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Variations in Decision-Making Profiles by Age and Gender:

A Cluster-Analytic Approach

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Abstract

Using cluster-analysis, we investigated whether rational, intuitive, spontaneous, dependent, and avoidant styles of decision making (Scott & Bruce, 1995) combined to form distinct decision-making profiles that differed by age and gender. Self-report survey data were collected from 1,075 members of RAND's American Life Panel (56.2% female, 18-93 years, *M*age = 53.49). Three decision-making profiles were identified: affective/experiential, independent/self-controlled, and an interpersonally-oriented dependent profile. Older people were less likely to be in the affective/experiential profile and more likely to be in the independent/self-controlled profile. Women were less likely to be in the affective/experiential profile and more likely to be in the interpersonally-oriented dependent profile. Interpersonally-oriented profiles are discussed as an overlooked but important dimension of how people make important decisions.

Keywords: decision making; decision-making styles; gender; age differences; cluster analysis

Variations in Decision-Making Profiles by Age and Gender: A Cluster-Analytic Approach

1. Introduction

Individual differences in decision-making styles, such as the tendency to use reason or intuition, are of long-standing interest to psychologists (see Appelt, Milch, Handgraaf, & Weber, 2011 for review). Decision-making styles are associated with job performance (Russ, McNeilly, & Comer, 1996), self-esteem (Thunholm, 2004), planning behaviors (Galotti et al., 2006), and decision-making competence (Bruine de Bruin, Parker, & Fischhoff, 2007; Parker, Bruine de Bruin, & Fischhoff, 2007). Whereas some style measures are context-specific (e.g., career decision making, Harren, 1979), others assess styles across contexts (e.g., Epstein, Pacini, Denes-Raj, & Heier, 1996; Nygren, 2000). The General Decision-Making Styles Inventory (GDMS; Scott & Bruce, 1995) assesses five decision styles of making important decisions—rational, intuitive, spontaneous, avoidant and dependent. Past GDMS research has used a "variable-centered" approach to investigate intercorrelations among *items* to compute subscales for specific styles, and analyze individual differences in those styles. Here, we use a "person-centered" approach to examine whether certain styles cluster together to form distinct profiles among subgroups of people, by looking at intercorrelations among *subscales* rather than *items* (Henry, Tolan, & Gorman-Smith, 2005).

1.1. Decision making

Many theories of decision making distinguish two ways of making decisions (Epstein, 1994; Evans, 2008; Sloman, 1996; Osman, 2004). First, the "affective/experiential" mode is fast and uses gut feelings and experience. Second, the "rational" mode is slower and uses reason and deliberation. Variability in these modes is seen between individuals, depending, for example, on their cognitive ability (Stanovich & West, 2000) and within individuals, such as when the

rational mode alters initial intuitions (Kahneman, 2003). Critics of dual-process approaches, however, note that focusing on two modes obscures the complexity of decisional processes (Keren, 2013; Keren & Schul, 2009). Some suggest there is one integrative decision-making process (e.g., Kruglanski & Gigerenzer, 2011), while others argue that decision making involves multiple processes (e.g., Frank, Cohen, & Sanfey, 2009) and is affected by social context (Strough, Karns, & Schlosnagle, 2011).

Drawing from previous decision measures (e.g., career decision-making, Harren, 1979) Scott and Bruce (1995) proposed four decision styles (i.e., rational, intuitive, dependent, and avoidant) which were confirmed, in addition to a fifth style, spontaneous. The *rational* style involves logical deliberation, matching the "rational" mode of dual-process models. The *intuitive* style reflects relying on feelings whereas the *spontaneous* style captures making decisions quickly; both of which match aspects of the affective/experiential mode of dual-process models. Prior work shows that spontaneous and intuitive styles are positively correlated (Baiocco, Laghi, & D'Alessio, 2009; Loo, 2000; Thunholm, 2004), suggesting these two styles may cluster together to form a profile.

The other two styles in Scott and Bruce's (1995) measure, the *dependent* (seeking assistance from others) and *avoidant* styles (postponing decisions) do not conform to a dual-process model. These styles may stand alone in differentiating between people, or they may co-occur with other styles as part of a profile. One study showed a positive association between rational and dependent styles (Loo, 2000), suggesting that people with rational styles may deliberate with others. However, individuals may involve others in the decision-making process for different reasons (see Meegan & Berg, 2002; Strough, Cheng, & Swenson, 2002).

