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Validity and reliability testing of the Swedish version of Melbourne

Decision Making Questionnaire, MDMQ-S

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Validity and reliability testing of the Swedish version of Melbourne Decision Making Questionnaire, MDMQ-S

Abstract

(208 words)

Background: The Melbourne Decision Making Questionnaire (MDMQ) is an attempt to capture and measure coping strategies that people use. The instrument had not previously been translated into Swedish. The aim of this study was to evaluate validity and reliability of the Swedish version of the MDMQ.

Method: A Swedish translation was performed and back-translated. A group of five pilot readers evaluated content validity. The translated questionnaire was tested among 735 patients, health care workers, health care students, and teachers. A parallel analysis (PA), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) were performed.

Result: An initial EFA with a four-factor solution showed a low concordance with the original 22-item four-factor model with a very low Cronbach's alpha in one of the dimensions. However, a second EFA with a three-factor solution showed a good model fit for the Swedish translation of the Melbourne Decision Making Questionnaire (MDMQ-S) with a satisfactory Cronbach's alpha. A CFA showed a goodness-of-fit after deleting six items.

Conclusion: After testing the MDMQ-S, we found support for validity and reliability of the instrument. We found the 16-item version of MDMQ-S to be satisfactory concerning the

subscales vigilance, procrastination and buck-passing. However, we found no support that the hypervigilance dimension could be measured by the MDMQ-S.

Keywords: confirmatory factor analysis; coping; decision making; exploratory factor analysis; parallel analysis; reproducibility of results, reliability, validity

Background

In order to deal with difficult and stressful situations, individuals use different coping strategies. Such a situation may be a decision that an individual make to seek treatment for diseases such as cancer or other diseases that may be perceived as stressful. The concept coping has been defined as realistic and flexible thoughts and acts that solve problems and thereby reduces stress (1, 2).

Coping strategies included in decision-making processes have been described by Janis and Mann (2) in the conflict theory model. Janis and Mann argue that in order to make a decision of importance for the future, there is much required from the person making the decision. According to Janis and Mann (2), a human should not be seen as a rational calculator who always arrives at the right decision, but instead as a person “beset by conflict, doubts, and worry, struggling with incongruous longings, antipathies, and loyalties, and seeking relief by procrastinating, rationalizing, or denying responsibility for own choices.” These characteristics might influence the decision-making process.

The conflict theory model demonstrates that the perceived level of stress directly affects information processing and further the coping reactions. Decision making starts with a challenge which could be an event or communication conveying threats or opportunities (3). The perceived level of stress influences information processing and further the use of different coping strategies in the decision-making process (2).

Coping patterns are based on three conditions: absence or presence of awareness of serious risks for whichever alternative is chosen, hope of finding a better alternative, and a belief that there is adequate time to search and deliberate before making a decision (3). Coping reactions involved in decision making are categorized as adaptive or maladaptive and affect the quality of decision. An adaptive coping strategy is *vigilance*, involving a search for and rumination over cues relevant to the threat; vigilance occurs only when all three conditions are met. Maladaptive coping strategies more often result in defective decisions (2, 3) and are characterized by denial or suppression of relevant information by escaping from the decisional conflicts. Maladaptive coping strategies include strategies such as *procrastination*, i.e., avoiding thinking and discussion about the issue and staying away from possible pressure, and *buck-passing*, i.e., evasions or thinking of the conflict issue by using selective attention and distorted information processing or shifting responsibility. Panic or a very high level of stress and hasty choice of a solution characterizes *hypervigilance*. During such stress, people escape the worst danger but overlook other serious consequences and drastic penalties (2, 3).

The Melbourne Decision Making Questionnaire (MDMQ) (4) measures the foregoing coping strategies that people use in decision making. The instrument had not previously been translated into Swedish. Measuring coping strategies in decision making could be useful in various areas. In health care, for example, decision making about self-management is crucial and particularly when illness is experienced as stressful (5). However, a translation of an instrument is a complex process (6, 7). A translation of the MDMQ to Swedish was made and used in this study to perform a psychometric test of the Swedish version.

Aim

The aim of this study was to evaluate validity and reliability of the Swedish version of the Melbourne Decision Making Questionnaire (MDMQ-S).

