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THE VALIDITY AND RELIABILITY OF THE TURKISH VERSION OF THE SMOKING-SPECIFIC COMPENSATORY HEALTH BELIEFS SCALE FOR ADOLESCENT[1]

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Abstract
The aim of the present study was to adapt a scale to measure Compensatory Health Beliefs among adolescents. Confirmatory factor analysis provided a good fit. Scale's internal consistence reliability coefficient was found .86 for the whole scale; .87 for exercise subscale; .80 for food and drink subscale, and .76 for amount of smoking subscale. Scale's test–retest reliabilities for the whole scale, exercise, food and drink, and amount of smoking subscales were .95, .79, .87, and .79, respectively. These findings show that the Turkish version of the Compensatory Health Beliefs Scale is a valid and reliable instrument.

Keywords: *Compensatory health beliefs, scale, validity, reliability*

1. Introduction

Smoking may be one of the leading causes of disease and preventable death. The tobacco epidemic is one of the biggest public health threats the world has ever faced. Consumption of tobacco products is increasing globally, though it is decreasing in some high-income and upper middle-income countries (WHO). In addition, Smoking among teenagers is a major public health problem. McGinnis and Foege (1993) stated that behavioral and lifestyle factors, such as smoking, being overweight or obese, and lack of exercise are major determinants of disease and death rate. Furthermore, smoking is a leading cause of preventable disease, all over the world, and disability in many developed (Doll, Peto, Boreham, & Sutherland, 2004; Reid, Hammond, Boudreau, Fong, & Saipush, 2010; Reitzel Mazas, Cofta-Woerpel, & Li, Cao, 2019; Sanchez, Opaleye, Martins, Ahluwalia, & Noto, 2010; Sims, 2009). According to the researches, most of the individuals who smoke cigarettes die from lung cancer or chronic obstructive lung disease and they have coronary heart disease (Ahmed, Rizwan-ur-Rashid, McDonald, & Ahmed, 2008; McGinnis & Foege, 1993; Ockene & Miller, 1997).

Result of studies stated that smoking is a behavior that starts in adolescence for 90% of adults (Etter, Prokhorov, & Perneger, 2002; Sims, 2009) with an average age of onset ranging between 13-15 years (El-Mhamdi, Wolfcarius-Khiari, Mhalla, Ben Salem, & Soltani, 2011; Fawibe, Shittu, 2011; Çelikel, Çelikel, & Erkorkmaz, 2009) and an overt male preponderance (El-Mhamdi, et al., 2011; Akindele, Babalola, Adesola, & Eme, 2010; Salawu, Danburam, Isa, & Agbo, 2010). According to the World health Organisation (WHO), tobacco use kills nearly 6 million people a year, of whom more than 5 million are from direct tobacco use and more than 600 000 are nonsmokers exposed to second-hand smoke. Furthermore, the years of potential life lost attributable to tobacco related diseases will continue to increase if we do not target interventions to prevent smoking initiation among adolescents. So, factors contributing to smoking habit must be put away in environment living adolescents.

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Some researchers (Brown, Lewinsohn, Seeley, & Wagner, 1996; Escobedo, Reddy, & Giovino, 1998; Goodman & Capitman, 2000; Hockenberry, Timmons, & Vander Weg, 2010) indicate that there is an association between smoking and depression among teens, other researchers state that there is a relationship between smoking and increased likelihood of suicidal ideation and/or behaviors (Afifi, Cox, & Katz, 2007; Bronisch, Höfler, & Lieb, 2008; King et al., 2001; Riala, Viilo, Hakko, & Räsänen, 2007), too. However, some findings show that the relationship between smoking and suicidal ideation are mixed (Boden, Fergusson, & Horwood, 2007; McGee, Williams, & Nada-Raja, 2005). Iglesias, Cavada, Silva, & Caceres (2007) indicate that smoking associated with the factors about the abuse of other substances such as alcohol and marijuana.