1.2. Aging

Dual-process models of aging and decision making posit that older people rely more on emotions and experience and less on reason than do younger people (Peters, Hess, Västfjäll, & Auman, 2007). Fluid cognitive abilities and working memory that support rational decision making decline in older age (see Babcock & Salthouse, 1990; Verhaeghen, Marcoen, & Goossens, 1993). Emotional and affective skills that support intuition may remain stable or even improve with age (Blanchard-Fields, 2007; Charles & Carstensen, 2010; Kennedy & Mather, 2007). Research investigating age differences in the role of emotions and cognitive ability in decision making yields inconsistencies (see Strough, Parker, & Bruine de Bruine 2015, Mikels, Shuster, & Thai, 2015 for reviews). If older people compensate for age-related cognitive declines by relying more on quick gut reactions, then older age may be associated with a decision-making profile focused on intuition and spontaneity rather than rationality.

However, two studies on age differences in decision styles yield inconsistent findings. Older age in community-dwelling adults was associated with a *greater* likelihood of reporting *both* rational and intuitive styles (Bruine de Bruin et al., 2007). For the intuitive style, a study of undergraduates (19-50 years) showed the opposite—older age was associated with reporting a *less* intuitive style (Loo, 2000). Discrepant findings could reflect differences in samples, with college education affecting the degree to which people rely on rationality and intuition. The current study therefore uses a large, life-span adult sample, in which participants of all ages are recruited in the same way (see Method).

Additionally, research on aging and decision making suggests that age differences in dependent styles are in need of investigation. Older adults (65-94 years) are more likely than younger adults (18-64 years) to report delegating decisions to others (Finucane et al., 2002). However, interviews of older adults (53-84 years old) show that although some prefer family

members to make decisions about financial and health plans for them, others want to avoid burdening family (Samsi & Manthorpe, 2011). The personal relevance of decisions may also influence how older adults approach decisions (Hess, 2014).

Dependence on others may increase with age (Strough et al., 2002), as older adults experience a decline in fluid abilities (Salthouse, 2012). If so, depending on others might allow older adults to rely on deliberation, with dependent and rational styles co-occurring in profiles characteristic of older adults. Alternatively, people may depend on others to avoid making decisions themselves. Dependent and avoidant styles are positively correlated in adolescence (Baiocco et al., 2009), but little is known about these styles in older adults because prior research focuses on intuition and reason.

1.3. Gender differences

Gender stereotypes characterize men and women as fundamentally different, even from different "planets" (Gray, 1992). Women are stereotyped as "intuitive" and men as "rational". However, research investigating gender differences in reports of intuitive and rational decision-making styles yields mixed results. Undergraduate women are more likely than men to report intuitive styles (Sadler-Smith, 2011). Using a mood induction that asked people to describe feelings about winning or losing a competition, women reported using more intuition, and men reported using more reason (Sinclair, Ashkanasy & Chattopadhyay, 2010). However, studies assessing general decision-making styles in age diverse samples do not find significant gender differences (Baiocco et al., 2009; Loo, 2000; Spicer & Sadler-Smith, 2005).

Gender stereotypes characterizing women as interpersonally oriented and men as self-reliant and individualistic (Gilligan, 1982; Tannen, 1991) suggest that men and women differ with the extent that they involve others in decision making (the dependent style). In career

decisions, women are more likely than men to endorse relying upon others (Phillips, Pazienza, & Ferrin, 1984). In addition, women are more willing to seek support compared to men (Tamres, Janicki, & Helgeson, 2002; Thoits, 1991). Together, this research suggests that women may be more likely than men to report using an interpersonally-oriented decision-making style.

1.4. Current study

Research Aim 1 is to examine whether decision-making styles form distinct clusters or profiles. Specifically, we examine whether decision-making profiles correspond to using reason versus affect and experience (as dual-process theories posit), as well as advice seeking, or using the dependent style. Research Aim 2 is to investigate age and gender differences in decision profiles.

2. Method

2.1. Participants

Participants were 1,075 members of RAND's American Life Panel (https://mmicdata.rand.org/alp/) who completed an internet survey (see Table 1 for demographic information). Panelists receive approximately $20 per 30 minutes of survey completion time. Panel members were recruited through random digit dialing for national surveys, including the monthly University of Michigan Consumer Survey. Additional members were recruited via snowball sampling. Panelists without internet access (3.7 %) were provided with access.