Method

Questionnaire

The rationale for choosing The Melbourne Decision Making Questionnaire (MDMQ), a questionnaire developed by Mann et al. (4), is that we consider it as practical for clinical use and easy for participants to answer. It consists of 22 items concerning the four subscales for the coping styles: *vigilance*, *hypervigilance*, *buck-passing*, and *procrastination*. The items are answered on a three-point scale (0 = not true for me; 1 = sometimes true; and 2 = true for me). The vigilance subscale is hypothesized to represent the most effective and rational coping strategy associated with moderate stress. The defensive subscales (*buck-passing*, *procrastination*, and *hypervigilance*) are hypothesized to represent less effective coping strategies, i.e., either avoidance or emotional excitement associated with severe emotional stress (4).

The questionnaire has been tested among university students and cancer patients in various contexts in the USA, Australia, and New Zealand, as well as in some European countries (the Netherlands, Spain, and Turkey). The tests of reliability of subscales in different countries have shown the following Cronbach's alpha: vigilance 0.65–0.80; hypervigilance 0.61–0.74; buck-passing 0.77–0.87; and procrastination 0.70–0.81 (4, 8-11).

Procedure

A Swedish translation was made and back-translated by an authorized translator and then accepted by the authors (c.f. 6, 12). To test if the translated instrument was suitable in a Swedish context, the instrument was tested in a pilot study among a convenience sample of 118 nursing students and teachers. After discussions among experts on behavioral science research, some minor changes in the wording of some items between the English version and the translated Swedish version were made. For example, a term such as “tremendous time pressure” was toned down to “high time pressure,” since some people avoided answering these items in the pilot study.

A group of readers consisting of one professor emerita, one professor, one associate professor, and two senior lecturers with expertise areas as diabetes, cancer, dementia, psychiatry, and working life research were consulted to evaluate content validity of the items (c.f. 13). The final questionnaire was tested among a convenience sample of various groups of patients (type-2 diabetes and malignant melanoma), health care students (medical, physiotherapists and nurse students on various levels), and university teachers (n=735) in order to get a maximum variation (14) (Table 1). This design provided a subject-to-item ratio of 35:1, well over the recommended 20:1 criterion (15). Teachers and students were asked about involvement face-to-face while patients were asked about participation in connection with recruitment in other ongoing studies.

Insert Table 1 about here

Statistical analysis

An initial analyse included assessment of the items' distributional properties (i.e. distribution in percent and skewness for each item). A parallel analysis (PA) was performed to determine the number of common factors in the Swedish translation of the Melbourne Decision Making Questionnaire (MDMQ-S) (16). Exploratory factor analysis (EFA) was used to explore the underlying structure of the 22-item MDMQ-S, with the main purpose to check for consistency with the English original version, while confirmatory factor analysis (CFA) was performed to evaluate the model fit.

During EFA, the 22 items were forced onto a four-factor solution based on the theoretical model of coping styles by Mann et al. (4), using principal axis factoring as the extraction method with direct oblique rotation (15). The extraction method was chosen because the data were not assumed to be normally distributed; direct oblimin rotation was chosen because the factors were expected to correlate with each other. A secondary EFA with a forced three-solution was done since the last factor had low loadings on Cronbach's alpha. Deletion of items from the 22-item MDMQ-S was performed using factor loadings in the EFA and model fit in the CFA. Three items were deleted since their factor loading was below 0.4 (17, 18) and additional two because there was not possible to obtain an acceptable goodness-of-fit in the CFA. Statistics used to assess goodness-of-fit were chi-square (χ^2) and chi-square/degrees of freedom (χ^2/df), Tucker-Lewis index (TLI), normed fit index (NFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Internal consistency was estimated by Cronbach's alpha.

Content validity on item (I-CVI) and scale level (S-CVI) was assessed by a panel of five experts who was asked to rate each scale item in terms of its relevance to the underlying construct. We then computed the percentage of items deemed to be relevant for each expert, and took an average of the percentages across experts (13). According to Polit and Hungler (13), content validity is “the degree to which the items in an instrument adequately represent the universe of content.” The SPSS version 17.0 and AMOS version 20.0 statistical software packages were used for statistical analysis. Parallel analysis was performed using FACTOR version 8.02.

