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Psychometric Evaluation of the Defense Styles Questionnaire 40 (DSQ-40) In A Sample of University Students

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Abstract
The study aimed to evaluate the psychometric properties of the DSQ-40 on a sample of university students. A total of 120 university students from Faculty of Sports Science and Recreation, UiTM, aged 18 – 24 years old with a mean BMI= 22.71 ± 4.44 kg/m^2 participated in this study. Participants were 65% male and 35% female. The internal consistency assessed found an acceptable average inter-item correlation and corrected inter-item correlation. The Cronbach's alpha of the three defense styles and overall DSQ-40 was reported high in both times assessed. Test-retest reliability of a two-week interval proof a stable measurement of the defense styles. Criterion validity was obtained with a significant relationship between mature defense style and BMI. There were significant relationships between defense styles, indicated the existent of the construct validity of the instrument. In differentiating the defenses between age groups, gender, and BMI categories, there was no significant difference ($p > .05$). The present study confirms the applicability of the DSQ-40 in measuring defense styles among non-clinical university students. It is concluded that DSQ-40 can be used for assessing defense styles among university students, a non-clinical population.

Keywords: defense mechanism; defense style; reliability; validity; university students

Introduction

The Defense Style Questionnaire (DSQ) is a self-reported inventory that measures groups of defenses styles based on Vaillant's model of the hierarchy of defense mechanisms derived from psychodynamic theory (Vaillant, 1994). They are ranging from immature to mature defense styles. The defense mechanisms exploration is continuously developed in researches. It's beyond conscious operation that can be revealed in normal functioning or psychopathology condition. Defense mechanisms are characterized as "regulatory processes that allow individuals to reduce cognitive dissonance and to minimize sudden changes in internal and external environments by altering how these events are perceived" (Vaillant, 1993). In coping with tense and anxious circumstances, these mechanisms are in action, unconsciously.

As the assessment of defenses is not reliable, this inventory was developed to quantify the defense styles instead of defense mechanisms separately (Andrews, Singh, & Bond, 1993). They are several versions of the instruments, from the longer version, DSQ-88 to a shorter version and latest, DSQ-40. Vaillant's model was the original measure of defense styles in quantitative (Vaillant, 1971, 1976). An immaturity – maturity continuum was proposed by Vaillant's hierarchical model, thus, the 67-item Defense Style Questionnaire (DSQ-67) was developed (M. Bond, Gardner, Christian, & Sigal, 1983). The possible conscious aspects of defense mechanism assessment were the main objective, with the aim "to elicit manifestations

of a subject's characteristic style of dealing with conflict, either conscious or unconscious, based on the assumption that persons can accurately comment on their behavior from a distance". An 88-item version was then established as a result from the 67-item DSQ (Bond & Vaillant, 1986). In later years, it was modified to a 72-item which consisted of 20 defenses of three factors: Mature, Neurotic and Immature (Andrews, Pollock, & Stewart, 1989), Due to more reasonable psychometric properties, this version was shortened to a 40-item questionnaire with 20 defenses which were more theoretical underpinnings of three factors: Mature, Neurotic, Immature.

The various versions of the defense style questionnaire were established by using the clinical population as the study sample. However, they were utilized in non-clinical population studies to assess the defense style.

Criterion validity is defined as the extent to which the scores measuring one test criterion are compatible with another test criterion being evaluated (Piedmont, 2014). In this study, defense styles and body mass index (BMI) is expected to be correlated. Test-retest reliability was employed, with the aim to assess the robustness of a scale and being able to produce stable scores across time in a population (Aaronson et al., 2002). In this study, the DSQ-40 was administered twice in two weeks interval and the total scores would be analyzed to see the correlation.

Thus, this study aimed to evaluates the psychometric of the 40-item DSQ, which is derived from the original measure (Bond et al., 1983) among the non-clinical university students. The average inter-item correlation, corrected item total correlation, internal consistency, test-retest reliability, criterion validity with BMI measurement were tested and evaluated.

Method

Participants and procedure

Data were obtained from 120 university students. They were selected based on their volunteer participation and were recruited among Faculty of Sports Science and Recreation in a convenience sampling. This sampling technique was chosen due to the availability of the participants, and they represent the university students (Lavrakas, 2008). To participate in this study, each participant gave their informed consent. The questionnaire was completed in meetings gathered with no compensation offered.

The participants were aged 18 to 24 years old, 65% (Lavrakas, 2008) =78) males and 35% (n = 42) female with mean BMI of 22.71 ± 4.44 kg/m^2. However, the data obtained revealed need major attention. Most of the participants were normal weight (47.5%, n = 57) and overweight (37.5%, n = 45). Some were underweight (15%, n =18).

