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Validity and Reliability Study of the Turkish Version of the Decisional Balance Scale for Adults

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This study was conducted for the purpose of adapting the Decisional Balance Scale (DBS) for Turkish and testing its validity and reliability to be able to measure adults' perceptions of the benefits and negative consequences of cigarette smoking. The tool was administered to a sample of 486 participants chosen using a random sampling method, and the test-retest analysis was conducted with 365 individuals from the original sample. After the scale was reviewed several times by experts in English and Turkish, data were analysed by factor analysis, Student t-test, Kendall W and dependent t-test. The DBS pros subscale's Cronbach alpha value was found to be 0.85 and the cons subscale was 0.81. The item to total score correlation coefficient was 0.37–0.77 for the pros subscale and 0.50–0.71 for the cons subscale. The scale's factor load was 0.39–0.79. In the confirmatory factor analysis results it was determined that the scale was appropriate and that the scale had a two-factor construct (GFI 0.90 and CFI 0.93). The opposite group approach supported the scale's construct validity. The results supported DBS's validity and reliability. The Turkish version of the DBS was found to be a reliable and valid tool and appropriate for use.

Keywords Reliability and Validity, Desicional Balance Scale, Primary Prevention, Tobacco/Smoking

INTRODUCTION

Cigarette use is a significant health problem in Turkey as it is in the rest of the world and smoking is rapidly increasing in children, youth and adults (Bilir & Taletar, 2006; Il Saglık Mudurluğu, 2007; PIAR, 1988; Tutunsuz Yasam Dernegi, 2007; UN Addictive Substances and Crimes Office, 2003). Previous studies have shown that the subjective evaluation of an individual's perceived benefits of cigarette smoking as well as perceived negative consequences are influential in decisions to either start smoking or change their cigarette smoking be-

havior (Velicer, DiClemente, Prochaska, & Brandenburg, 1985; Velicer, Prochaska, Fava et al., 1998). Reliable and valid instruments to measure these phenomena exist, but none of the existing instruments have been used in Turkey. For this reason, the aim of the methodological study described in this article was to adapt the Decisional Balance Scale (DBS) for a Turkish population. This article describes the methods used to achieve this goal.

METHOD

Research Sample

The study sample were parents of students at four randomly chosen primary schools in Izmir Province. Instrument testing requires 5–10 people to be included for every item on the instrument (Mishel, 1998). Therefore, the researchers determined that a sample size of 226 was needed in order to conduct a power analysis with a 0.20 Type II error and 0.05 level of significance. The DBS scale was sent to adults in 511 families. Four hundred eighty six (486) scales were completely filled out and included in the research, indicating a 95% participation rate.

Data Collection Instruments

Data were collected in the study using a "Demographic Data Collection Form," which asked six questions about age, gender, educational and economic status, cigarette smoking status, and the 20 item "Adult Decisional Balance Scale" (DBS).

Decisional Balance Scale (DBS)

The original DBS was developed in 1985 by Velicer, DiClemente, Prochaska and Brandenburg (1985) as a 24-item scale for the purpose of evaluating adults' perceptions of the pros and cons of cigarettes. The adult DBS was decreased to 20 items by Pallonen et al. (1998). The adult DBS contains a 10-item pros and a 10-item cons subscale. The items are in a 1–5 point Likert type scale. The point distribution for the DBS is 10–50.

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Velicer et al. (1985) determined that the DBS cons subscale had a Cronbach alpha value of 0.88 and pros subscale alpha value of 0.89.

Lafferty et al. (1999) determined the scale's Cronbach alpha value to be 0.82, and Park et al. (2003) found a cons subscale alpha value of 0.78 and pros subscale value of 0.84. Having a high pros subscale score indicates that the individual has a strong perception of the benefits of cigarette smoking; having a high cons subscale indicates that the individual has a strong perception of the negative consequences of cigarette smoking.