Ethical considerations

The questionnaires were distributed to the participating patients by mail. In a letter enclosed with the questionnaire, they were informed about the aims of the studies, that participation was voluntary, and confidentiality assured. The studies where the questionnaires have been used have been approved by the regional Ethics Review Board in Umeå (Dno 2011-88-32; Dno 06-126M). The participating students and health care professionals included for the psychometric analysis were also informed about the study and requested in person and could without reason withdraw without giving any reason and assured confidentiality. This analysis, which is a analysis of the psychometrics of the instrument, did not require own ethical approval (19).

Result

An initial analysis of the distribution of responses showed skewness in several items. Only six items (4, 16, 17, 19, 20, and 22) were considered to be evenly distributed. However, the number of missing items was very low (Table 2).

Insert Table 2 about here

A parallel analysis (PA) based on minimum rank factor analysis was done to determine the minimum number of factors in the MDMQ-S. The result showed that the recommended number of factors was two (Figure 1).

Insert Figure 1 about here

An initial EFA with a four-factor solution showed a low concordance with the original four-factor model since the last factor (hypervigilance) included only two items with a very low Cronbach's alpha (0.230). Therefore, a second EFA (still using 22 items) with a three-factor solution was performed (Table 3). This model was more consistent although items associated with the original dimension hypervigilance loaded low in most of the factors.

Insert Table 3 about here

CFA was performed on the final version to test its goodness-of-fit. After deleting six variables (items 1, 13, 15, 17, 20, and 22 – all but one [item 17] originating from the hypervigilance dimension), the chi-square was significant ($\chi^2 = 341.3$, $df = 101$, $p < 0.001$); however, the relative chi-square (χ^2/df), applied in order to make a test less dependent on sample size, was 3.4. The TLI was 0.88; NFI was 0.88; CFI was 0.91 and exceeded the necessary 0.9 for acceptable model fit; and, finally, RMSEA was 0.06. The final model is shown in Figure 2, including the path coefficients (standardized regression weights and correlations).

Correlations between the factors were in the interval of -0.06 to 0.73, and the highest correlation was between procrastination and buck-passing. All of the path coefficients were

significant at the $p < 0.001$ level. A CFA based on the original four factors was also performed. However, goodness-of-fit on this model could not be obtained.

Insert Figure 2 about here

Discussion

The aim of this study was to evaluate validity and reliability of the Swedish version of the Melbourne Decision Making Questionnaire (MDMQ-S).

Five experts in the field assessed content validity. A standard acceptability for S-CVI is 0.80 while Polit and Beck (18) states it as low as 0.70, while Waltz et al. (20) argue that S-CVI should be 0.90 or higher. The S-CVI for the MDMQ-S was 0.81. This is on the lower range and it can be argued that translation of some items can contribute to this fact. However, one of the items that scored low on I-CVI was deleted in the final model. This would change the scale's total validity score. On item level, four items scored lower than 0.78 as recommended by Lynn (21), which could be explained by translation and cultural sensitivity, which is of importance to consider in translations of questionnaires. During the process of questionnaire adaptation, we tried to achieve conceptual, item, and semantic equivalence (22).

The reliability of the four-factor model was quite low in the factor hypervigilance, with a Cronbach's α of only 0.230. A second model with a three-factor solution showed a satisfactory reliability between 0.744 and 0.801. This indicates good internal consistency among the items; however, it does not imply uni-dimensionality, i.e., homogeneity (c.f. 23). When reviewing the items loading to hypervigilance, we have discussed if they conceptually

represent hypervigilance as in theory. This is one suggestion why the hypervigilance items did not load in one separate factor and resulted in low alpha. Mann et al. (4) found differences in goodness-of-fit between a US sample and New Zealand sample, and explained this with cultural differences, which also could be the case for this northern Swedish population.

The parallel analysis suggested a two-factor solution. This is in line with the theoretical assumption that coping strategies are either adaptive or maladaptive (24). In addition, Hayton, Allen, and Scarpello (25) argue that in some situations PA can under-factor. One of these situations is when there is a high correlation between factors, as in this case.