The BMI obtained were evaluated to measure the criterion validity with DSQ-40. Significant relationships were expected between defense style(s) and BMI. The reliability was assessed by administering a test-retest protocol (De Vet, Terwee, Mokkink, & Knol, 2011). This protocol required the administration of the same questionnaire twice over a period of time to the same participants. Reliability is the consistency or reproducibility of measurement (Hopkins, 2000). The participants completed the questionnaire twice with a 2-week interval. A short interval would expect some degree of correlation (Brinkman, 2009). Therefore, this study chose two weeks interval between the administration of the questionnaire to the participants. The questionnaires were collected immediately after completion to prevent the participants to check the first questionnaire when completing the second. It was hypothesized that the items measured from the two different times should correlate highly.

Measures

The original English version DSQ-40 (Andrews et al., 1993) is composed of 40 items which measure the three defense styles categories; mature (anticipation, humor, sublimation and suppression), neurotic (idealization, reaction formation, pseudo-altruism and undoing) and immature (acting out, autistic fantasy, denial, isolation, passive aggression, rationalization, splitting, somatization, displacement, projection, devaluation and dissociation). Each defense style consists of two items. The items statement was responded to on 10-point scales from strongly disagree to strongly agree (1 - 10). Responses to the items were summed and subtracted to the number of items per defense style.

Anthropometric measurement

Participants' body weight was gathered using electronic scales. Standing height was measured to the nearest 0.5cm. The BMI was calculated by dividing weight in kg to the height in m squared. The value obtained were then categorized to underweight (< 18.5kg/m^2), normal weight (18.6kg/m^2 – 23kg/m^2) and overweight (> 23.0kg/m^2) (Boo et al., 2010).

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Science (SPSS) version 22.0. Internal consistency was examined by using corrected-item total correlation, average inter-item correlation and Cronbach's Alpha, α. The average inter-item correlations should fall between .15 and .50 to meet the reliability measure (Clark & Watson, 1995). An α value greater than 0.6 is desirable reliability (Lance, Butts, & Michels, 2006).

Pearson's correlation was assessed for test-retest reliability and criterion validity of the DSQ-40 and BMI. The correlations between defense styles were also calculated. A significant relationship was set at .05 ($p < .05$). The strength of the underlying relationships was measured where r = .00 to.30 is small, > .30 to.50 is low, > .50 to.70 is moderate, > .70 to.90 is high and > .90 to 1.00 is very high (Cohen, Cohen, West, & Aiken, 2003).

Descriptive statistics were presented from the analysis of the Independent sample t-test for age groups and gender differences in measures DSQ-40; mature, immature and neurotic defense style. A one-way analysis of variance (ANOVA) was used to assess the mean scores of the three defense styles by BMI categories. Statistical significance was set at .05 ($p < .05$).

Results

Table 1 shows the item characteristics of the 40-item DSQ-40 and corrected inter-item correlation for the reliability. The skewness (-.827 to .181) and kurtosis (-.885 to 1.416) value were in the normal range, thus the data are in a normal distribution. For the corrected inter-item correlation, the value ranged from .110 to .568, with no negative correlations indicated. The average inter-item correlation was acceptable, .166. All items are retained even there are seven items with less than .3 in the corrected inter-item correlation. The alpha if item is deleted did not affect the Cronbach' alpha much. Thus, the 40-item were eligible for further analyses.

The entire scale of the Cronbach's Alpha coefficient revealed a high internal consistency for both times, α_1 = .881, α_2 = .875 and for each of the defense styles; $mature_1$= .615, $mature_2$ = .605, $neurotic_1$ = .745, $neurotic_2$ = .721 and $immature_1$ = .834, $immature_2$ = .833 (Table 2).

The test-retest reliability was high for the three defense styles, r = .794 - .991 and overall DSQ-40, r = .926 (Table 3).

For criterion validity, mature defense style and BMI shows a significant relationship, r = .185, $p < .05$ with small strength but not with immature and neurotic defense styles ($p > .05$). The

construct validity of the scale was proven as the correlations between the defense styles were moderate and significant (r = .259 to .586, p < .05) (Table 4).