Procedures

Translation of the Scale Items into Turkish

When an instrument is translated for adoption into another language and culture, it is necessary to use correct grammar of the target language and for idioms and items foreign to the culture to be completely changed. This procedure is not just a word for word translation because conceptual adaptation must also be considered (Sencan, 2005; Tezbasaran, 1997). To accomplish the translation, the researchers:

- Obtained written permission from Wayne Velicer to adapt the DBS for Turkish and to use it in this study.
- Engaged three English language philologists (translation experts) expert in both English and Turkish to independently translate the tool from English to Turkish.
- Revised the translation by working with researcher colleagues and submitted it to be further refined by a Turkish language philologist.
- Re-translated the scale from Turkish to English using a different English language philologist who had not seen the original English version of the tool, a step recommended by Savasır and Sahin (1997), Sencan (2005), and Tezbasaran (1997).

Receiving Expert Opinions

To determine the equivalence of the items of the translated form with those on the original form it was necessary to conduct validity and reliability analyses (Savasır & Sahin, 1997; Sencan, 2005). Therefore, opinions of eight experts about the Turkish translation of the Adult DBS were solicited. These experts were: two medical faculty members (one in Pulmonary Medicine, one in Pediatrics), and six nursing faculty members at two different university schools. The experts were given the Adult DBS original and translation together and were asked to score each item on the scale for its appropriateness from 0–10 (0 = not appropriate at all, 10 = completely appropriate) (Savasır & Sahin, 1997; Sencan, 2005, Tezbasaran, 1997).

Pilot Test

After the first translation, experts suggest administering the scale to 10–20 people who have similar characteristics to the study population to ask the participants to judge whether or not the items are understandable, and to correct any deficiencies and errors prior to formatting the final instrument. This procedure is recommended with each translation (Mishel, 1998; Savasır & Sahin, 1997; Sencan, 2005; Tezbasaran, 1997).

After revisions were made to several items according to the analysis of concordance (described later) and expert assessment, the pilot instrument was administered to 20 adults. In the absence of corrective feedback, the decision was made that the scale's validity and reliability were adequate. These data are reported later in this article.

Data Collection

For test-retest analysis a group of at least 30 is recommended (Savasır & Sahin, 1997).

In order to be able to compare the data from the first and second administration of the instrument the parents in this study were asked to use a pseudonym on the forms. The confidentiality of the participants was thus ensured.

For test-retest purposes, the instrument should be administered for the second time at an interval that should not be short enough for subjects to remember the answers given in the first administration but not so long that the respondents would have changed significantly. The recommended interval is between two and six weeks (Patrick & Beery, 1991; Sencan, 2005; Tezbasaran, 1997). For the test-retest analysis in this study the second scale was administered to 486 adults at three weeks. However, some forms were removed because they were not completed or because pseudonyms did not match and a total of 365 people were included for the test-retest analysis; 75% of the first test forms were matched with retest data. One hundred twenty one people who completed the first scale did not participate in the second round. They had similar sociodemographic characteristics with those who returned the second round.

After written permission was obtained from the Ministry of Education and university ethics committee the purpose of the study was explained to the parents of students in a school meeting. Following the meeting, the parents who consented to participate in the study were given the instrument. Those who hadn't come to the meeting were sent an information form that explained the purpose of the study and were invited to contact the researchers by phone to discuss the study if they were interested in participating. Children of parents who called back and consented to participate were given the scales and took them home to their parents. The parents were asked to fill in the forms. Four hundred eighty six scales were distributed in the first administration and forms were sent to the same parents via their children for the second administration

Data Analysis

The research data were coded and analyzed on a computer (Akgul, 2003; Ozdamar, 2005; Simsek, 2008). The following table demonstrates data and methods used for analysis.