2.2. Procedure

Our survey invitation was sent to 1,353 panelists, 1,075 who responded[1] (for a 79.5% response rate).

2.3. Measures

[1] Respondents were more likely than nonrespondents to be male, older, and White (see Bruine de Bruin, Strough, & Parker, 2014 for details).

2.3.1. Demographics. Participants reported their age (which was entered into the analyses as a continuous variable), as well as their gender, marital status, family income, ethnicity, and highest education attained (see Table 1).

2.3.2. Decision-Making Styles. The 25-item GDMS Inventory (Scott & Bruce, 1995) measured the following styles: rational (e.g. *"My decision making requires careful thought"*), intuitive (e.g. *"When making decisions, I rely upon my instincts"*), dependent (e.g. *"I rarely make important decisions without consulting other people"*), avoidant (e.g. *"I postpone decision making whenever possible"*), and spontaneous (e.g. *"I make quick decisions"*). Scott and Bruce (1995) established validity, through factor-analytic procedures, and reliability among four samples (military, young adults, undergraduates, and engineers/technicians; αs = .68-.87). Participants used a 5-point Likert scale (1=strongly disagree to 5=strongly agree) to rate how well statements described how they make "important" decisions ($\alpha > .81$; see Table 2).

2.4. Data Analysis

Analyses were conducted using SPSS 18.0. Table 2 shows descriptive statistics and correlations for the measures of decision styles. We examined skewness and kurtosis and applied transformations as needed. Following Henry et al. (2005), we used a two-step cluster analytic approach. The first step was Ward's hierarchical cluster analysis which formed clusters by maximizing within-group similarities and between-group differences. Second, a non-hierarchical (*K*-means) cluster analysis confirmed the hierarchical cluster solution. Cluster solutions were validated by conducting a MANOVA that used the cluster profiles as independent variables, and the five decision-making styles as dependent variables to ensure distinctions between groups (Aldenderfer & Blashfield, 1984). Last, logistic regressions examined age and

gender as predictors of profile memberships, controlling for marital status, family income, education, and ethnicity.

3. Results and Discussion

3.1. Preliminary Analyses

We used logarithmic transformations to correct for skewness and kurtosis of rational and avoidant styles. Correlations among variables were small to moderate (see Table 2); there were no multivariate outliers or multicollinearity issues.

3.2. Decision-Making Style Profiles

The two-step cluster analysis (Henry et al., 2005) identified a 3-cluster solution. A MANOVA found a significant 3-cluster differentiation in the five decision styles, $F(5, 1055) = 13{,}285.54$, Wilk's $\Lambda = 0.450$, $p < .001$. As shown in Table 3, the spontaneous and dependent decision styles were the most distinguished between the clusters.

Figure 1 presents the three clusters, in terms of their mean standardized scores on each decision-making style. Cluster 1 corresponded to high use of a spontaneous style and moderately high use of an intuitive style ($N = 315$, 29.7%). Cluster 2 captured high use of a dependent style and low use of all other styles ($N = 281$, 26.5%). Cluster 3 ($N = 288$, 27.1%) represented low endorsement of all styles with the dependent and spontaneous styles the lowest.

3.2.1. Decision Profiles Discussion. The first profile matches the idea of the intuitive, fast mode of decision making posited in dual-process models (Epstein, 1994; Evans, 2008; Osman, 2004; Reyna, 2004), and hence we labeled it **"**affective/experiential." This profile also shows below-average use of advice or support from others. In contrast, the second profile is defined as using or needing advice and assistance from other people. This profile captures the social context within which decisions occur, with some people preferring to delegate decisions

(Finucane et al., 2002; Samsi & Manthrope, 2011), seek advice, and make decisions with others. We labeled this profile "dependent" to match Scott and Bruce's term for the subscale. Importantly, however, items from the dependent subscale do not distinguish how or why people involve others. For example, using "advice of other people in making important decisions" and "rarely making important decisions without consulting other people" could indicate seeking information from experts to make the "best" decision, or delegating decisions to others due to lack of interest or ability. Hence, the term "interpersonal" might better represent this profile.

Distinguishing characteristics of the third profile are independence from others and a lack of spontaneity—that is, *not* making decisions driven by quick, affective reactions or consulting others. Hence, we labeled it "independent/self-controlled." This profile suggests a slow, controlled approach to decision making which is consistent with the deliberative system in dual-process models (Kahneman, 2003; Stanovich & West, 2000). Notably, however, the rational style was not a defining feature of this profile, nor was it well-distinguished across any profile. Hence, this style seems to be less central for differentiating decision-making profiles.