Most of the research about smoking has focused on psychological predictors of the initiation of smoking behavior. The emotional, social, psychological, and behavioral factors are considered as factors affecting the smoking in adolescent individuals (Kim, 2004). Diverse psychological factors have been implicated in the use of cigarette by adolescents and these include peer pressure, smoking parents or siblings, tobacco adverts, absence of restriction at home, stress and unemployment (Sanchez, Opaleye, Martins, Ahluwalia, & Noto, 2010; El-Mhamdi et al. 2011; Fawibe & Shittu, 2011, Osungbade & Oshiname, 2008). Furthermore, parental socioeconomic level and adolescent smoking were reported to be inversely associated (Tyas & Pederson, 1998). Likewise, it was found that low-income, people with an unstable source of income or unemployed have higher tendencies to smoke (Yahya, Hammangabdo, & Omotara, 2010; Ding et al., 2009). Parental smoking behaviors have also been found to have a role not only on youth initiation, but also in the escalation of their smoking habits. Some studies indicate that adolescents having at least one smoking parent are more likely to begin smoking themselves (Ahmed et al., 2008).

According to the researchers (Ahmed et al., 2008; Babatunde et al., 2012; Odeyemi, Osibogun, Akinsete, & Sadiq, 2009; Yahya, Hammangabdo, & Omotara, 2010), one of the most important factors is peers. The likelihood of quitting among young people is strongly dependent on the extent of smoking among their peers. Influence of friends and going to parties/clubs are major factors contributing to the smoking habit. Probably, peer education in schools emphasizing knowledge of the health implications of smoking as well as early diagnosis of smoking related health problems may be more beneficial for encouraging smoking cessation. Additionally, as compensatory health beliefs some intervention methods must be developed and examined by researchers to prevent smoking initiation or quit of adolescents.

Compensatory health beliefs are the statements that people hold that an unhealthy behavior can be compensated for or neutralized by engaging in a health-protective behavior (Knäuper, Rabiau, Cohen, & Patriciu, 2004). For example, smoking can be compensated for by physical activity (Radtke, Scholz, Keller, Knäuper, & Hornung, 2011). Another obvious example, person who wants to lose weight, but who wants to eat a piece of chocolate cake might think: “I will eat the chocolate cake now and then go to the gym later to burn it off” (Kaklamanou, Armitage, & Christopher, 2013).

Knäuper et al. (2004) developed a scale to measure compensatory health beliefs in Canada. Since the Knäuper et al. (2004) study, three studies have examined the compensatory health beliefs scale, producing an inconsistent pattern of findings (Kaklamanou, Armitage, & Christopher, 2013; Kaklamanou & Armitage, 2012; Radtke et al. 2011). The aim of the present research was to adapt a scale to measure smoking-specific CHBs among adolescents. The general CHB scale was developed by Knauper et al. (2004), which measure CHBs in general (e.g., eating and sleeping habits) might not be appropriate for the investigation of smoking behavior in particular. Then, Radtke et al. (2011) developed smoking-specific CHBs among based on the general CHB scale for adolescents, developed by Knauper et al. (2004).

ISSN 1512-1801

2. Method

2.1. Participants

Participants of the study consisted of 318 eight-grade students in Sultangazi, İstanbul. Participants include 133 males and 182 females. All the participants participated in the study voluntarily. Informed consent was obtained from the schools and all individuals participated voluntarily and were treated according to the American Psychological Association(APA) ethical guidelines (APA, 2002). The data collection and its analysis were done anonymously. Ages of individuals participating in the study ranked between from 13 to 15. The perceived socioeconomic status was 17% high-level income, 18% lower level income, and 25% mid-level income. 40% of participants didn't answer about socioeconomic status. The perceived academic achievement level was 36% high-level academic achievement, 8% lower level academic achievement, and 53% mid-level academic achievement. 3% of participants didn't answer about academic achievement. There were smoking individuals a family for the majority of participants, 10 of them were siblings, 118 of them were fathers, 15 of them were mothers, 34 of them were fathers and mothers, 12 of them fathers and siblings. In addition, all individuals were smoking in the family of 6 participants.

