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Validation study of the extended theory of reasoned action questionnaire for drug abuse prevention in adolescents

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Abstract

The aim of this study was to design and assess the validity and reliability of a questionnaire for drug abuse avoidance in Iranian male adolescents based on the theory of reasoned action. A sample of adolescents (n = 433) completed the survey instrument. The instrument was validated using content validity and construct validity (Exploratory & confirmatory factor analysis). The reliability of the scale was assessed by two different methods: internal consistency and test-retest analysis. The results obtained from exploratory factory analysis showed that the questionnaire contained 4 factors (attitude toward behavior, subjective norms, intention and self-efficacy) that jointly accounted for 57% of variance observed. The results from confirmatory factor analysis showed good fit for the data. Reliability as assessed by Cornbach's alpha and intraclass correlation coefficient showed satisfactory results (Cronbach's alpha = 0.72 and ICC = 0.85). Overall the findings suggest that the Persian extended version of TRA scale is a valid measure and can be used in future studies.

Keywords: Abuse, Adolescent, Drug, Validity, Reliability

Introduction

Education is a principle method for the preventing addiction [1]. Research has shown that the most effective educational programs follow a theory-based approach derived from behavioral change models [2]. Several theories have been proposed about the role of beliefs held by adolescents and youth about the complications of occasional drug use, with assumptions that are based on such factors as adolescents' expectations and perceptions of drugs, personal attributes and relations with drug-using peers. These factors can influence adolescents' cognition and the evaluations and decisions they make about drugs [3]. Among theories based on these perspectives and potentially effective in changing drug abuse behaviors in adolescents is the Theory of Reasoned Action (TRA), which is a widely used and highly efficient belief-based theory [4].

Presupposing that people's actions are completely rational, this theory attempts to determine consistency factors responsible for the compatibility of the attitude-behavior relationship. It thus proposes that the best predictor of behavior is the individual's

intention to perform that behavior [3].

In this theory, Icek Ajzen & Martin Fishbein emphasize the relationship between awareness and attitude and also the relationship between awareness and behavior through attitude. This theory has two hypotheses:

• Most human behaviors are under his voluntary control, which can be predicted through his words, if intentional.

• Human actions are rational because human being contemplates the consequences of his actions with the information that is available to him before performing them.

This theory represents current theories for predicting behavioral intentions and personal decisions made about performing or not performing certain behaviors. This theory is capable of accurately predicting voluntary health behaviors and shows the essential aspects of decision-making in health decisions and behaviors. The theory of reasoned action predicts the intention to perform certain behaviors in a recognized state. This theory can explain any behavior that is under the individual's control. It presupposes that intention directly determines behavior while all other factors affect behavior indirectly. The power of the individual's intention to perform certain behaviors is resulted from two factors –attitude toward behavior and subjective norms.

The theory of reasoned action is based on the following constructs:

1- Attitude toward behavior: Positive or negative evaluation of a behavior, incorporating two factors –behavioral beliefs (BB) and Outcome evaluations of a behavior (OEB) [4].

2- Subjective norms: Presuming that people's behaviors are influenced by various individuals in the community, such as the father, the mother, the spouse, religious leaders, etc., this construct incorporates two factors as well –normative beliefs(NB) and Motivation to comply(MC) [4].

3- Behavioral intention: Individual's decision and will to perform a certain behavior.

4- Behavior

This theory successfully predicts those behaviors that are fully under the individual's voluntary control, but performs poorly in relation to behaviors not under his full voluntary control [5-8]. Thus, to cover and affect such behaviors, the theorists invented the Theory of Planned Behavior (TPB) by adding a control construct, i.e. perceived behavioral control (PBC).