The literature is also somewhat confusing about how many factors the original model comprises. Mann et al. (4) describe five different models, varying from a two-factor model up to a six-factor model. However, they suggest a four-factor solution. After translation and testing of a Swedish population, we could not support this four-factor solution. Based on an EFA, we suggest that the scale preferably is treated as a three-factor model. We also found that the original hypervigilance factor only loaded with two items, and weakly; therefore, all items for this factor were deleted in the final model. This is in line with Costello and Osborne (15), who argue that a factor with fewer than five items or loading ≤ 0.50 should be considered as weak and unstable.

The goodness-of-fit (TLI, NFI, CFI, and RMSEA) in the CFA was acceptable. However, the chi-square test was high and showed a significant p-value, which is non-preferable. However, since the chi-square test is sensitive to sample size (26) and this study had a large sample (n

= 735), we did not expect chi-square to be non-significant. The relative chi-square was 3.4, that is, well within the recommended range of 2.0 to 5.0 (27, 28).

Several responses showed a skewed distribution. One explanation for this may be that the sample was rather homogenous, despite the fact that the sample consisted of patients, teachers and students. Another explanation could be that the number of responses was too few and it was too easy for the participants to answer one of the extremes. A further development of the scale could include an adding the number of responses.

There are several difficulties to confront when translating a questionnaire from one language to another. One is the method used in the translation process. We used perhaps the most common method, the forward-backward translation method (12). Hagell et al. (29) compared a forward-backward translation with a translation done with a dual panel. They found fewer missing items in the dual-panel version. However, since the latter method is more time-consuming and difficult to do and a committee participant may be reluctant to criticize other participants (12), we decided to do a forward-backward translation.

Furthermore, Maneesriwongul and Dixon (12) recommend that even though a dual-panel translation is made, it is necessary to combine this with a back-translation. Our result showed that we had very few missing items in our translation of the MDMQ-S, which may indicate that the respondents did not find the questions difficult to answer.

Methodological discussion

One limitation of our study is that we have tested the instrument among different groups of people. Testing an instrument means to test the validity and reliability aspects that can be

new for each setting and for different groups. However, since we wanted to find out if this instrument is usable in different groups and context, we decided to use a diverse sample. The participants in this study were patients as well as healthy volunteers, i.e., students and teachers. This method may have affected the results because the participants had different perspectives when they responded to the instrument. However, the study was not an assessment of coping strategies as such, only a psychometric test of a translation. Furthermore, coping strategies seen as decisional coping patterns are considered quite stable over time and should not change radically because of illness (4, 30). On the other hand, this sample mirrors a diverse population consisting of people from both sexes, at various ages, with various educations, and various backgrounds including health and illnesses – characteristics that we view as strengths in a study aiming to test the psychometric properties of a questionnaire.

Conclusion

After testing the MDMQ-S, we found support for validity and reliability of the instrument. We found the Swedish revised 16-item version of MDMQ-S – concerning the subscales vigilance, procrastination and buck-passing – as satisfactory. We found no support for a measurement of the hypervigilance dimension in our translation of the instrument and therefore deleted this dimension. Reasons for deletion were that the dimension was unclear; it was originally only a moderately good dimension (4); and important nuances of the translation may have been lost. We found cultural differences between the two languages; it would be of interest to investigate if these differences also exist among people with the same language but living in different cultural contexts within a single country. It

would be of interest for future care development to reach more of those people who rate high on the maladaptive dimensions since these are the individuals who should receive special treatment in health care. This approach, however, would require another way to calculate scores and instrument development suitable for screening, something that further research should address.

Relevance for clinical practice

We found this instrument useful to identify adaptive and maladaptive coping strategies. The aim of testing the Swedish version of the MDMQ was to make a Swedish instrument designed for assessing decision making available to others.

Estimating or assessing coping resources in various scientific studies is of great importance to reach people who are at risk. Today, a variety of scales is available to assess both coping resources as well as coping strategies; however, many of these scales are only assessable in the English language. The translation of the MDMQ scale will be of importance for scientific studies in a Swedish context and in a more clinical context.

