Metacognitive Beliefs and Students' Tendency toward Drug Abbuse and Cross-level Effect of School-Bounding

Somayeh Purehsan [1*], Mohammadreza Falsafinejad [1], Ali Delavar [1], Noorali Farokhi [1], Ahmad Borjali [2]

1. Department of Educational Evaluation and Measurement, Faculty of Psychology and Educattion, Allameh Tabataba'i University, Tehran, Iran.
2. Department of Clinical Psychology, Faculty of Psychology and Education, Allameh Tabataba'i University, Tehran, Iran.

ABSTRACT

Objective: The present research aimed to examine positive and negative beliefs about worry and tendency of students to drug abuse in terms of cross-level effect of school-bounding.

Methods: In this multi-level investigation, 1000 students of high schools were selected by means of multi-stage sampling technique. Then, they completed metacognitive questionnaire (MCQ), school-bounding and questionnaire of readiness for addiction scale (Wade & Butcher). The data were analyzed by cross-level analytical method.

Results: Findings showed that positive and negative metacognitive beliefs significantly affect students' tendency to drug abuse and the variable of school-bounding has direct and significant effect on students' tendency to drug abuse while it has indirect and significant effect on relationship among negative and positive beliefs about worry and tendency to drug abuse.

Conclusion: The results indicate the importance of taking multi-level approach toward tendency to drug abuse and addiction and using microlevel and macrolevel to define phenomenon of addiction and tendency to drug abuse.

1. Introduction

A Review on studies in the field of tendency to drug abuse indicates that all investigations have examined this phenomenon based on one-level analytical approach. In other words, tendency to drug abuse and its effective factors have always been explored only at microlevel or macrolevel and not as a multi-level phenomenon studied at both micro and macro levels. This study tends to analyze the effect of inefficient metacognitive beliefs of school-bounding elements on students' tendency towards drug abuse with multi-level approach and within the framework of a cross-level modeling.

Addiction is now one of the foremost problems, spread globally far beyond healthcare and medical borders and has been converted into a mental, social, and family problem. Drug abuse and other illegal uses of drugs by teens and youth are one of the paramount challenges and problems for public and mental-social health system that imposes many individual, social, healthcare, and economic damages to communities (Skiba, Monroe, & Wordarski, 2004).

In recent years, drug abuse is seen not only in adolescents but also in teenagers. In this regard, the studies have shown that illegal drug abuse has been increased

* **Corresponding Author:**
Somayeh Purehsan, PhD
Address: *Department of Educational Evaluation and Measurement, Faculty of Psychology and Educattion, Allameh Tabataba'i University, Tehran, Iran.*
E-mail: *amar.pejohesh@yahoo.com*

among students in some countries (Botvin, Dusenbury, Baker, James, & Oritz, 2008).

Due to our special geographic condition, young population, and some economic and social problems in our country (Iran), researchers have addressed drug abuse as an individual and social problem more dangerous than other risky behaviors. The results of a joint study by United Nations Office of Drug and Crime (UNODC) and Rehabilitation Organization during two periods in 1998 and 2009 under the title of "fast evaluation of addiction status in Iran", signify the presence of young drug abusers in Iran (Khademi Eshkezari, 2012).

Metacognition is a multi-factor concept, composed of knowledge, processes, and strategies, which evaluate, monitor, and control cognition. In fact, most of the cognitive activities depend on metacognitive factors, which monitor and control these activities (Irak & Tosun, 2008; Spada, Mohiyeddini, & Wells, 2008; Sica, Stekke, Ghisi, Chiri, & Fraces Chini, 2007).

Metacognition is what we notice and accept in our consciousness. It forms the evaluations and all types of strategies we take to regulate our thoughts and emotions (Wells, 2009). In recent years, several studies have been conducted on the role of metacognitive beliefs regarding drug-dependence by Wells et al.; While before then, the studies were focused on the cognitive intervening factors.

However, with the presentation of Wells' metacognitive theory (theory of Self-Regulatory Executive-Function, S-REF), the results of the new studies suggested a relationship between metacognitive beliefs and drug-dependence (Wells, 2009). In an investigation carried out by Spada, Nikcevic, Giovanni, and Wells (2007) on 140 drug-dependent persons, the results indicated a relationship between 3 metacognitive concepts with drug-dependence. These metacognitive concepts are positive metacognitive beliefs about worry, negative metacognitive beliefs (about uncontrollability and risk), and beliefs in low cognitive ability. Hence, the metacognitive concepts may associate with drug-dependence disorder.

In another study, Spada, Zandvoort, and Wells (2007) compared the metacognitive beliefs in a group of alcoholic-dependent persons (problem drinkers) with normal people. The results of their investigation showed that the drunkard significantly acquired higher scores in 5 metacognitive factors compared to normal people. Similarly, logistic regression[1] analyses revealed that the metacog-

1. This technique is similar to diagnostic analysis from noticeable aspects and the main goal of these two techniques is to predict membership in class and identifying new hybrid factor.

nitive factors contributed significantly in prediction of cases of drinking than negative emotions (anxiety and depression). Also, the results of this analysis showed that among metacognitive factors, variables of beliefs in low cognitive ability as well as beliefs in necessity for control of thinking were strong and significant predictors for drinking and these 2 factors could predict independently the membership in this class (as drunkard) more than negative emotions. Of note, this investigation was the first one that empirically proved the drunkard's higher scores in some metacognitive dimensions compared to the general population.