3.3. Aim 2: Age and Gender Differences in Profiles

Three binary logistic regressions were conducted with membership in each decision-making style profile as a discrete outcome variable (0= not in profile, 1= in profile) to assess potential age and gender differences. When entering indicators simultaneously, significant models were found when predicting the affective/experiential, $\chi^2(6)= 31.66$, $p<.001$, $R^2= .04$ (Nagelkerke) and dependent profiles, $\chi^2(6)= 19.10$, $p= .004$ $R^2= .02$, but not the independent/self-controlled profile, $\chi^2(6)= 9.78$, $p=.13$, $R^2= .01$.

3.3.1. Age Differences: Results and Discussion. For the affective/experiential profile, age significantly predicted profile membership. Growing older by one year was associated with

2% decreased odds of being in the affective/experiential profile. Although the overall model was not significant, age was a significant predictor of the independent/self-controlled profile. Growing older by one year was associated with 1% increased odds of being in the independent/self-controlled profile (see Table 4).

Theorists suggest that as people grow older, they shift towards relying more on affect and experience and less on deliberation to make decisions, reflecting age-related declines in fluid cognitive abilities and maintenance or improvement in emotion regulation (e.g., Peters et al., 2007). However, belonging to the affective/experiential profile was *less* likely with older age. Rather, older age was associated with an increased likelihood of being in the independent/self-controlled profile. Notably, Scott and Bruce's (1995) inventory asks about "important" decisions. Hess (2014) suggests that older adults apply cognitive resources to personally important decisions. Hence, our findings may reflect that with age, people may be less inclined to make what they see as *important* decisions quickly and intuitively perhaps due to less time left in life to recover from, say, a bad financial decision.

We did not find a significant association between the dependent profile and age. Previous studies show older adults are more likely to delegate or defer decisions to others (Chen, Ma & Pethtel, 2011; Finucane et al., 2002). Although depending on others and delegating decisions both involve other people, dependence (as measured by GDMS inventory) reflects utilizing others' advice or obtaining support to make decisions, whereas delegation and deferring reflect not wanting to take responsibility for or postponing decisions. Age may not relate uniformly to various ways people involve others when making decisions. Our findings suggest that obtaining advice from others is important across the life span, not just among older adults.

3.3.2. Gender Differences: Results and Discussion. Significant gender differences were found in two of the three profiles (see Table 4). Females have 37% decreased odds of being in the affective/experiential profile than males, but have 45% increased odds of being in the dependent profile.

Stereotypical views of men and women suggest women use intuition and are interpersonally-oriented whereas men are logical and independent (Gilligan, 1982; Gray, 1992). In contrast to these stereotypes, men were more likely than women to be in the affective/experiential profile. The spontaneous items on Scott and Bruce's subscale are conceptually similar to items used to measure impulsivity (Parker et al., 2007). Other work suggests that, on average, men tend to engage in more impulsive and risky behaviors than women do (Byrnes, Miller, & Schafer, 1999; Cross, Copping, & Campbell, 2011). Hence, men's relatively greater likelihood of belonging to the affective/experiential profile may represent a tendency toward greater impulsiveness.

In accord with gender stereotypes, women were more likely than men to belong to the dependent decision-making profile. Women may utilize other people for support and advice when making decisions, similar to how women are more likely than men to use social support as a coping strategy (e.g. Thoits, 1991). However, as discussed earlier, our findings do not address the function of involving others in decision making (getting advice to make the best decision, relying on others to make decisions, delegating decisions to others).

4.1. Limitations and Future Directions

Notable strengths of the current study include a large, national adult life span sample, which addresses limitations from prior research using convenience samples. There are some limitations, however, that should be addressed. First, the generalizability of the profiles is limited

by our sample, which included relatively few non-white participants. Second, self-report measures of decision styles may potentially be affected by participants' concerns about social desirability, and not reflect their actual decision-making performance (see Applet et al., 2011). Men, for instance, may have rated "interpersonal" items lower because relying on others is inconsistent with masculine gender roles in contemporary US culture. In addition, decision styles assess participants' perceptions of how they approach decisions, which may not reflect cognitive decision processes. Lastly, our cross-sectional design does not address age changes or cohort differences (Miller, 2007). Cross-sequential designs are necessary to understand within-person changes and historical influences.