Table 1: Item characteristics of the 40-item DSQ

Item	*M*	*SD*	Sk.	Krt.	$r_{ci\text{-}tc}$	α-id
Sublimation 1	6.10	1.835	-.200	.142	.480	.876
Sublimation 2	6.59	1.803	-.829	1.345	.384	.878
Humor 1	5.88	2.091	-.454	-.048	.254	.880
Humor 2	7.18	1.516	-.067	-.454	.296	.879
Anticipation 1	6.92	2.191	-.619	-.262	.375	.878
Anticipation 2	5.98	1.876	-.142	.542	.394	.877
Suppression 1	5.72	2.250	-.112	-.405	.269	.880
Suppression 2	5.50	1.806	-.483	.566	.224	.880
MATURE	6.24	.989	.319	.469		
Rationalization 1	5.61	2.603	-.263	-.885	.117	.884
Rationalization 2	5.63	2.196	-.301	-.050	.435	.877
Projection 1	5.72	2.026	-.450	.496	.452	.876
Projection 2	5.56	2.435	-.019	-.679	.401	.877
Denial 1	5.37	1.490	-.063	1.416	.292	.879
Denial 2	6.20	2.229	-.265	-.487	.362	.878
Omnipotence 1	5.60	2.047	-.293	.037	.452	.876
Omnipotence 2	6.90	2.018	-.809	.732	.201	.881
Mak-unworthy 1	5.60	1.964	-.244	.113	.370	.878
Mak-unworthy 2	4.22	2.265	.181	-.851	.105	.883
Tran-to-act 1	6.47	2.439	-.310	-.346	.473	.876
Tran-to-act 2	6.48	2.470	-.470	-.441	.415	.877
Autistic fantasy 1	6.27	2.110	-.321	.475	.351	.878
Autistic fantasy 2	7.43	1.886	-.153	-.726	.416	.877
Displacement 1	5.98	2.048	-.533	.072	.383	.878
Displacement 2	7.25	1.769	-.091	-.816	.533	.875
Isolation 1	6.92	1.681	.023	-.336	.433	.877
Isolation 2	6.82	1.609	.107	-.005	.506	.876
Pas-agg 1	6.25	2.302	-.265	-.304	.363	.878
Pass-agg 2	6.84	2.050	-.360	-.040	.526	.875
Displacement 1	6.73	1.510	.123	.449	.536	.876
Displacement 2	7.25	1.621	-.185	.084	.459	.877
Somatization 1	5.86	2.412	-.360	-.441	.389	.878
Somatization 2	7.63	1.865	-.620	-.006	.435	.877
IMMATURE	6.29	.937	-.168	2.595		
Fals-altr 1	6.16	2.774	-.385	-.885	.217	.882
Fals-atlr 2	7.52	2.165	-.777	-.066	.341	.878
Reac-form 1	6.62	2.029	-.384	.241	.290	.879
Reac-form 2	6.77	2.057	-.481	.316	.392	.877
Idealization 1	6.32	1.783	.121	-.298	.568	.875
Idealization 2	6.28	2.022	-.209	.039	.567	.874
Undoing 1	6.02	2.323	-.524	-.225	.319	.879
Undoing 2	6.67	1.902	-.344	.471	.445	.877
NEUROTIC	6.61	1.697	3.80	21.96		
Average inter-item correlation DSQ-40 = .166, α = .881						

Note. Sk. = Skewness, Krt. = Kurtosis, *r*ci-tc = corrected item-total correlation, α-id = Cronbach's alpha if item deleted, Mak-unworthy = making unworthy, Tran-to-act = transition to action, Pas-agg = passive aggression, Fals-altr = falsu altruism, Reac-form = reaction formation

Table 2: Cronbach's α for DSQ-40

Defense style	α_1	α_2
Overall DSQ-40	.881	.875
Mature	.615	.605
Neurotic	.745	.721
Immature	.834	.833

Table 3: Test-retest correlations of defense styles and overall DSQ-40 in a two-week interval

Defense style	*r*
Mature	.991*
Neurotic	.794*
Immature	.990*
Overall DSQ-40	.926*

*correlation is significant at .05

Table 4: Correlations between defense styles and BMI

	BMI	Mature	Neurotic	Immature
Mature	.185*	1	.259*	.586*
Neurotic	.145		1	.312*
Immature	.142			1

*correlation is significant at .05

The defense styles mean scores score was divided into three categories of defense styles: mature = 6.239 ± 0.988, neurotic = 6.614 ± 1.698 and immature = 6.286 ± 0.937. The items were rated by using a 10-point scale, where a rate greater than 5 indicates a more agreement to the defense style. Thus, the results show moderate mature, neurotic and immature defense styles. In comparing the scores by age groups, gender, and BMI categories, there are no significant differences in the total score and the three defense styles ($p > .05$). The mean BMI of this study sample is in the normal category (22.71 ± 4.44 kg/m^2) (Table 5).