TABLE 1
Data and methods used for analysis

Characteristic Examined	Statistical Method
• Expert opinions' concordance analysis	→ Kendall W analysis
• Scale and subscales' test-retest congruency analysis	→ Pearson correlation analysis,
	→ t-test in dependent groups
• For scale and subscales: item-total score analysis	→ Pearson correlation analysis
• Scale and subscales' internal consistency	→ Cronbach alpha coefficient
• Item-Factor relationship	→ Factor analysis
• Whether or not the items and subscales explain the scale's original construct	→ Confirmatory Factor analysis

FINDINGS

Demographics

In this study 47.7% of the participants were male, 52.3% were female, 61% were primary school graduates, 17 % were high school graduates, and 22% were university graduates. Forty two percent reported middle socio economic status (their earnings barely covered their expenses), the mean age was 37.2 ± 5.7, and 51.4% of the sample were smokers. Seventy three percent (73.1 %) of smokers were male.

Validity Analyses

DBS's Concordance Validity

The eight experts' scores were evaluated using the Kendall W and no statistically significant difference was found between the scores (for adult DBS Kendall W = 0.221, p = 0.115), consequently the experts' scores were determined to be in accordance.

Adult DBS's Construct Validity

Among various methods that measure instrument construct validity, one method is factor analysis. The coefficient of the factor analysis in this study (Kaiser-Meyer-Olkin [KMO]) was 0.83 and the Bartlett test was $X^2 = 1527.5$, p = 0.000. The total variance explained by each factor was 24% for the pros subscale and 42.5% for the cons subscale.

As a result of the first order confirmatory factor analysis a statistically significant correlation was found between the pros and cons subscales (r = -42, Figure 1). The pros subscale factor load was 0.39–0.79 and the cons subscale was 0.49-0.71. (Figure 1).

The model concordance indicators were found to be RMSA 0.046, the Goodness of Fit Index (GIF) .90, NIF .90, NNFI .92 and CFI .93.

Contrasted Group Comparison

Statistically significant differences were noted between the scale's pros and cons subscales' mean scores for the cigarette smokers and nonsmokers (p = .000, Table 2). The cigarette smoker group's pros subscale mean score was high and their cons subscale mean score was low.

Internal Consistency Analysis

The reliability coefficients for the Adult DBS subscales were determined to be $\alpha = .85$ for the *pros subscale* and $\alpha = .81$ for the *cons subscale*.

When the 20-item scale's item-total score correlations were examined to assess instrument reliability, the pros subscale correlation coefficients (Pearson's Product Moment Correlation) were found to be .37–.77 and for the cons subscale to be .50–.71 at a statistically significant level (p < 0.001; Table 3).

In addition, the examination of each item's correlations between the first and second administration revealed that only two items were found to have a low test-retest reliability coefficient (r = .28 and .29), the other items' test-retest reliability coefficients were r = .30–.66 and they were found to be statistically significant (p < 0.001; Table 3).

Test-Retest Reliability

The stability of the DBS subscales over time, the test-retest reliability coefficient, between the two administrations of the scale with a three week interval was evaluated with Pearson's Product Moment Correlation. Statistically significant positive correlations were determined between the test-retest score means of the DBS subscales (Pros subscale: r = 0.721, p = 0.000; Cons subscale: r = 0.713, p = 0.000; Table 4).

To determine whether or not there were differences in the mean scores obtained from the subscales between the first and second time, the scale was evaluated using the t- test in dependent groups and no statistically significant differences were found (p>0.05).

To test whether or not the participants' responses to the scale's items were equal, the Hotelling T^2 test was employed. The hotelling test measures whether or not a response bias exists. The means were determined to be different as a result of this test (Hotelling T^2 = 72.802, p <0.000), indicating lack of bias.

DISCUSSION OF FINDINGS

If an instrument will be used in a different language it is necessary to show that it has the same validity and reliability as the instrument's original format (Patrick & Beery, 1991; Sencan, 2005; Tezbasaran, 1997). For this reason it was necessary to evaluate the validity and reliability of the DBS, which researchers plan to use with a Turkish population sample.