2.2. Procedure

The participants were asked to complete the Turkish version of the smoking-specific compensatory health beliefs scale, the Turkish version of the decisional balance scale for adolescent smoking and the Turkish version of the motivation for smoking cessation scale for teenagers. They were told that their responses would be treated confidentially and anonymously. The entire procedure took about 30 minutes.

Students were invited to indicate their interest in completing the same questionnaire again in the following month. Those who indicated interest to do, so they were approached again for filling in the smoking-specific CHBs scale for the second time. Analysis was computed using the data collected during the first session. The data gathered from the second session were only used for establishing test–retest reliability scores.

2.3. Instrument

2.3.1 Smoking-specific Compensatory Health Beliefs Scale

The scale has been developed by Radtke et al. (2011) in order to measure smoking-specific compensatory health beliefs. This instrument consisted of 10 Likert-type items that contributed to three subscales; ''exercise'', ''food and drink" and "amount of smoking". The structure of the factors is listed in Table 1. The first factor, was labelled 'exercise'. This factor has three items. In agreement with these items means physical exercise as one strategy to compensate for the negative health effects of smoking can be perceived by respondently (e.g., Smoking can be compensated for by physical activity). The second factor was labelled 'food and drink'. This factor has four items. The four items connote the respondent's belief that negative health effects may be neutralized by eating healthily or by reducing alcohol consumption (e.g., The negative effects of smoking can be made up for by eating healthy). The third factor is labelled 'amount of smoking' that it has three items. These three items reflected the belief that a reduction of the number of cigarettes smoked would compensate the health consequences of smoking (e.g., The effects of smoking during the weekend can be compensated for by not smoking during the week). Subscales that represented the three components of "exercise", ''food and drink" and "amount of smoking" were calculated by taking sum scores of the constituent items assigned to each component (Radtke et al., 2011).

ISSN 1512-1801

In the analysis about the original form of the scale, three factors were obtained. The first factor, which accounted for 18% of the common variance after rotation, was labelled 'exercise'. In agreement with these items means respondents perceived physical exercise as one strategy to compensate for the negative health effects of smoking. The second factor, accounting for 18% of the variance, was labelled 'food and drink'. The four items connote the respondent's belief that negative health effects may be neutralized by eating healthily or by reducing alcohol consumption. The third factor, accounting for 15% of the variance, was labelled 'amount of smoking'. These three items reflected the belief that a reduction of the number of cigarettes smoked would compensate for the health consequences of smoking (Radtke et al., 2011).

The multilevel CFA was conducted with the other random sub-sample to confirm the scale's factor structure. For the described model above, the chi-square value indicated that the model fit the data well (x^2 (32, N = 122) = 36.38; p = .27). Furthermore, the goodness of fit was assessed with the Comparative Fit Index (CFI = .98), the Tucker Lewis Index (TLI = .98), the root means square error for approximation (RMSEA = .03), and the standardized root mean square residual (SRMR = .05). All values meet the criteria for acceptable model fit (Hu & Bentler, 1999). Likewise, all factor loadings were significant $p \leq .001$ (Radtke et al., 2011).

The alpha coefficient for the total scale was α= .80. The internal consistency of the subscales ranged from a low of 0.71 to a high of 0.78. The majority of the corrected inter-item correlations clustered around r = 0.29 (.11–.55). After the data had been collected twice, resulting retest-reliability coefficient for smokers was r_{tt}= 0.71 (n = 91) (Radtke et al., 2011).

2.4. Data Analysis

A communication established through an e-mail with Radtke, who studied on psychometric expects of smoking-specific compensatory health beliefs Scale, so that necessary permission can granted. In the process of translation of smoking-specific compensatory health beliefs Scale into Turkish, at first, 3 expert translators translated scale items into first Turkish, then into English again to examine their consistence. Necessary corrections are made by 5 experts in psychological counselling and guidance field-by getting their opinions. After that, this form was reexamined by three experts in Turkish language and literature in terms of meaning and grammar. Following this, the Turkish version was given to 43 adolescents who were asked to identify unclear items. After that, this scale' Turkish form and English form were applied to adolescent in order to be examined between two forms linguistic equivalence.