However, from the very first days PBC was proposed, some degree of ambiguity emerged between this construct and the self-efficacy (SE) construct that plays the main role in Bandura's Social Cognitive Theory (SCT) [10]. As the pioneer of TPB, Ajzen believes that no difference exists between perceived behavioral control and self-efficacy [9]. In his social cognitive theory, Bandura defines self-efficacy as "people's belief about the ability to perform actions that affect influential life events" [9,11-13]. People with stronger senses approach difficult tasks as challenges to overcome. The stronger these beliefs are, the easier will people pursue the more difficult tasks. These definitions clearly reveal the degree of overlap between these two constructs. Both constructs are concerned with control, perceiving the difficulty or easiness of a certain behavior (PBC) and the belief that one is capable of performing it (SE) [9]. Meanwhile, various studies have demonstrated that, in some cases, Bandura's concept of self-efficacy predicts intention and behavior better than perceived behavioral control [12]. Therefore, given the lack of a tool for evaluating interventions based on the expanded version of the theory of reasoned action (derived from combining this theory with the self-efficacy construct) for drug abuse prevention in adolescents, the researchers designed the aforementioned questionnaire and examined its validity and reliability.

It should be noted that the most crucial part of studies on behavioral change has been the development of a suitable tool for the examination and assessment of studied variables; to reduce errors of measurement, major actions should be taken such as the designing of a suitable tool and its standardization [14]. Therefore, considering that the validity test (determining a tool's ability to assess variables under study) is among the

main features of any questionnaire [15], and also given that the most essential step in determining the validity of any questionnaire is to determine the validity of its constructs (particularly in psychometrics) [16], the present study was conducted with the purpose of development, validity and reliability of the expanded theory of reasoned action questionnaire.

Method

The participant population of this cross-sectional study consisted of 433 male students aged 15 to 19 with a mean age of 16.8 and a standard deviation 0.721, randomly selected from 6 high schools of various districts of Tehran.

The expanded theory of reasoned action questionnaire: Using two guidelines for questionnaire design based on this theory (Jalilian 2004 and Ajzen 2006) [17,18], the questionnaire used for the present study was designed as follows:

- Designing 10 open-ended questions in the theory of reasoned action for extracting existing beliefs (according to guidelines) [17], and distributing them among 25 adolescents as suggested by Godin and Kok [19] so that, in ample time, they can express their beliefs about the advantages and disadvantages of drugs, their abstractions of external sources such as father, mother, relatives, religious beliefs, etc. about drug use and the barriers against their drug use.
- Extracting beliefs expressed by the majority of adolescents, and designing questions for each construct according to guidelines and based on beliefs extracted by this majority. For calculating the scores, the sum total of the product of each belief and its weight were used for calculating the final scores of the constructs of attitude and subjective norms [20,21].
- Designing the self-efficacy questions using aforementioned guidelines and other available tools (including the drug use self-efficacy tool presented by Martin GQ [22].

Stages of assessing the questionnaire validity and reliability:

Questionnaire validity: Three methods were used for assessing the validity of this study –face validity, content validity (qualitative and quantitative) and construct validity (confirmatory factor analysis).

Face validity: First, the designed questionnaire was distributed among a few adolescents in the target population in order to be studied and commented on regarding matters such as "its ambiguity and difficulty for responding, repetitive nature, existence of irritating statements and terms and also the existence of contradictory responses making responding difficult". At this stage, the questionnaire was assessed by its target group in terms of its face validity, reasonability, suitability, desirability, logical sequence of the items, expressiveness, concision and comprehensiveness. The adolescents' comments were collected and necessary modifications were then made to the questionnaire.

Content validity: This was performed in two forms:

Qualitative content validity: A panel of several experts were invited for this purpose, who carefully examined the tool and submitted their revisions in writing format on matters including grammar adherence, use of appropriate words, proper sequence of items, proper scoring, time allocated for completion of tool and suitability of dimensions selected. The expert-recommended modifications were then made to the questionnaire in order to obtain a satisfactory validity.

Quantitative content validity or content validity ratio (CVR): After modifications were made, the questionnaire was distributed among 10 experts in health education, public health and psychology who were to score the items' level of necessity (item necessary, useful but unnecessary, and unnecessary). Next, the mean score of the questions pertaining to each construct and ultimately the overall mean score of constructs were taken into consideration for assessing the intended validity. Satisfactory values are presented in the standard indices specified in the Lawshe table (0.62 for 10 experts) [23].