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Table 1. Background data of the participants

	Total n=735	Women n=440 (60,9)	Men n=282 (39,1)	Missing gender (n=13)	p
Age [mean(sd)]	50.22 (18.90)	44.75 (18.62)	58.70 (15.99)		<0.001
Group [n(%)]					<0.001
Patient	444 (60.4)	194 (44.1)	244 (86.5)	6	
University teacher	56 (7.6)	45 (10.2)	5 (1.8)	6	
MD student	30 (4.1)	14 (3.2)	16 (5.7)		
Nurse student	120 (16.3)	105 (23.9)	14 (5.0)	1	
Nurse specialist student	43 (5.9)	42 (9.5)	1 (0.4)		
Midwife student	19 (2.6)	19 (4.3)	0 (0.0)		
Physiotherapist student	23 (3.1)	21 (4.8)	2 (0.7)		

Table 2. Median and distribution in percent for each item and response alternatives of the Swedish version of the Melbourne Decision Making Questionnaire (MDMQ-S) (n=735). English version in plain text, Swedish in italics

	Items	Median	0	1	2	Missing*
1	I feel as if I'm under tremendous time pressure when making decisions. <i>Jag känner mycket stor tidspress när jag ska fatta olika beslut.</i>	1	39.9	54.3	5.6	0.1
2	I like to consider all of the alternatives. <i>Jag brukar överväga olika alternativ.</i>	2	8.0	31.8	59.8	0.4
3	I prefer to leave decisions to others. <i>Jag föredrar att lämna över beslut till andra.</i>	0	55.0	40.4	4.6	0.0
4	I try to find out the disadvantages of all alternatives. <i>Jag försöker att se vilka nackdelar som finns med olika alternativ.</i>	2	14.9	31.7	53.3	0.1
5	I waste a lot of time on trivial matters before getting to the final decision. <i>Jag använder mycket tid till annat innan jag kommer till beslut.</i>	1	49.0	42.0	8.8	0.1

6	I consider how best to carry out the decision.	2	7.9	34.5	57.6	0.0
	<i>Jag överväger hur jag på bästa sätt skall genomföra ett beslut.</i>					
7	Even after I have made a decision I delay acting upon it.	0	50.0	44.0	5.7	0.3
	<i>Även efter att jag har fattat ett beslut skjuter jag upp att agera i enlighet med mitt beslut.</i>					
8	When making decisions I like to collect lots of information.	1	7.3	44.7	47.4	0.5
	<i>Innan jag fattar ett beslut vill jag samla mycket information.</i>					
9	I avoid making decisions.	0	72.7	23.5	3.5	0.3
	<i>Jag undviker att fatta beslut.</i>					
10	When I have to make a decision I wait for a long time before starting to think about it.	1	49.7	42.4	7.5	0.4
	<i>När jag måste fatta ett beslut väntar jag länge.</i>					
11	I don't like to take responsibility for making decisions.	0	57.7	33.3	8.4	0.5
	<i>Jag tycker inte om att ta ansvar för att fatta beslut.</i>					
12	I try to be clear about my objectives before choosing.	2	5.4	29.9	64.5	0.1

	<i>Jag försöker vara klar över mina mål innan jag väljer.</i>					
13	The possibility that some small thing might go wrong causes me to swing abruptly in my preferences.	1	45.9	46.2	7.6	0.3
	<i>Möjligheten att småsaker kan gå fel får mig att plötsligt ändra inställning.</i>					
14	If a decision can be made by me or another person I let the other person make it.	1	37.8	55.4	6.7	0.1
	<i>Om ett beslut kan fattas av mig eller en annan person låter jag den andre fatta det.</i>					
15	Whenever I face a difficult decision I feel pessimistic about finding a good solution.	0	49.6	43.8	5.7	1.0
	<i>När helst jag står inför ett svårt beslut känns det hopplöst att hitta en bra lösning.</i>					
16	I take a lot of care before choosing.	2	9.4	39.5	50.5	0.5
	<i>Jag tänker efter noga innan jag väljer.</i>					
17	I don't make decisions unless I really have to.	1	48.4	33.4	17.5	0.7
	<i>Jag fattar inte beslut om jag verkligen inte måste.</i>					
18	I delay making decisions until it is too late.	0	77.2	20.0	2.2	0.7