TABLE 2
Comparison of decisional balance scale score means according to cigarette smoking status

DBS	Smokes Cigarettes			Does Not Smoke Cigarettes				
Subscales	n	m	sd	n	m	sd	t	p
Pros Subscale	187	45.9	5.1	178	37.1	9.8	8.417	.000
Cons Subscale	187	20.1	8.6	178	25.2	9.6	3.941	.000

TABLE 3
DBS subscales item-total score and items' test-retest analyses

| DBS	Items	Item-subtotal Score Correlation (n = 486)		Items' Test-Retest Score Correlations (n = 365)	
		r	p	r	P
Pros Subscale	1. Cigarette smoking is pleasurable.	.77	.000	.63	.000
	2. I like the ritual of taking out of my cigarettes and pausing a moment to light up	.37	.000	.31	.000
	3. I am relax and therefore more pleasant when smoking	.76	.000	.66	.000
	4. If I try to stop smoking, I'll probably be irritable and a pain to be around	.75	.000	.48	.000
	5. My family and my friends like me better when I am happily smoking than When I am miserable trying to quit	.51	.000	.29	.000
	6. I like myself better when I smoke	.56	.000	.43	.000
	7. Smoking helps me concentrate and to better work.	.75	.000	.43	.000
	8. Smoking cigarettes relieves tension	.69	.000	.35	.000
	9. By continuing to smoke I feel I am making my own decision.	.64	.000	.31	.000
	10. After not smoking for a while, a cigarette makes me feel great	.67	.000	.38	.000
Cons Subscale	11. My smoking affects the health of others	.55	.000	.30	.000
	12. Others close to me would suffer if I became ill from smoking	.51	.000	.37	.000
	13. Because I continue smoke, some people I know think I lack character to quit	.50	.000	.31	.000
	14. Smoking cigarettes is hazardous to my health	.55	.000	.33	.000
	15. I'm embarrassed that I have to smoke.	.67	.000	.39	.000
	16. My cigarette smoke bothers other people.	.64	.000	.30	.000
	17. People think I am foolish for ignoring warnings about cigarette smoking	.59	.000	.28	.000
	18. People close to me disapprove of my smoking	.69	.000	.36	.000
	19. I am foolish to ignore the warnings about cigarettes.	.71	.000	.32	.000
	20. I would be more energetic right now if I didn't smoke.	.65	.000	.33	.000
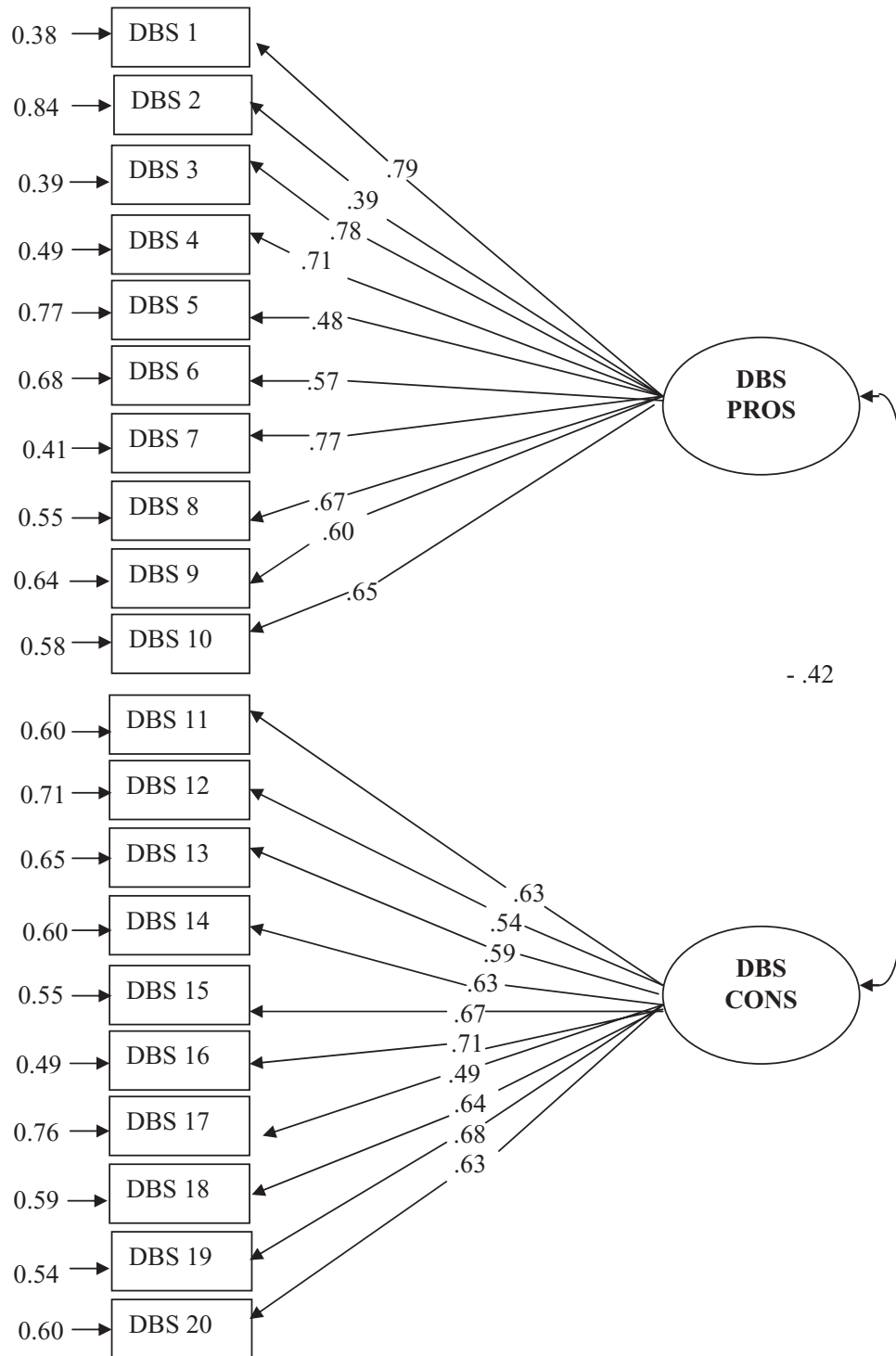
FIG. 1. Decisional Balance Scale's Confirmatory Factor Analysis Model.

