ORIGINAL ARTICLE

FACTOR STRUCTURE ANALYSIS OF SHORT SMOKING CONSEQUENCES QUESTIONNAIRE (SSCQ) IN UNIVERSITY STUDENTS

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ABSTRACT

Background: Following the accessibility of cigarettes to the public, the prevalence of smoking has risen in the population, especially among adolescents. In developing countries, 48% of males and 7% of females smoke. Factor analysis is a valuable technique for simplifying complex variables and is often used in the development of clinical assessment instruments.

Objective: This study holds the objective to analyze the factor structure of Short Smoking Consequence Questionnaire (SSCQ) among Pakistani adolescent population.

Methods: A Cross-sectional Study at University of Punjab. June 2016 to October 2017.SSCQ was used to assess outcome expectancies among 255 university students. Confidentiality was prioritized and privacy was given while they answered the Questionnaire. The confirmatory factor analysis was done for all the four latent variables using software AMOS plug-in for SPSS Ver: 21.0. Graphics and model Fit was evaluated by using reference guide Adapted from Bentler (1990) for GFI, CMIN, df, CFI, NNFI, and RMSEA with LO HI 90% confidence interval.

Results: Factor analysis showed a Chi-square /df (CMIN/DF) is < 3, quite below the upper threshold of 5.00 with a significant p value showing a poor fit of model due to large sample size. Good of fit index (GFI) .833 and Adjusted Good of fit index (AGFI) .789 were tolerable.

Conclusion: The study concluded that S-SCQ is a legitimate tool and it can be useful in assessing the expected outcome of smoking among the youth of Pakistan, with a tolerable Good of fit index (GFI) and Adjusted Good of fit index (AGFI).

Key Words: Factor Structure Analysis, FCA, smoking consequences, SSCQ, University students, smoking.

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INTRODUCTION

In recent years the prevalence of cigarette smoking in the society tremendously increased due availability and access of cigarettes to the general public. According to this research, among 18–25-year-olds who smoke world-wide, the prevalence for males and females is 36% and 9%, respectively.[1,2]

Substance use outcome expectancies play a crucial role in the process of substance abuse.[3] As described in the addictive behavior models based on social learning theories it is hypothesized that these outcome expectancies are related to abuse of substance and they complement other confounding factors like personality traits, emotional condition and behavior regarding drug use.[4] Drug outcome expectancies are conceptualized as an individual's perceptions of both the positive and negative outcomes associated with experimenting with a specific drug. These

outcome expectancies are usually built in as significant hypothetical models for addiction and have significant motivational influences for drug use.[5]

Though many researches on outcome expectancies for smoking have been done mostly on college or among university students, but very few studies have highlighted the importance of ethnic or racial dissimilarities in smoking incidence and their ways of smoking, behavior regarding cessation and health outcome among these groups.[6-9]. The Smoking Consequences Questionnaire (SCQ) evaluates both desirability and probability for all the four smoking outcome expectancies. The probability assessment was more significant than desirability rating in differentiating different subgroups of smokers and results from different studies have shown that the positive expectancies were well differentiated. Subsequent studies have examined the internal coherence of Smoking Consequences Questionnaire in adults .[10]

This research was intended to analyze the Factor Structure analysis of Short Smoking Consequence Questionnaire (SSCQ) among Pakistani adolescent population who were smokers and or ex-smokers studying at university level. This study was focused on graduate medical students who represent an adolescent population that have a congenial environment of university and had opportunity to interact in a wide variety of ways.

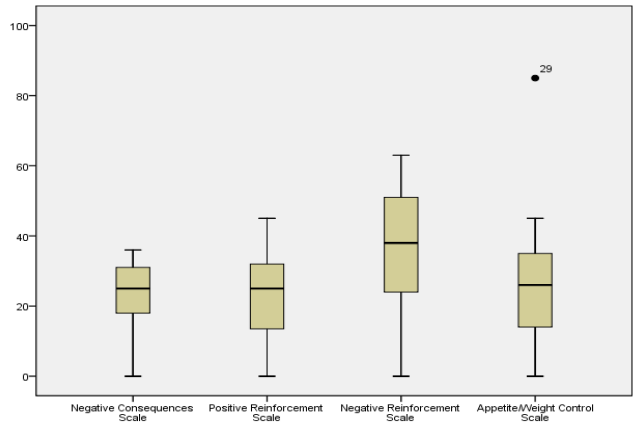
RESULTS

A total of 255 individuals participated in the S-SCQ survey. The respondents had an average age of 20.59 ± 1.85 years, with their ages ranging between 18 and 24 years. The sample comprised predominantly male participants (90.2%), while females accounted for 9.8% (Graph 1). The mean smoking duration among participants was 3± 1.99 years, with a minimum of 6 months and a maximum of 10 years. The majority (79.2%) reported smoking for less than 5 years, while 20.8% had smoked for a duration of 5 to 10 years (Table 1).