	<i>Jag skjuter upp beslut tills det är för sent.</i>					
19	I prefer that people who are better informed decide for me.	1	31.4	52.6	15.2	0.8
	<i>Jag föredrar att människor som är bättre informerade beslutar för mig.</i>					
20	After a decision is made I spend a lot of time convincing myself it was correct.	1	44.3	41.8	13.5	0.4
	<i>När ett beslut är taget ägnar jag en hel del tid åt att övertyga mig själv om att det var rätt.</i>					
21	I put off making decisions.	0	59.6	35.9	3.8	0.7
	<i>Jag skjuter upp beslut.</i>					
22	I can't think straight if I have to make decisions in a hurry.	1	48.9	41.4	9.2	0.4
	<i>Jag kan inte tänka klart om jag måste fatta beslut i en hast.</i>					

* Percentage of internal missing items

Table 3. Items, factor loadings, total variance explained, Cronbach's alpha, and content validity index on item and scale level for the three-factor structure of the Swedish version of the Melbourne Decision Making Questionnaire (MDMQ-S)

		Buck- passing	Vigilance	Pro- crastination	I-CVI	
	14	If a decision can be made by me or another person I let the other person make it			.706	.8
	11	I don't like to take responsibility for making decisions			.672	-.481 .6
	19	I prefer that people who are better informed decide for me			.671	.8
	9	I avoid making decisions			.652	-.489 .8
	3	I prefer to leave decisions to others			.644	-.353 .8
X	15	Whenever I face a difficult decision I feel pessimistic about finding a good solution			.549	-.442 .8
X	20	After a decision is made I spend a lot of time convincing myself it was correct			.545	.8
X	17	I don't make decisions unless I really have to			.545	-.395 .8
X	13	The possibility that some small thing might go wrong causes me to swing abruptly in my			.545	-.310 .4

preferences				
	16	I take a lot of care before choosing.	.706	1.0
	8	When making decisions I like to collect lots of information	.702	1.0
	6	I consider how best to carry out the decision	.687	.8
	12	I try to be clear about my objectives before choosing	.647	1.0
	4	I try to find out the disadvantages of all alternatives	.642	1.0
	2	I like to consider all of the alternatives	.578	1.0
	5	I waste a lot of time on trivial matters before getting to the final decision		-.712 .6
	21	I put off making decisions	.376	-.669 .8
	10	When I have to make a decision I wait for a long time before starting to think about it	.455	-.640 1.0
	7	Even after I have made a decision I delay acting upon it		-.617 .6
	18	I delay making decisions until it is too late	.348	-.601 .8
X	22	I can't think straight if I have to make decisions in a hurry	.464	-.495 .8

X	1	I feel as if I'm under tremendous time pressure when making decisions	.384		-.414	.8
		Total variance explained (%)	24.3	12.6	5.94	
		Cronbach's alpha	.801	.744	.745	
		S-CVI				.81