In scale adaptation studies, for structure validity, first and second-order confirmatory factor analysis was used. To determine the reliability of the scale, Cronbach's (1951) Coefficient Alpha and test–retest reliability were used. For item analysis, t-test and corrected item correlation were used.

3. Findings

3.1. Linguistic Equivalence

In this study, at first, the linguistic equivalence of the smoking-specific compensatory health beliefs scale was examined between Turkish form end English form. Results are illustrated in Table 1.

Table 1 The Linguistic Equivalence of the Smoking-specific Compensatory Health Beliefs Scale

Factors	Application		*DF*	*r*
Whole scale	English form	14,90	6,39	.79**
	Turkish form	13,73	5,98	
Exercise	English form	6,30	4,57	.77**

ISSN 1512-1801

	Turkish form	5,40	4,28	
Food and Drink	English form	4,96	1,71	.76**
	Turkish form	4,76	1,77	
Amount of Smoking	English form	3,63	1,73	.85**
	Turkish form	3,56	1,71	

$^{**}p < 0.001$, $^{*}p < 0.05$

According to the result of analysis, between the Turkish form end English form correlation coefficient was found .79 for whole scale, .77 for exercise, .76 for food and drink, and .85 for amount of smoking.

3.2. Structure Validity

3.2.1 First Order Confirmatory Factor Analysis

The three factors of smoking-specific compensatory health beliefs scale (exercise, food and drink and amount of smoking) were analyzed with first order confirmatory factor analysis to investigate the factor structure to determine at which point theory and reality diverge from each other, and to detect problematic areas using LISREL 8.51. Results are illustrated in Figure 1.