Construct validity (Exploratory and confirmatory factor analysis): Exploratory and confirmatory factor analysis were used for

assessing construct validity.
The questionnaire reliability was assessed using the internal consistency and the retest method in LISREL-8.8 and SPSS-11.5, results of which are presented in the findings section.

Results

Following the implementation of modifications derived from the comments made by adolescents and then the experts with regard to face validity and qualitative content validity, the quantitative validity of the questionnaire was calculated for each construct through the CVR approach and based on the expert scorings. According to the scores submitted by the 10 experts, the questionnaire's mean CVR was larger than the satisfactory values according to standard indices specified in the Lawshe table for confirming content validity (table for 10 experts) (Table 1).
When performed the exploratory factor analysis (433 students completed the designed questionnaire), 18 items were loaded indicating a 4-factor solution for the questionnaire namely: attitude toward behavior (7 items), subjective norm (4 items), self-efficacy (5 items, and behavioral intention (2items) that jointly explained %57.399 of variance observed[KMO=0.866, & the Kruit-Bartlett's test (P<0.001, X2=2196.67)]. This finding revealed a relationship between variables; therefore, the "principal component analysis method" with a varimax rotation for defining subscales could be used and all the data for the statistical participant were entered in the factor analysis. Items with factor loadings of 0.15 or above comprised one factor (domain) and a "measure of special values" greater than 1 was applied (Table 2).
Results of the construct validity assessment (the confirmatory factor analysis) as per LISREL output are presented in table 2 (Figure 1). As per the data presented in this table, df/ x2 values lower than 5, RMSEA values lower than 0.1, SRMR values lower than 0.08 and finally satisfactory values for other fit indices including CFI, AGFI, NNFI and relatively satisfactory values for NFI and GFI indicate satisfactory values for confirming the model fit, in other words, for confirming construct validity (Tables 2 and 3 and Figure 1).
Using the internal consistency method for assessing reliability, for each construct and for all the items, this value was shown to exceed the standard value of 0.7 for confirming reliability of the tool (Table 1). Assessing reliability of the tool using the retest method also showed the correlation coefficient for each construct to be acceptable and significant in the two stages (Table 1). For the final questionnaire, the 4-point Likert items confirmed included 14 items on attitude (7 paired items including behavioral beliefs for the assessment of consequences), 8 on subjective norms (4 paired items including normative beliefs and compliance motivation), 2 on behavioral intention and 5 on self-efficacy.
Responses to all items were developed in a 5-point Likert scale with scores from 1 to 5 and consistent with objectives of the study. As approximated by the pilot study (the assessment of validity and reliability), 15 to 20 minutes were allocated to completing the questionnaire.

Table 1 *Reliability and content validity ratio*

Constructs	Reliability		Content validity ratio CVR
	Test-retest (Pearson`s coefficients)	Internal Consistency (Cronbach's alpha)	
Attitude toward behavior	0.78*	0.72	0.83
Subjective norms	0.87*	0.77	0.92
Behavioral intention	0.85*	0.85	0.75
Self-efficacy.	0.78*	0.81	0.90

*P ≤0/01

Table 2 *Exploratory factor analysis- EFA and confirmatory factor analysis-CFA.*

Factors	CFA	EFA			
	Factors loading	Factors loading			
		4	3	2	1
Intention 1	0.77	0.794	0.083	0.408	0.093
Intention 2	1	0.703	0.106	0.479	0.250
(OEB1 × 1 BB) Attitude 1	0.5	-0.033	0.681	0.195	0.061
(OEB2 × 2 BB) Attitude 2	0.23	0.520	0.205	-0.334	0.186
(OEB3 × 3 BB) Attitude 3	0.43	0.082	0.233	0.229	0.597
(OEB4 × 4 BB) Attitude 4	0.75	0.089	0.716	0.119	0.261
(OEB5 × 5 BB) Attitude 5	0.53	0.099	0.213	0.276	0.663
(OEB6 × 6 BB) Attitude 6	0.38	0.074	0.690	0.051	-0.032
(OEB7 × 7 BB) Attitude 6	0.59	-0.033	0.613	0.002	0.269
Subjective norm 1(NB1 × MC1)	0.72	0.163	0.113	0.257	0.698
Subjective norm 2(NB2 × MC2)	0.75	0.055	0.061	0.260	0.725
Subjective norm 3(NB3 × MC31)	0.72	0.064	0.065	0.115	0.756
Subjective norm 4(NB4 × MC4)	0.47	0.255	0.051	0.060	0.596
Self-efficacy 1	0.48	-0.030	0.108	0.420	0.547
Self-efficacy 2	0.58	0.119	0.090	0.567	0.364
Self-efficacy 3	0.61	-0.013	0.210	0.664	0.265
Self-efficacy 4	0.72	0.182	0.075	0.769	0.268
Self-efficacy 5	0.83	0.179	0.125	0.764	0.267
Total initial eigenvalues		1.109	1.320	1.604	6.299
Percentage of variance	-	6.161	7.335	8.909	34.994
Percentage Of Variance Explained		57.399			