Decisional Balance Scale Validity

Scale's Concordance Validity

Experts were asked to evaluate the draft scale to determine its content validity and revisions were made according to their feedback (Sencan, 2005; Tezbasaran 1997). Experts used a form for assessment that provided scores for item concordance. When the majority of the experts have the same opinion it is considered to be an indicator of content validity (Sencan, 2005; Tezbasaran

TABLE 4
Comparison of DBS subscale test-retest score means (n = 365)

DBS Subscales	First Administration X±SD	Second Administration X±SD	r	p	t	p
Pros Subscale	41.5 ± 9.2	42.4 ± 9.4	.721	.000	1.454	.148
Cons Subscale	21.3 ± 8.3	21.8 ± 8.9	.713	.000	.635	.526

1997). In this study the opinions of eight experts were analyzed which evaluated the appropriateness of the DBS items translated into Turkish for the language and culture. The recommendations of the experts about the statements' format and content were evaluated and some items were changed accordingly.

In the Kendall W concordance analysis which examined the agreement between the experts' opinions (Sencan, 2005; Tezbasaran, 1997), it was determined that the expert opinions were in concordance (Kendall W = .221 p = .115). According to these results the Turkish version of the DBS's statements can be said to be appropriate for Turkish culture, it represents the area that was targeted for measurement and its comprehensive validity was established.