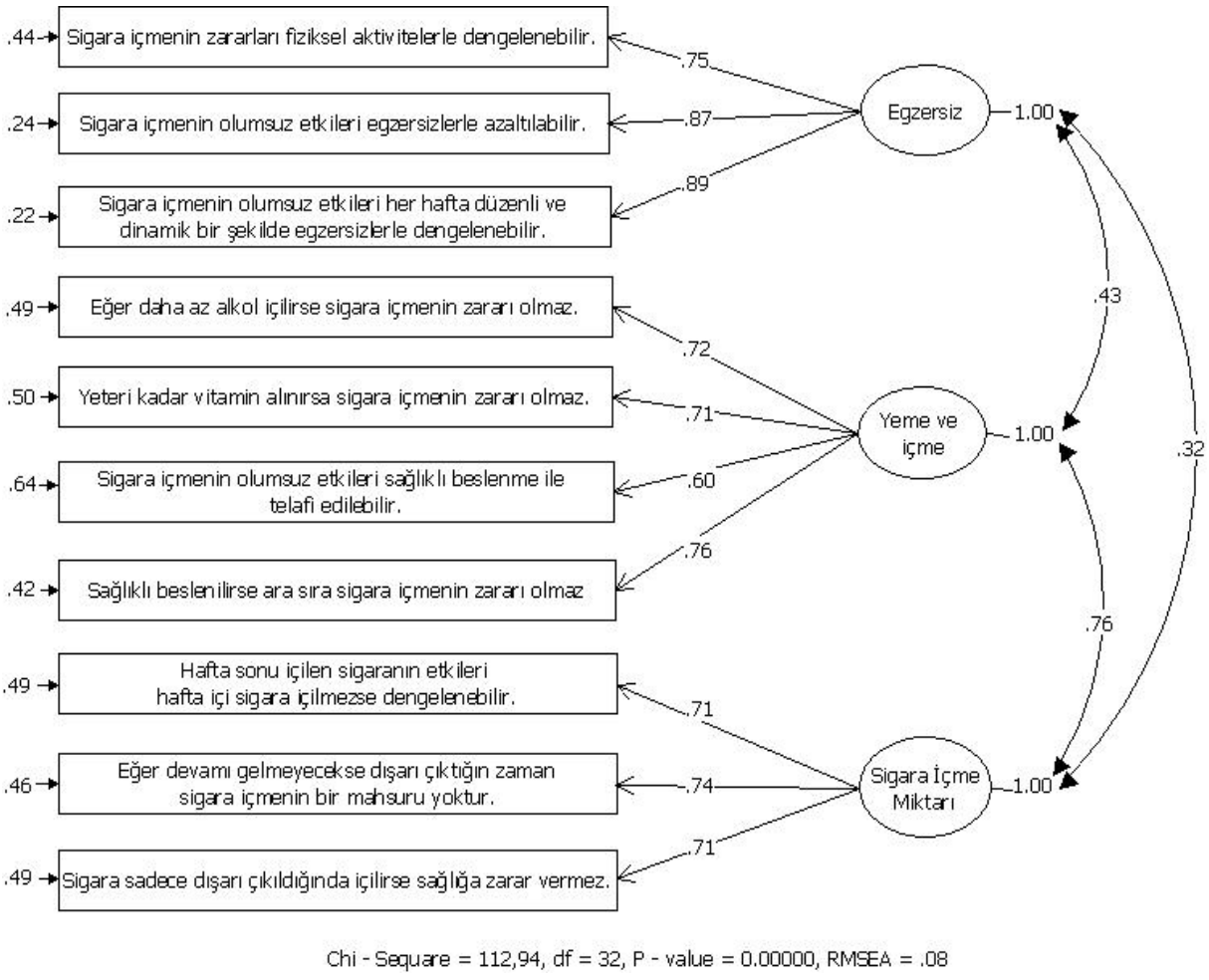

Figure 1. *Path Diagram and Factor Loadings Related to Smoking-specific Compensatory Healt Beliefs Scale*

ISSN 1512-1801

First order confirmatory factor analysis performed to confirm the three-factor structure found in original form of scale for structure of smoking-specific compensatory health beliefs scale in CFA. In the result of first order confirmatory factor analysis, it was found that model's accordance index is examined and Chi-square value is meaningful (x^2=112,94 sd=32, p= 0.0000). Accordance index values were found as RMSEA=.08, GFI=98, CFI=.97, IFI=.97, NFI=.95, AGFI= .97, RFI= 93 and NNFI= .95.

3.2.2 Second Order Confirmatory Factor Analysis

First order confirmatory factor analysis revealed three factors for smoking-specific compensatory health beliefs Scale. Second order confirmatory factor analysis was conducted to test whether these three indicators are predicted by smoking-specific compensatory health beliefs latent variable. The model tested with second order confirmatory factor analysis to test the factor structure. According to the model results provided a good fit to the data (X^2= 103,58 *DF*= 32, *p*=0.0000), *RMSEA*= .08, *GFI*= .94, *CFI*= .95, *IFI*= .96, *NFI*= .94, *AGFI*= .89, *NNFI*= .94 and *SRMR*= .06). Results are illustrated in Figure 2.

