous* decision making could show men to be more impulsive and engage in risky decision making (Barel, Shahrabani & Tzischinsky, 2017; Cano-López, Cano-López, Hidalgo & González-Bono, 2017; Lighthall et al., 2012).

As a limitation of this research, participants from both studies were university students, which were necessary to generalize to other samples. This is a general problem for the validation of GDMS because almost all the preceding validations were based on student samples (see Table 1), except for two military samples, one sample of engineers and two of adolescents (Baiocco et al., 2009, 2007; Scott & Bruce, 1995; Thunholm, 2004). That issue is important because differences in decision styles have been found between samples of different age (Delaney et al., 2015). Another limitation is the low Cronbach's α of some of the sub-scales of TIPI or brief COPE. This low internal consistency in the scales could be the reason for the lack of relationships between some Big five traits and decision making styles that have been seen in past research (Bavolar & Bačíková-Slešková, 2018; Dewberry et al., 2013; Wood & Highhouse, 2014).

We suggest that future research should obtain more variety of samples in age and context, to perform age invariance and to use longer scales to test personality and coping styles.

In conclusion, the Spanish adaptation of GDMS questionnaire has acceptable psychometric characteristics, and it is thus a useful instrument to measure decision making styles in Spanish speaking populations. Moreover, invariance by sex implies more validity to future research with GDMS. Finally, personality and coping styles relationships with GDMS provides more clues to the adequacy of each decision style in people's lives.

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Appendix 1: Mean ± SD and p values of the comparisons between participants who complete retest and participants who not, in the second sample.

	Retest	Not retest	p value
Age	21.07 (4.71)	20.79 (3.26)	.520
Sex, women (%)	96 (43.6)	124 (56.4)	.048
Rational	4.02 (.55)	3.97 (.55)	.407
Intuitive	3.68 (.81)	3.67 (.76)	.864
Dependent	3.59 (.76)	3.57 (.82)	.722
Avoidant	2.52 (1.07)	2.52 (.97)	.982
Spontaneous	2.57 (.95)	2.61 (.91)	.832

Appendix 2: English General Decision Making Style and Spanish translation.

Item	English	Spanish
Int.	Listed below are statements describing how individuals go about making important decisions. Please indicate the extent to which you agree or disagree with each statement.	A continuación, se presentan unos enunciados que describen cómo las personas toman decisiones importantes. Por favor, indique en qué medida está de acuerdo o en desacuerdo con cada enunciado.
R1	I plan my important decisions carefully.	Planeo mis decisiones importantes cuidadosamente.
R2	I double-check my information sources to be sure I have the right facts before making decisions.	Reviso mis fuentes de información para asegurarme de que mi información es correcta antes de tomar decisiones.
R3	I make decisions in a logical and systematic way.	Tomo decisiones de forma lógica y sistemática.
R4	My decision making requires careful though.	Mi toma de decisiones requiere una cuidadosa reflexión.
R5	When making a decision, I consider various options in terms of a specific goal.	Cuando tomo una decisión, considero varias posibilidades para lograr un objetivo.
I1	When making decisions, I rely upon my instincts.	Cuando tomo decisiones, confío en mis instintos.
I2	When I make decisions, I tend to rely on my intuition.	Cuando tomo decisiones, tiendo a confiar en mi intuición.
I3*	I generally make decisions which feels right to me.	Normalmente tomo decisiones con las que me siento bien.
I4*	When I make a decision, it is more important for me to feel the decision is right than to have a rational reason for it	Cuando tomo una decisión, es más importante para mí sentir que la decisión es correcta que tener una razón racional para tomarla.
I5	When I make a decision, I trust my inner feelings and reactions.	Cuando tomo una decisión, confío en mis sentimientos y reacciones.
D1	I often need the assistance of other people when making important decisions.	A menudo necesito la ayuda de otra persona cuando tomo decisiones importantes.
D2	I rarely make important decisions without consulting other people.	Raramente tomo decisiones importantes sin consultárselas a otras personas.
D3	If I have the support of others, it is easier for me to make important decisions.	Si tengo el apoyo de otras personas, es fácil para mí tomar decisiones importantes.
D4	I use the advice of other people in making my important decisions.	Uso el consejo de otras personas para tomar mis decisiones importantes.
D5	I like to have someone to steer me in the right direction when I am faced with important decisions.	Me gusta tener a alguien que me guíe en la dirección correcta cuando me enfrento a decisiones importantes.
A1	I avoid making important decisions until the pressure is on.	Evito tomar decisiones importantes hasta que me siento presionado a hacerlo.
A2	I postpone decision making whenever possible.	Pospongo la toma de decisiones siempre que sea posible.
A3	I often procrastinate when it comes to making important decisions.	A menudo aplazo la toma de decisiones importantes.
A4	I generally make important decisions at the last minute.	Normalmente tomo las decisiones importantes en el último minuto.
A5	I put off making many decisions because thinking about them makes me uneasy.	Pospongo la toma de decisiones porque pensar en ellas me inquieta.
S1	I generally make snap decisions.	Normalmente tomo decisiones relámpago.
S2	I often make decisions on the spur of the moment.	A menudo tomo decisiones respondiendo a un impulso.
S3	I make quick decisions.	Tomo decisiones rápidas.
S4	I often make impulsive decisions.	A menudo tomo decisiones impulsivas.
S5	When making decisions, I do what seems natural at the moment.	

Note: Int. = Introduction to test; * Item eliminate after confirmatory factor analysis for low factor loadings (< .30).