Adult DBS's Construct Validity

Factor and Confirmatory Factor Analysis

One of the basic aims of factor analysis is to look at relationships between variables to reveal new constructs. In other words, in factor analysis variables are grouped and common factors are created (Aker, Dundar, & Peksen, 2005; Sencan, 2005; Tezbasaran, 1997). In the original form of the DBS, developed by Velicer et al. (1985) and revised by Pallonen et al. (1998) the 20 items were grouped under two factors. As a result of factor analysis in this study the Kaiser-Meyer-Olkin coefficient (KMO) was found to be .83 and Barlett test result $X^2 = 1527.5$, p = 0.000. These values show that the sample size and data were appropriate to conduct factor analysis. As a result of the analysis, the factor distribution of the items was consistent with those found in the revised scale by Pallonen et al. (1998). It was determined that 24% of the total variance was explained in the pros subscale and 42.5% in the cons subscale. Thus, the total explained variance was 66.5%. The greater the obtained variance the stronger an instrument's factor structure. In studies in social sciences variances, between 40% and 60% are considered to be adequate (Sencan, 2005). The total variance obtained in this study was adequate, so Turkish DBS form was shown to have acceptable construct validity.

Confirmatory factor analysis is used to evaluate whether or not the items are adequately represented in subscales and whether or not the defined subscales adequately explain the scale's original construct. Confirmatory factor analysis evaluates whether or not a factor's items' relationships with the factor are adequate (Patrick & Beery, 1991; Simsek, 2008; Sen-

can, 2005). At the same time, confirmatory factor analysis is a method to determine evidence of validity for use of an instrument in a different culture from the one for which it was developed (Buyukozturk, 2007). As a result of DBS confirmatory analysis the pros subscale factor loads were 0.39–0.79 and cons subscale factor loads were 0.49–0.71. GFI, NFI, NNFI and CFI were found to be > .90 and RMSA < .50. These values indicates data consistent with the model, the scale's items and subscales are associated with the scale, every item on both subscales adequately defines their own factor and confirms the two-factor structure (Simsek, 2007).

These results support the construct validity of DBS and show that it is a valid instrument for use in Turkish samples (Figure 1).

Contrasted Group Comparison

Another method used in the determination of construct validity is the contrasted group comparison. In this method groups are determined which will receive significantly different scores from the scale. It is expected that a difference will be found between the groups by administering the scale to the groups (Patrick & Beery, 1991; Sencan, 2005). In this study the DBS scores of individuals who did and did not smoke cigarettes were compared. The results showed that cigarette smokers had higher perceived benefits scores than nonsmokers and lower perceived disadvantages (Table 2). The DBS significantly divided the two groups of perceived pros and cons, demonstrating that the scale is an effective instrument for evaluating smokers and nonsmokers which supports the construct validity of DBS.

DBS's Reliability

DBS Subscales' Internal Consistency Analysis

Cronbach alpha coefficient is calculated as an indicator of homogeneity in attitude instruments with Likert-type scale responses to items. This test for internal consistency shows whether or not the items measure the same characteristics and whether or not the items are associated with the subject targeted for measurement. The reliability coefficient needs to be near 1 (one) to consider the measurement tool adequate (Sencan, 2005 Tezbasaran, 1997). The DBS's items' alpha reliability coefficient for the cons subscale was found to be .81 and for the pros subscale .85. The results are consistent with those reported by Velicer et al. (1985) and Park et al. (2003). The scale's

subscales were found to have a high level of reliability for internal consistency.

DBS Subscales' Item-Total Score Analysis

The correlation coefficient of item analysis is used for reliability analysis to determine to what degree an instrument's items are associated with the entire instrument (Sencan, 2005; Tezbasaran, 1997). Obtaining a high correlation coefficient for each item shows that that item is highly connected with the theoretic construct being measured, or that the item is influential and adequate to measure the targeted behavior. It is recommended that the coefficient be greater than .20 or .25 to be acceptable as an item (Patrick & Beery, 1991; Sencan, 2005; Tezbasaran, 1997). In the examination of the item-total score correlations for this 20-item scale in this study the pros dimension correlation coefficients (Pearson's Product Moment Correlation) were .37–.77 and the cons subscale were .50–.71 which are at a statistically significant level (p < 0.001; Table 3). According to these results all of the DBS's items showed adequate correlation with their own subscale's total score and the subscales' item reliability was found to be high (p < 0.001, Table 3).