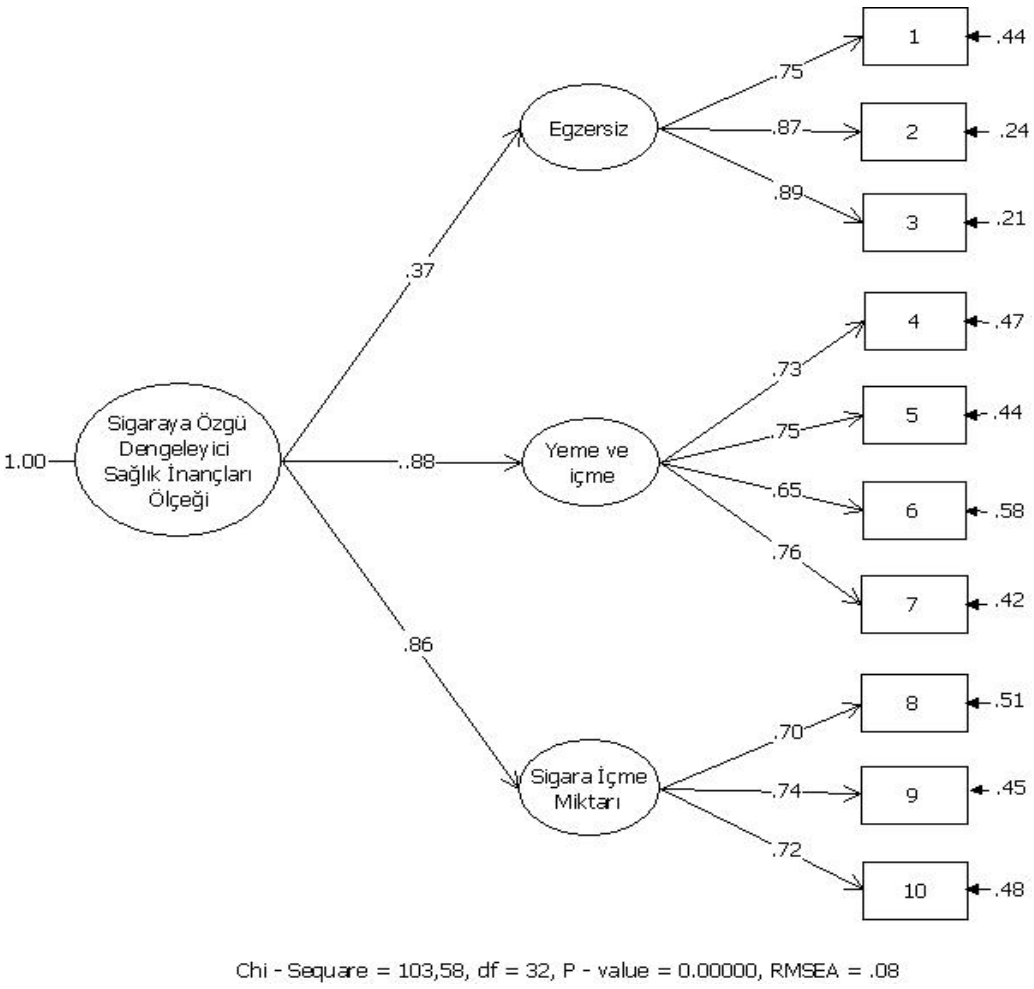

Figure 2 Path Diagram and Factor Loadings Related to Smoking-specific Compensatory Health Beliefs Scale

As illustrated in Figure 2 and Figure 1, both models have the close fit indices. Thus, it can be concluded that smoking-specific compensatory health beliefs latent variable predicts all three

ISSN 1512-1801

factors of the scale. And also, standardized values show that the smoking-specific compensatory health beliefs latent variable predicts exercise (.37), food and drink (.88) and amount of smoking (.86) (see Figure 2).

Schermelleh-Engel, Moosbrugger & Müller (2003) stated that reasonable fit indices of models range between $2 \leq X^2/DF \leq 3$ for X^2/DF, $0.01 \leq p \leq 0.05$ for p, $0.05 \leq RMSEA \leq 0.08$ for the Root Mean Square Error of Approximation; $0.85 \leq AGFI \leq 0.90$ for the Adjusted Goodness of Fit Index; and $90 \leq GFI \leq 0.95$ for the Goodness of Fit Index; and $0.05 \leq SRMR \leq 0.10$ for the Standardized Root Mean Square Residual. AGFI values typically range between zero and one with larger values indicating a better fit. A rule of thumb for this index is that 0.90 is indicative of a good fit relative to the baseline model, while values greater than 0.85 may be considered as an acceptable fit. Furthermore, Hu and Bentler (1999) gave evidence that 0.90 might not be a reasonable cutoff for all fit indices under all circumstances. They suggested raising the rule of thumb minimum standard for the CFI and the NNFI from 0.90 to 0.95 to reduce the number of severely mis-specified models that are considered acceptable based on the 0.90 criteria. In this regard, the results indicated that this model has acceptable fit indices.