All factor loadings are significant at $p \leq 0.01$

Table 3 *Fitness indexes in CAF*

Fitness indexes	Results	Recommended cut-off value
x^2/ df	1.96	; ≤3 or 5 ≤2
P– value	0.001	-
Root Mean Square Error of Approximation- RMSEA	0.07	≤ 0.05 ; ≤0.08 0r <1
Comparative Fit Index- CFI	0.94	≥0.90 ; ≥.8
Normed Fit Index- NFI	0.88	
Goodness of Fit Index- GFI	0.87	
Non Normed Fit Index- NNFI	0.93	
Standardized Root Mean Square Residual- SRMR	0.08	≤ 0.05 or 0.08

Table 4 *Factors correlations in CFA*

	1	2	3	4
1. Attitude toward behavior	1			
2. Subjective norms	0.484	1		
3. Self-efficacy.	0.503	0.633	1	
4. Behavioral intention	0.417	0.486	0.556	1

Discussion

The present study was conducted with the purpose of development, validity and reliability of the expanded theory of reasoned action for drug abuse prevention in adolescents. That is to say, the questionnaire used in this study was designed with one adjustment (replacing perceived behavioral control with the self-efficacy construct) in concordance with the theory of planned behavior, and results of the

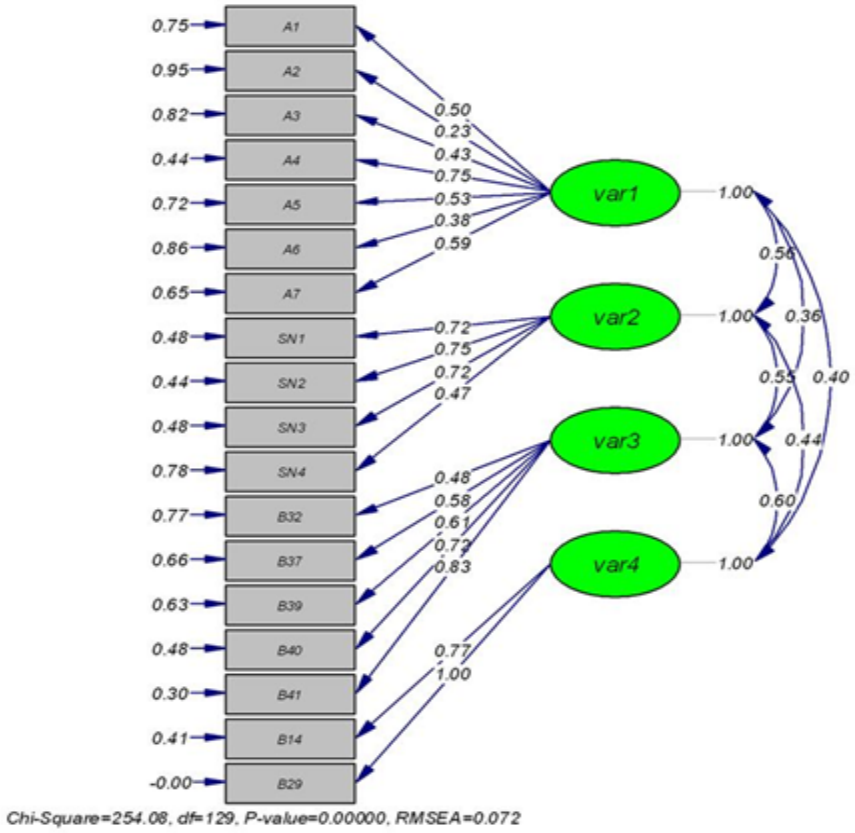

Figure 1 *Confirmatory actor analysis (model`s diagram)*

validity and reliability assessments demonstrated satisfactory qualitative validity once the suggested modifications were made. Moreover, the CVR value proved acceptable for every single item, calculated at 0.85 for the entire questionnaire thus indicating the quantitative validity of the questionnaire. Reliability of the questionnaire was confirmed using the internal consistency method for each construct (minimum 0.7) and by obtaining the satisfactory and significant correlation between the items in the test-retest stages. Results of the factor analysis (exploratory and confirmatory) also confirmed the satisfactory (construct) validity of the questionnaire. According to results obtained, the 29-item questionnaire designed based on the expanded theory of reasoned action has an acceptable validity and reliability and can be used in future studies. Finally, given that fairly all the stages of the validity and reliability assessment and confirmation were meticulously conducted, the questionnaire is reliable for use in interventions.

After assessing the face validity and the content validity of the questionnaire using qualitative methods and incorporating modifications proposed by respondents and experts, satisfactory quantitative validity (validity ratio) values were obtained for items of each construct and also for the overall mean of items, which confirmed the content validity of the questionnaire. In a study conducted by Karimi et al [24], the validity ratio of the items of the theory of planned behavior questionnaire was higher than the standard (56), given the number of experts.