Table 5: Difference of defense styles mean scores by demographic variable

Variable	Mature	Neurotic	Immature
		M(SD)	
Overall	6.24 (.99)	6.61 (1.70)	6.29 (.94)
Age (years)			
18–20 (*n*=103)	6.27 (.96)	6.57 (1.27)	6.33 (.87)
21–24 (*n*=17)	6.05 (1.14)	6.89 (3.33)	5.99 (1.27)
p-value	.402	.471	.164
Gender			
Male (*n*=78)	6.28 (.94)	6.60 (1.88)	6.27 (.87)
Female (*n*=42)	6.16 (1.09)	6.64 (1.31)	6.31 (1.06)
p-value	.545	.890	.862
BMI, mean BMI = 22.71 ± 4.44 kg/m^2			
UW (*n*=18)	5.99 (.69)	6.49 (1.29)	6.16 (1.10)
NW (*n*=57)	6.24 (1.07)	6.35 (1.35)	6.21 (.99)
OW (*n*=45)	6.34 (.98)	6.99 (2.15)	6.43 (.80)
p-value	.445	.161	.448

Discussion

The present study examines the psychometric properties of the DSQ-40 using a sample of the non-clinical university students by assessing the reliability analysis by using average inter-item correlation, corrected item total correlation and Cronbach's alpha for internal consistency and test-retest reliability and criterion validity with BMI measurement.

The analysis of reliability shows that this questionnaire has adequate internal consistency with positive corrected inter-item correlation and acceptable average inter-item correlation. The Cronbach's alpha yielded by the two-time assessment was also high. In assessing by defense styles, the α value is lower in mature defense styles, even the total DSQ-40 is high, followed by neurotic and immature. A similar finding is also reported in another study including adults, with low reliability for mature (Segal, Coolidge, & Mizuno, 2007).

Test-retest reliability is appropriate in measuring the stability of the DSQ-40 since it examines an individual's defense styles. The response invariability would estimate measurement error (Hays, Anderson, & Revicki, 1993) however, in this study, the responses in two different times are considered stable. This study supports the reliability of this instrument to be used among the non-clinical group which is the university students. This result is consistent with a study using a clinical group as participants and the same reliability design protocol (Yilmaz, Gencoz, & Ak, 2007). In another study that involve university students as participants have also found similar results but with a two-month interval between the administration of the questionnaire (Hayashi, Miyake, & Minakawa, 2004). Defense mechanisms are developed under unconscious and highly associate with ego development and psychopathology (Waqas et al., 2015), measuring them under two intervals would validate the instrument. Although some of the studies suggested an interval of 7 days up to several months to administer the second test, this study chose a two-week interval. Defense mechanisms operate at an unconscious level, therefore the interval would not be affecting the responses to the instrument.

There were significant correlations between the defense styles, thus this indicates that they are not independent. These verified that the defenses are directed along a mature or adaptive defense to immaturity or maladaptive defenses continuum (Andrews et al., 1993). Those who age-matured are more towards mature defenses; sublimation, suppression, anticipation and humor (Segal et al., 2007) and also lower levels of psychopathology; neurotic defenses. The less adaptive defense styles are the neurotic defenses while the immature defenses are associated with difficulty controlling, conveying, and recognizing emotional events. This study involved university students aged above 18 years old, thus mature defense revealed a moderate relationship with immature defense and a weak relationship with neurotic defense.

Defence mechanism has been a new topic in body weight issues. Individuals with psychological issues in body weight will employ certain types of defense styles. The criterion validity was found from a significant positive correlation between mature defense style and BMI with small strength. However, immature and neurotic did not significantly correlate with BMI. In contrast with a study conducted among obese participants reported that immature defense style correlated with BMI (Arafa, Hussein, Fahmy, Abd El Mawella, & Nassar, 2014). However, in a study using high school female students revealed that mature defense style; humor and altruism and some immature defense styles; displacement and annulment were correlated significantly with BMI (Alipour, Golshani, & Kouchakentezar, 2016). Therefore, criterion validity is obtained, with a small strength correlation. The higher the BMI of the participants, the greater their mature defense style score. The participants' muscle mass could influence their BMI, where the sample was sports science students who are highly active. Therefore, their BMI is high due to muscularity, thus this explains the more mature defense style even with increased BMI.

Indirect construct validity was measured during the administration of the questionnaire. The feedback of the participants was obtained on the words or terms that they do not understand. The researcher took note of the terms questioned and gave a brief explanation of the meaning of the sentence in which that terms being used. This kind of feedback is very important to ensure that the participants answered the intended construct. From this information, the words or terms will be subjected to modification to alter to the participants' understanding. For

example, Denial 1, *I'm a very inhibited person*, was changed the word *inhibited* to *self-consciousness*. This changes the item to: *I'm a very self-conscious person.* Changing the sentence would give a better idea of the meaning of the construct, thus it would measure the construct precisely.