3.3. Reliability

Cronbach's Alpha and test–retest reliability were used in order to examine the reliability of the scale. Scale's internal consistence reliability coefficients were found .86 for the whole scale; .87 for exercise subscale; .80 for food and drink subscale, and .76 for amount of smoking subscale. These values were similar to those reported in the study of Radtke et al., (2011) (ın that study, the alpha coefficient for the total scale was α= .80. The internal consistency of the subscales ranged from a low of 0.71 to a high of 0.78 and were all statistically significant at the $p < 0.01$ level. If we consider that presumed reliability is 0.60 (Büyüköztürk, 2010) that can be used in research, the scale's reliability level is enough. The findings concerning the test-retest reliability analysis are shown in Table 2.

Table 2 The Test–retest the Reliability of Smoking-specific Compensatory Health Beliefs Scale

Factors	Application	$\bar{X}$	*DF*	*r*
Whole scale	First application	16,15	7,05	.95**
	Second application	14,50	6,74	
Exercise	First application	7,30	4,17	.76**
	Second application	5,84	3,42	
Food and Drink	First application	6,61	2,11	.77**
	Second application	5,92	3,12	
Amount of Smoking	First application	4,38	2,82	.76**
	Second application	4,00	2,29	

**$p < 0.001$, *$p < 0.05$

Scale's test–retest reliability for the whole scale, exercise, food and drink, and amount of smoking subscales were .95, .79, .87, and .79, respectively.

3.4. Item Analysis

Corrected item-total correlations and T-test, which is a comparison of the lower 27% and upper 27% groups were formed according to total scores of the test, were used for item analysis. The findings concerning the item analysis are shown in Table 3.

ISSN 1512-1801

Table 3 The Items of the Smoking-specific Compensatory Health Beliefs Scale, Corrected Item-total Correlation, and T-test

Items	Corrected Item-Total Correlation			T-test
	Exercise	Food and drink	Amount of smoking	
1	.70			18,71***
2	.79			23,53***
3	.77			27,06***
4		.60		7,58***
5		.71		10,70***
6		.62		20,05***
7		.59		12,37***
8			.54	9,44***
9			.66	9,35***
10			.58	6,27***

$^{**}p < 0.001$, $^{*}p < 0.05$

In the result of the item analysis, corrected item-total correlations ranged from a low of 0.54 to a high of 0.79; t (DF=169) values ranged from a low of 6,27 (p<.001) to a high of 27.06 (p<.001); and were statistically significant at the p<0.001 level .

4. Discussion

In the literature, it is seen that there is very little research about this subject, so such scales must be developed in order to research. These scales also must be adapted to other cultures. In multilevel EFA result, three different subscales labelled “exercise”, “food and drink”, and “amount of smoking” were found by Radtke et al., (2011). In this study, the scale was adapted to Turkish culture and examined whether the factor structure of CHBs scale was confirmed first order and second order multilevel CFA. Result of the factor structure of the scale was confirmed by a multilevel CFA. The subscales were especially important for the investigation of content-specific CHBs, whereas the total smoking-specific CHBs scale enable the use of an aggregated score. The use of the total smoking-specific CHBs score is also feasible, because of the good internal consistency of the whole scale.

The reliability analysis of the scale showed that Cronbach’s Alpha was high. If we consider that preassumed and required reliability is .60 (Büyüköztürk, 2010), the scale’s reliability level is adequate. In this context, satisfactory to good internal consistency reliability of the scale were found in the total score and subscale scores ($p < .001$).

If the interpretation of item total correlations is.30 and higher items, they differentiate with its items, we see that item total correlation is in enough level (Büyüköztürk, 2010). In t-test results have meaningful. Internal consistence values in the scale are in coherence, so reliability for internal consistence is high. Item total correlation and 27% low-high group comparison result shows that results are distinguishing as original form. We can say that Turkish form of smoking-specific CHBs Scale can be used as valid and reliable according to the result of the study.