The item-total score analysis is as much an indicator of reliability as it is accepted as an indication of validity (internal consistency) and it reflects the scale's construct validity as well (Sencan, 2005; Tezbasaran, 1997).

Evaluation of Concordance between DBS Subscales' Test-Retest Score Means with Correlation Analysis and t test

Test-retest measurement of the stability of an instrument is the most frequently used analysis of reliability. It is frequently evaluated with the Pearson Product Moment Correlation analysis (Sencan, 2005; Tezbasaran, 1997). The closer a correlation coefficient is to +1, the more reliable the tool over time. Correlation coefficient between test-retest scores on instruments should be at least .70 (Sencan, 2005; Tezbasaran, 1997). In the original DBS study the coefficient for the cons subscale was found to be .87 and the pros to be .90, in the retest three weeks later the stability coefficient between the two administrations of the adult DBS were found to be .71 for cons subscale and .72 for pros subscale (p = 0.000, Table 2). Therefore, the translated Turkish version of DBS was found to have a high level of reliability and the results between the two administrations of the scale were similar.

Statisticians also recommend that the two test results' score means and standard deviations be examined for similarity (Sencan, 2005; Tezbasaran, 1997). When this calculation was done, no statistically significant difference was found in the score means (p>0.05, Table 4). In the administration of the same instrument to individuals at different times, the individuals gave similar and consistent responses to items which indicates the stability of the instrument (Sencan, 2005; Tezbasaran, 1997). The Turkish DBS was found to have a high level of reliability.

There may not be any significant differences in individuals' total scores, but they could have answered every item differently.

For this reason it is also necessary to examine the consistency between items for the two administrations (Patrick & Beery, 1991; Sencan, 2005; Tezbasaran, 1997). In the examination of the correlations between scores for every item at the first and second administration only two items were found to have low test-retest reliability coefficients (r = .28 and .29), the other items' test-retest reliability coefficients were r = .30–.66, and they were statistically significant (p < 0.001; Table 3). Other than the two items, having the scales' items give similar results at the two measurements is an indicator that the items were understood by the subjects, and that items measured consistently.

Before removing items which have low reliability coefficients from a scale, it is necessary to look at the change in alpha coefficient and means. If the alpha coefficient increases when an item is removed from the scale, then that item decreases the reliability of the instrument and needs to be deleted from the scale. Items that do not change reliability are items which support the scale and do not need to be deleted from the scale (Sencan, 2005; Tezbasaran, 1997). Because the two items on the Turkish DBS had high correlation with their own subscale's total score and because the scale's reliability level was not affected when they were removed the decision was made to retain them in the scale.

Scales are susceptible to several common problems. The most troublesome are referred to as response bias (Polit & Hungler, 1997). The response bias is a type of cognitive bias which can affect the results of a statistical survey if respondents answer questions in the way they think the questioner wants them to answer rather than according to their true beliefs. This may occur if the questioner is obviously angling for a particular answer (as in push polling) or if the respondent wishes to please the questioner by giving what appears to be the "morally right" answer. Response bias is thought to have an adverse effect on the reliability and validity of the scales (Wikipedia, 2009). Therefore, in this study, the hotelling T^2 test was conducted in order to find out whether or not a response bias exists. As a result of this test the means were determined to be different (Hotelling $T^2 = 72.802$, p <0.000) (Ozdamar, 2004). The test result shows that people do not interpret every item the same and there was no response bias while answering the questions.

Implications for Practice

This study provided evidence that the DBS is a reliable instrument for measuring Turks adult individuals' positive and negative perceptions about cigarette use. This tool is considered to be a practical tool for professionals who specialize in smoking prevention. Using this scale, researchers can determine the pro/con perceptions of subjects and effectively design services that aim to prevent smoking for those who don't smoke but perceive benefits of smoking. Other interventions could be designed for helping people quit who already smoke. Professional nurses and other providers can develop interventions specific to the culture and informed by the results obtained from this scale.

DECLARATION OF INTEREST

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