The Cronbach's Alpha calculated confirmed the reliability of the tool used in this study. Cronbach's Alpha values above the standard for each construct and its items and also for the overall items indicated reliability of the tool in terms of its internal consistency. In the study conducted Karimi et al [24], Cronbach's Alpha values calculated for all items and constructs of the theory of planned behavior proved satisfactory (0.72 to 0.85). The coefficient of internal consistency of constructs of the theory of planned behavior calculated in other studies ranged from 0.74 to 0.93 in the study conducted by Fan et al [25], 0.68 to 0.89 in Buiko et al [26], 0.73 to 0.87 in Alamsioto [26] and 0.80 to 0.93 in Blue and Marro [28].

Furthermore, according to the test-retest method, the correlation of items and constructs in the two stages was satisfactory and significant, indicating stability of the tool.

In the study conducted by Karimi et al [24], the correlation of items in the two stages of retest was significant and at least 0.84. In the studies conducted by Buiko et al [26] and Mehri et al [29], this value was significant and ranged from 0.26 to 0.77 and 0.70 to 0.83, respectively.

Results of the construct validity assessment using the confirmatory factor analysis showed satisfactory fit indices and validity of the tool (Table 2).

In the study conducted by Karimi et al [24], results of the confirmatory factor analysis of the questionnaire were satisfactory, with df/X2=2.7, RMSEA=0.07, CFI=0.96, NFI=0.94 and GFI=0.92. In the study conducted by Fan et al [25], satisfactory fit indices were obtained for the theory of planned behavior questionnaire, with df/X2=1.56, RMSEA=0.051, CFI=0.94, NFI=0.93 and GFI=0.87).

Study limitations included the single-gender nature of the participant population due to cultural limitations (adolescent girls' not participating), failure to calculate the validity indicator in the assessment of the quantitative validity due to practical problems and shortage of time for repeats, and failure to conduct the confirmatory factor analysis for a different population to achieve greater reliability. It is therefore suggested for future studies to apply this questionnaire to adolescent girls as well and to also conduct the confirmatory factor analysis in a population other than the one in which the exploratory factor analysis is conducted. Conducting this study in other cities of Iran is also encouraged.

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Conclusion

According to results obtained, the designed questionnaire based on the expanded theory of reasoned action demonstrated satisfactory validity and reliability and can be easily used in future theory-based interventions.

Contributions

Study design: MT, ARH
Data analysis: MT, AAHM
Manuscript preparation: MT, AM

Conflict of interest

"The authors declare that they have no competing interests."

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