Despite these limitations, our findings can inform future research. In terms of individual differences in decision-making profiles, the "fast" versus "slow" distinction (Kahneman, 2011) is not the only important dimension. Although limited by the number of styles measured in the GDMS, our study shows that profiles also vary on the dimension of interpersonal versus individualistic. Future research should focus on disaggregating aspects of the "dependent" profile. A first step would be to distinguish different functions of including others, such as information or advice seeking, compensating for one's own perceived or actual deficits, or collaborating to make joint decisions (see Meegan & Berg, 2002; Strough et al., 2002). Additional research is necessary to investigate whether focusing on multidimensional profiles (as opposed to styles in isolation) distinguish negative and positive real-world decision outcomes (Bruine de Bruin et al., 2007).

4.2. Conclusions

Individuals' decision-making approaches are multidimensional. Individuals appear to utilize a *composition* of styles, rather than solely depending upon one approach when making

important decisions. Older adults and women were less likely to be in the affective/experiential decision profile, however, women were also more likely to have an interpersonally-oriented, "dependent" profile. Given the age and gender differences found, researchers should acknowledge how age and gender may influence decision-making processes. Examining how the styles cluster among diverse samples and in relation to real-world outcomes will also enhance our understanding of the complexities associated with decision making.

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Table 1

Demographic Characteristics

Variable	Descriptive Statistics	Percentage of Sample
Age (years) [2]	M_{age}= 53.49; Mdn_{age}= 55.00 (SD = 14.85; range 18-93)	
Gender	Males	43.8
	Females	56.2
Ethnicity	American Indian/Alaskan	0.7
	Asian/Pacific Islander	2.2
	Black/African American	7.9
	White/Caucasian	84.9
	Other	4.3
Education	High school graduate or less	16.8
	Some college	23.3
	Associate's degree	12.6
	Bachelor's degree	27.2
	Graduate degree	20
Marital Status	Married/living with partner	61.3
	Separated/divorced	17.4
	Widowed	6
	Never married	15.3

[2] Percentage of adults in each age group: 18-39 yrs (17.9%), 40-59 yrs (47%), 60-69 yrs (23.4%),70+ yrs (11.7%). In analyses, age was a continuous variable.

Table 2

Descriptive Statistics, Correlations, and Coefficient Alpha, for Decision-Making Styles

Decision-making styles	N	*M*	SD	Skewness	Kurtosis	α	Correlations			
							1	2	3	4
1. Rational	1065	4.17	0.68	-0.86	1.41	0.84				
2. Intuitive	1066	3.65	0.76	-0.14	-0.49	0.81	.16**			
3. Dependent	1066	3.11	0.91	-0.07	-0.37	0.85	.07*	.01		
4. Avoidant	1066	2.12	0.87	0.73	0.16	0.86	-.28**	-.02	.26**	
5. Spontaneous	1063	2.44	0.86	0.41	-0.05	0.87	-.29**	.28**	-.02	.31**

Note. *p<.05, **p<.01

Table 3

MANOVA Main Effects with Decision-Making Styles and Profiles

Decision-Making Styles	F	$\eta_p 2$
Rational	29.95	0.05
Intuitive	67.69	0.11
Dependent	461.78	0.47
Avoidant	26.83	0.05
Spontaneous	629.55	0.54

Note. All main effects (df= 2; p<.001).

Table 4

Binary Logistic Regressions Predicting Profile Membership from Age and Gender

		95% CI for Odds Ratio		
Predicted Profiles	*b* (SE)	Lower	Odds Ratio	Upper
Affective/Experiential				
Included				
Constant	0.69(.39)			
Marital Status	0.05(.05)	0.955	1.05	1.150
Household Income	-0.06(.05)	0.862	0.94	1.028
Education	-0.28(.14)	0.572	0.76	1.004
Ethnicity	-0.02(.07)	0.854	0.99	1.136
Age	-0.02(.01)$_c$	0.973	0.98	0.992
Gender (0=males, 1=females)	-0.47(.14)$_c$	0.480	0.63	0.822
Dependent				
Included				
Constant	-1.15(.39)			
Marital Status	-0.03(.05)	0.886	0.97	1.063
Household Income	0.09(.04)$_a$	1.006	1.09	1.190
Education	0.05(.14)	0.799	1.05	1.176
Ethnicity	-0.10(.08)	0.781	0.91	1.048
Age	0.01(.01)	0.997	1.01	1.016
Gender	0.37(.13)$_b$	1.120	1.45	1.878
Independent/Self-Controlled				
Included				
Constant	-1.65(.41)			
Marital Status	-0.02(.05)	0.892	0.98	1.080
Household Income	-0.04(.05)	0.881	0.96	1.052
Education	0.24(.15)	0.952	1.27	1.694
Ethnicity	0.12(.07)	0.976	1.12	1.294
Age	0.01(.01)$_a$	1.000	1.01	1.022
Gender	0.07(.14)	0.816	1.07	1.403