Analysis conducted to assess construct validity was first order and second order confirmatory factor analyses, which yielded significant chi-square value and adequate fit indices. According to the generally accepted criteria a good fit can be claimed if GFI, AGFI, CFI, IFI, and NFI indices are above .90, RMSEA and SRMR are below .10 and also AIC and CAIC values are lower than the independent and saturated models’ AIC and CAIC values (Schermelleh-Engel, Moosbrugger, & Müller, 2003). A rule of thumb for this index is that .90 is indicative of good fit relative to the baseline model, while values greater than .85 may be considered as acceptable fit. Furthermore, Hu and Bentler (1999) gave evidence that .90 might not be a reasonable cutoff for all

ISSN 1512-1801

fit indices under all circumstances. They suggested to raise the rule of thumb minimum standard for the CFI and the NNFI from .90 to .95 to reduce the number of severely misspecified models that are considered acceptable based on the .90 criteria. In this regard, the results indicated that this model has acceptable fit indices. Regarding these criteria, model provided a good fit to the data. Considering the recommendation that internal consistency coefficient (.86) can be considered as a construct validity indicator for the whole scale (Anastasi & Urbina, 1997; Büyüköztürk, 2010; Dağ, 2005) together with factor structure, reliability coefficients, good fit indices obtained by first-order and second-order confirmatory factor analysis, it can be concluded that smoking-specific CHBs Scale is a valid measurement tool for Turkish culture. High reliability estimates indicate that the scale is reliable. The scale adapted in this study, which has simple factors and which is easy to answer makes a major contribution to the research area. It can be concluded that the research accomplished its aim.

There can be some suggestions as a result of validity and reliability studies. First, the sample size of adolescent smokers in the study is expandable. However, it is not always possible to determine the number of smokers at the beginning of studies in school settings, because there is a wide variation of smokers in each school class, so that the sample size is finally acceptable. Second, the mean of the smoking-specific CHBs is rather low. A possible explanation regards the formulation of the questions, concerning smoking-specific CHBs as already mentioned above. Possibly, adolescent smokers would agree upon smoking-specific CHBs to a greater extent if the items were worded in first person format. As a consequence, future studies should vary the answering format in order to account for this explanation.

Further research is also recommended to examine the smoking-specific CHBs in different samples (e.g., in adults). In order to test the long-term effects of smoking-specific CHBs on smoking cessation, a longitudinal design would be needed. Moreover, it is intended to integrate smoking-specific CHBs into an existing theoretical model of behavior change (such as the Health Action Process Approach, cf. Schwarzer, 2008), because so far, CHBs have not been investigated within the framework of such a behavior change model. The CHB model (Rabiau et al., 2006) explains the generation of CHBs as well as the implementation of compensatory health behavior, but not the relevance of CHBs for a behavioral change. In addition, it is required to test the smoking-specific CHBs are related to other concepts such as risk perceptions, outcome expectancies, attitudes, or descriptive norms (cf. Manning, 2009; Radtke et al., 2011) to analyze their contribution to health behavior change in more detail.

Until now, research on predictors of smoking cessation among adolescents found that amongst others, self-efficacy, knowledge, and beliefs about smoking are important predictors of smoking cessation (e.g., Dijk, Reubsaet, de Nooijer, & de Vries, 2007; Radtke et al., 2011). Because our results indicate that smoking-specific CHBs are important predictors of smoking cessation, CHBs should be targeted in interventions. For example, an intervention could focus on unmasking CHBs and to inform adolescents that smoking cannot be compensated for by any other healthy behavior. This should raise adolescents' awareness for these maladaptive beliefs and thereby limit CHBs' potential to reduce cognitive dissonance. A second strategy could be to reduce the automatic activation of CHBs. Because CHBs are often activated after indulgence, interventions might want to strengthen adolescents capabilities to resist temptations to smoke. Thus, interventions could for example address adolescents' resistance self-efficacy to deal successfully with high-risk situations that provoke temptations (cf. Marlatt, Baer, & Quigley, 1995; Radtke et al., (2011). Regarding smoking-specific CHBs, more studies are needed to enhance our knowledge about their role for smoking outcomes as well as how to deal with them in interventions. Thus, smoking-specific CHBs can promote appropriate interventions for adolescent smokers and better assist in smoking cessation.

ISSN 1512-1801

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