Table no: 1 Demographics and smoking history of respondents (n=255)

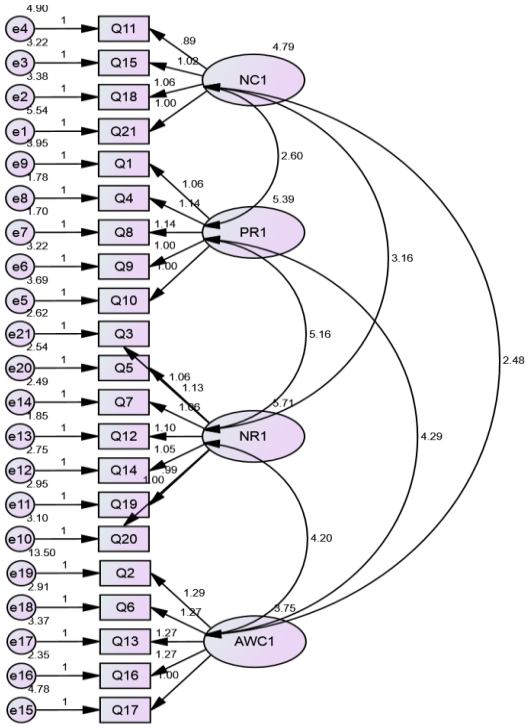
Variable	Freq.	Percent	Mean ± SD
Age			
18 - 21 years	167	65.5	Mean =20.522 SD =± 1.85454
21 - 24 years	88	34.5	
Gender			
Male	230	90.2	
Female	25	9.8	
Smoking status			
Smoker	218	85.5	Mean = 3.0176 years SSD =±1.99524
Ex-Smoker	37	14.5	
Duration of smoking			
< 5 years	202	79.2	
5 - 10 years	53	20.8	

The four-factor reliability analysis revealed a mean score of 23.43 (SD ± 9.64) for the Negative Consequences (NC) scale. Mean Score of Positive Reinforcement scale was 23.07 ± 12.94, while the Negative Reinforcement scale recorded a mean score of 35.84 ± 18.20. For the Appetite and Weight Control scale, the mean score was 12.93 ± 9. (Graph 1).



Graph no: 1 Box Plot: Four factors of Short Smoking Consequences Questionnaire (SSCQ)

Factors	Negative Consequences (NC)	Positive Reinforcement (PR)	Negative Reinforcement (NR)	Appetite/Weight Control (AWC)
Mean	23.43	23.07	35.84	24.48
Std. Deviation	9.638	12.937	18.197	12.934



Graph no: 2 Confirmatory Factor Analyses for SSCQ

Table no: 2.1 Model Fit Statistics

Model	NPAR	CMIN	DF	P	CMIN/DF
Default Model	48	521.447	183	.00	2.849
Saturated Model	231	.000	0		
Independence Model	21	4596.999	210	.00	21.890

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.403	.833	.789	.660
Saturated model	.000	1.000		
Independence model	4.848	.142	.056	.129

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.887	.870	.923	.911	.923
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.871	.773	.804
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table no: 2.2 Model Fit Statistics:

NCP

Model	NCP	LO 90	HI 90
Default model	338.447	274.016	410.519
Saturated model	.000	.000	.000
Independence model	4386.999	4170.053	4611.203

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.053	1.332	1.079	1.616
Saturated model	.000	.000	.000	.000
Independence model	18.098	17.272	16.418	18.154

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.085	.077	.094	.000
Independence model	.287	.280	.294	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	617.447	626.550	787.428	835.428
Saturated model	462.000	505.810	1280.032	1511.032
Independence model	4638.999	4642.982	4713.366	4734.366

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.431	2.177	2.715	2.467
Saturated model	1.819	1.819	1.819	1.991
Independence model	18.264	17.410	19.146	18.279

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	106	113
Independence model	14	15

Model fitting summary: Graph 2 and Table demonstrate strong factor loadings across all variables, reflecting high covariance between the factors. In the confirmatory factor analysis (CFA) diagram, the amount change in the dependent variable (Y) for a one standard deviation change in the independent variable (X) shown by standardized regression coefficients where the observed covariances were 5.16 between the Positive Reinforcement (PR) and Negative Reinforcement (NR) scales, 4.20 between the PR scale and Appetite and Weight Control (AWC) scale, and 3.16 between the Negative Consequences (NC) and NR scales.

The Chi-square/df ratio (CMIN/DF) was below 3, which is well within the acceptable threshold of 5.00. However, despite a significant p-value, the model's overall fit is considered poor, likely due to the large sample size. The Goodness of Fit Index (GFI) was 0.833, and the Adjusted Goodness of Fit Index (AGFI) was 0.789, both of which are within tolerable limits.

The model's absolute fit was further compared to that of the Independence model using the Tucker-Lewis Index (TLI = 0.911) and Comparative Fit Index (CFI = 0.923). These indices indicate a significant discrepancy, with higher values reflecting a better fit, as detailed in Table 2 (Model Fit Statistics).