Note. $^a p < .05$, $^b p < .01$, $^c p \leq .001$

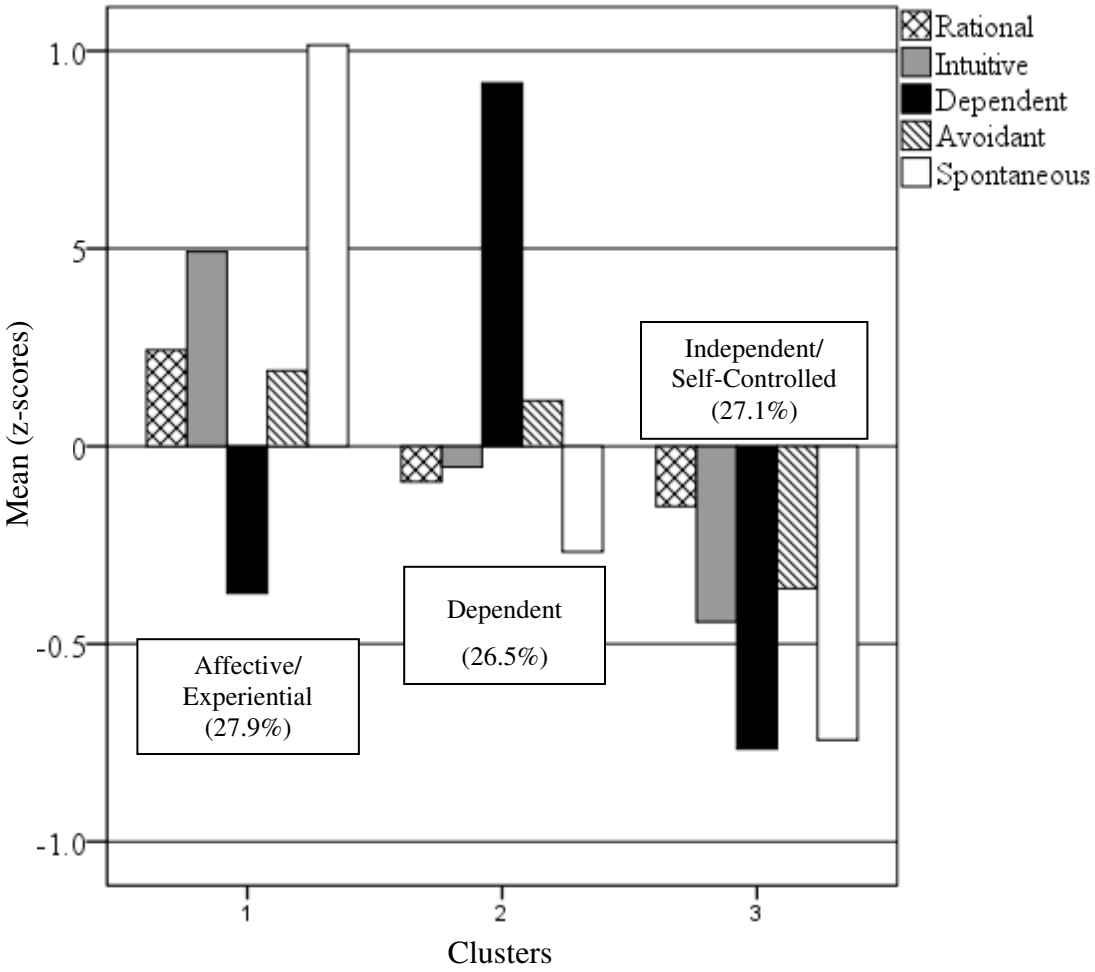

Figure 1. Decision-making style profiles displaying the three different endorsement patterns. Numbers in parentheses indicate the percentage of the sample belonging to each profile.