X = Items deleted in the MDMQ-S

I-CVI = Content validity index for items

S-CVI = Content validity index for scale

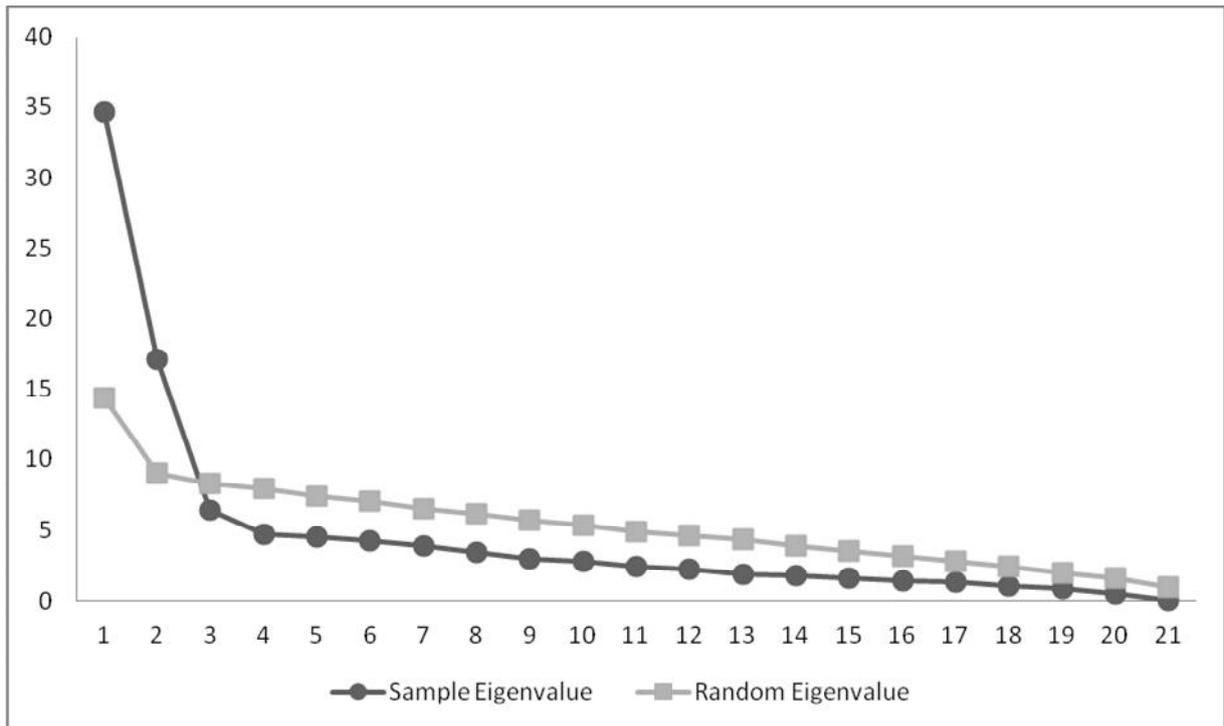


Figure 1. Scree plot of parallel analysis of the Swedish version of the Melbourne Decision Making Questionnaire (MDMQ-S)

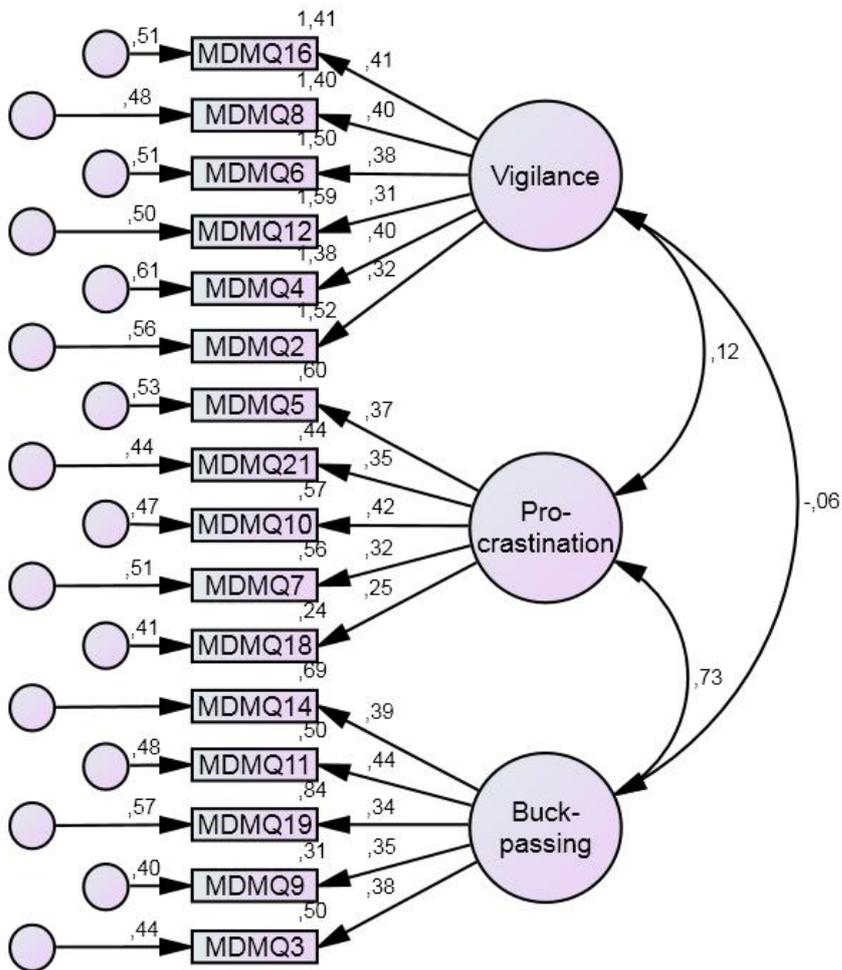


Figure 2. Model of the 16-item MDMQ-S with standardized regression weights and correlations.