The Root Mean Square Error of Approximation (RMSEA), which represents the standard deviation of residuals or the average difference between predicted and observed values, was 0.085. While an acceptable RMSEA value is typically below 0.05, the 90% confidence interval for RMSEA in this study ranged from 0.077 to 0.094, indicating a moderate model fit. The p-close value was not acceptable, further supporting this interpretation.

The significant chi-square (χ^2) statistic suggests rejection of the null hypothesis for a good model fit. Similarly, the RMSEA values reinforce the notion that the model fit is uncertain, aligning with the chi-square results.

DISCUSSION

This study investigated the analysis of factor structure of the short form of the Smoking Consequences Questionnaire (SSCQ) in a cohort of young adolescents from a public sector university. Most of the previous studies on cigarette smoking perceptions have concentrated on beliefs, attitudes and the root causes of tobacco use, rather than on the expectancies linked to smoking.[11-13] A CFA analysis in this research revealed a good factorial invariance and model fit for all four

subscales of S-SCQ in both samples and each sample validation analysis showed that those scores of these four subscales were significantly related to factors that are related to smoking. This study also aims to provide an initial assessment of using this instrument to evaluate anticipated outcome in Pakistani adolescent smokers and ex-smokers.

In general, other researchers have confirmed that probability ratings have a more discriminative and predictive use.[12-14] These conclusions do implicate that that future researches might have an advantage by assessing the desirability and probability ratings and interaction between them while examining outcome expectancies for smoking. Also, in my study given that there was a relatively small predominant male samples and majority were current smokers these smoking outcome expectancies were not appraised for a gender difference and among heavy and light smokers which in my opinion is an important concern that should be explored in future researches for validity and reliability of this S-SCQ. The findings in my study are validated by other studies from a CFA of this instrument subscale among young adults those who were heavily smoking.[9,11,14,15]

In this study confirmatory factor analysis (CFA) was conducted by using AMOS pug-in for SPSS ver: 21.0. The maximum likelihood estimates and model fitting was examined by analyzing CFI and TLI as proposed by Hu & Bentler (1999) given below.

Model fitting reference guide Adapted from Bentler (1990).

Measure	Threshold
Chi-square/df (cmin/df)	< 3 good; < 5 sometimes permissible
p-value for the model	> .05
CFI	> .95 great; > .90 traditional; > .80 sometimes permissible
GFI	> .95
AGFI	> .80
SRMR	< .09
RMSEA	< .05 good; .05 - .10 moderate; > .10 bad
PCLOSE	> .05

In my study TLI and CFI values were .911 and .923 which are considered as indication of a good model fitting.[17] The Good of fit index (GFI) .833 and Adjusted Good of fit index (AGFI) .789 were tolerable.

There is general agreement that while performing CFA an appropriate sample sizes should be around 100 that is focusing on a ratio of 4-5:1 for subject and variables.[17,18] The uncertainties in my model fitting due to RMSEA of .085 and Chi-square /df (CMIN/DF) is < 3, quite below the upper threshold of 5.00 with a *p* value which is significant in my study might be due to a large sample size of 255 subjects.

Additional researches on the measurement of smoking and illicit substance use, with larger and more diverse samples of both genders among young adolescents, are necessary to determine the measurement properties of the S-SCQ. Additionally, an evaluation of the test-retest reliability of the short version of Smoking Consequences Questionnaire (S-SCQ) should be performed in the Pakistani population. This is the first study done in Pakistan that analyzed the short version of Smoking Consequence Questionnaire (S-SCQ) among adolescent university students for which smoking related researches are being recently carried but to my knowledge no study has yet been done so far measuring outcome expectancies for cigarette smoking among university students.

CONCLUSION

The study concluded that the S-SCQ is an effective tool for evaluating the anticipated smoking outcome in Pakistan's young adolescents. with a tolerable Good of fit index (GFI) and Adjusted Good of fit index (AGFI). This version of Smoking Consequence Questionnaire (S-SCQ) for anticipated smoking outcome can be useful in future studies for evaluating the outcome expectancies for smoking and other illicit drug use in other subgroups among Pakistani populations.

The findings of this study are confined to university students who are current or ex-smokers, with an emphasis on the expected outcomes of smoking among current smokers, and only a small number of ex-smokers. In this study we analyzed factor structure evaluation of the instrument. Test-retest reliability using repeated measures was not included, and model fitting analysis was not conducted to enhance the model's fit.

ETHICAL APPROVAL

Ethical approval was granted by the Departmental Doctoral Program Committee of the Punjab University.

CONFLICT OF INTEREST:

Authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

MAQ: Concept, design, literature Review, Data Collection and Analysis, Discussion and conclusion
SA: Literature Review, Data Collection and results
MQ: Discussion writing and plagiarism correction
MA: Discussion writing, results compilation, references
MAT: Discussion writing, references
ALL AUTHORS: Approval of the final version of the manuscript to be published

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