The mean scores for the three defense styles were relatively moderate. This could be due to the sample was non-clinical. A clinical sample would reveal a more prominent mean score in defense style(s). In addition, the study's finding is inconsistent with previous studies pertaining to differences in defense use by gender (Cazan & Clinciu, 2015; Diehl, Fuchs, Rathmann, & Hilger-Kolb, 2018; Waqas et al., 2015). This study observed that there was a similar distribution of defense style scores between male and female participants. Female students were reported to be more studious, would employ high neurotic (Diehl et al., 2018), tend to not yield greater in any defense style in this study. The participants recruited were sports science students, who are highly active in physical activity and some of them are athletes. Therefore, they have a channel to divert their stress due to academic or life as university students through sports participation. Thus, this influences similar scores of the three defense styles.

Conclusion

The DSQ-40 is reliable and valid to be used among the university students in measuring their defense styles. For assessed criterion validity, there were found acceptable validity. The high correlation of test-retest scores and high internal consistency is the proof of its stability and reliability. Hence, the DSQ-40 is a good measure in assessing the defense styles of university students. Future studies should be carried out which assess similar scales for construct validity and different scales for divergent validity. This study recommends the use of this instrument among university students.

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Appendix A (Defense Style Questionnaire-40, (Andrews et al., 1993)

NO	Items
	I get satisfaction from helping others and if this were taken away from me, I would get depressed.
2	I'm able to keep a problem out of my mind until I have time to deal with it
3	I work out my anxiety through doing something constructive and creative like painting or wood work.
4	I am able to find good reasons for everything I do.
5	I am able to laugh at myself pretty easily.
6	People tend to mistreat me.
7	If someone mugged me and stole my money, I'd rather he be helped than punished.
8	People say I tend to ignore unpleasant facts as if they didn't exist.
9	I ignore danger as if I was Superman.
10	I pride myself on my ability to cut people down to size.
11	I often act impulsively when something is bothering me.
12	I get physically ill when things aren't going well for me.
13	I'm a very self-conscious person.
14	I get more satisfaction from my fantasies than from my real life.
15	I've special talents that allow me to go through life with no problems.
16	There are always good reasons when things don't work out for me.
17	I live more of my life in my dreams than in real life (instead of work more things out in my daydreams than in my real life).
18	I fear nothing.
19	Sometimes I think I'm an angel and other times I think I'm a devil.
20	I get openly aggressive when I feel hurt.
21	I always feel that someone I know is like a guardian angel.
22	As far as I'm concerned, people are either good or bad.
23	If my boss bugged me, I might make a mistake in my work or work more slowly as to get back at him.
24	There is someone I know who can do anything and who is absolutely just and fair.
25	I can keep the lid on my feelings if letting them out would interfere with what I'm doing.
26	I'm usually able to see the funny side of an otherwise painful predicament.
27	I get a headache when I have to do something I don't like.

28 I often find myself being very nice to people who by all rights I should be angry at.
29 I am sure I get a raw deal from life.
30 When I have to face a difficult situation, I try to imagine what it will be like and plan ways to cope with it.
31 Doctors never really understand what is wrong with me.
32 After I fight for my rights, I tend to apologize for my assertiveness.
33 When I'm depressed or anxious, eating makes me feel better.
34 I'm often told that I don't show my feelings.
35 If I can predict that I'm going to be sad ahead of time, I can cope better.
36 No matter how much I complain, I never get a satisfactory response.
37 Often I find that I don't feel anything when the situation would seem to warrant strong emotions.
38 Sticking to the task at hand keeps me from feeling depressed or anxious.
39 If I were in a crisis, I would seek out another person who had the same problem.
40 If I have an aggressive though, I feel the need to do something to compensate for it.

Mature (4): Sublimation (I1, I2), humor (I3, I4), anticipation (I5, I6), and suppression (I7, I8)
Immature (12): Rationalization (I9, I10), projection (I11, I12), denial (I13, I14), omnipotence (I15, I16), making unworthy (I17, I18), transition to action (I19, I20), autistic fantasy (I21, I22), lamination (I23, I24), somatization (I25, I26), passive aggression (I27, I28), displacement (I29, I30), isolation 9I31, I32)
Neurotic (4): False altruism (I33, I34), reaction formation (inverse reaction) (I35, I36), idealization (rationalization) (I37, I38), undoing (I39, I40).
Note. All items are rated by using strongly disagree to strongly agree (1 -10).