Spada and Wells (2006) analyzed positive and negative metacognitive beliefs in 10 alcoholics. In this study, specific choices (instead of general metacognitive beliefs) were designed to explore metacognitive beliefs about drinking (MCQ-30). Also in this scale, the relevant positive and negative metacognitive beliefs were proposed about drinking. Based on the study results, problematic drunkard people might have the related positive and negative metacognitive beliefs in alcohol use. These findings were in line and support theory and metacognitive S-REF model (Wells & Matthews, 1994). At the same time, these findings were consistent with previous findings which dealt with identifying the positive and negative metacognitive beliefs and other disorders (e.g. pervasive anxiety order and depression major disorder).

Later, Spada, and Wells (2008) conducted a comprehensive investigation that comprised 4 studies per se. This investigation was mainly aimed at creating a clinical tool for evaluation of positive and negative metacognitive beliefs about alcohol. In their first study, they designed 2 scales about positive and negative metacognitive beliefs in relation with alcohol-dependence i.e. NAMS and PAMS (negative alcohol metacognitive scale and positive metacognitive scale, respectively). Then, they conducted the primary factor analysis on them in their second and third studies.

Finally, they explored the validity of predictor and reliability of scales and in the fourth study. They analyzed reliability and accuracy of classification of scales in a clinical setting. The results of this survey showed that metacognitive beliefs were strongly and significantly related to alcohol-dependence and regardless of negative emotions (anxiety and depression), the metacognitive factors were assumed as independent and significant predictors in alcohol-dependence. This finding supports the role of metacognitive beliefs in drug-dependence (including alcohol).

In recent years, the researchers in the field of educational psychology have focused on factors in school setting, which are related to positive educational outcomes and mental health of the students. The school may also play an important role in occurrence of anti-social behavior. Thompson, Lachan, Overpeck, Ross, and Gross (2006) defined the school-bounding as the measure of students' satisfaction with their presence at school.

In definition of "Wingspread Declaration on School Connections", which is more acceptable than other definitions, it is assumed that the school-bounding with students' beliefs in that the adolescents in school pay attention to the student and prepare the ground for their learning and respect for them as a human (Blum & Libbey, 2004).

According to theory of social control, school-bounding implicates that the weak social links among teenagers may lead to hostility, delinquency, drug abuse, and so on (Dixon, 2007). All conducted studies emphasize that the school-bounding may predict many educational, psychological, behavioral, and social outcomes in students. Most studies suggest the school-bounding will reduce risky behaviors, including drug abuse (Battistich & Hom, 1997; McPartland & Mcdill, 1977; and Hawkins et al., 2001).

According to a research carried out by Moeini and Allahverdipoor (2010) on students with background of school-truancy, these students are further smoking than students who do not encounter this problem. In the study of Aminian and Seyed Mirzaee (2010), a negative and significant relationship was seen between female students' tendency to addiction of drugs and their response to social need and opportunity at school. The review of studies in the field of addiction and drug abuse has shown that in all these surveys, this phenomenon has been examined according to one-level conventional approach. In other words, tendency to addiction and its effective factors have been always studied at individual level and not as a multi-level phenomenon both at micro and macro levels.

This study aimed to analyze the effects of positive and negative beliefs about worry in inefficient metacognitive beliefs and school-bounding on students' tendency to drug abuse by taking a multi-level approach and within a cross-level model. Based on the conducted studies, 2 variables (positive beliefs about worry and negative beliefs about uncontrollability and risk) affect addiction and persons' tendency toward drug abuse more than other metacognitive variables. These 2 metacognitive variables were considered in this investigation. Based on the evidence about relationship of inefficient metacogni-

tive beliefs and school-bounding with students' tendency to drug abuse and considering 2 theoretical levels in this study (students' and school's levels), the following cross-level model is proposed to define the relationship between research variables.

The research hypotheses are proposed according to the presented model as follows:

Hypotheses at students' level

H1: The positive beliefs about worry affect students' tendency to drug abuse.

H2: The negative beliefs about worry affect students' tendency to drug abuse.

Cross-level hypotheses

H3: School bounding affects students' tendency to drug abuse.

H4: School bounding affects the relationship between positive beliefs about worry and students' tendency to drug abuse.

H5: School bounding affects relationship between negative beliefs about worry and students' tendency to drug abuse.

2. Methods

The present study is intended to define the causal intergroup relations of variables; therefore, it is an applied study in terms of goal and a correlation study based on regressive analysis in terms of data collection. Similarly, as the effect of one variable at school level is examined on a dependent variable at individual level as well as the relationship among independent variables at individual level with dependent variable, the approach of this study is of multi-level type and based on cross-level model.

The study population includes high school second graders, at Kerman Province, Iran during academic year 2013-14. The sample size comprised 1000 participants, who were chosen from 24 high schools and 6 cities through clustering sampling technique. To analyze the data, multi-level analysis and linear multivariate regression were adapted. Analysis of multi-level hypotheses requires 3 basic conditions. If these conditions are met, the multi-level hypotheses can be tested.

1) Intraclass correlation: The intraclass correlation is the ratio of intergroup variance to total variance (sum of intergroup and intragroup variances) for dependent vari-

able at individual level. In other words, intraclass correlation indicates how much the variance of a dependent variable at individual level is determined by its membership in the group and caused by difference among groups. If the intraclass correlation is smaller than 0.05, it is impossible to conduct multi-level analyses (Klien, Katherine, Kozlowski, & Steve, 2000).

2) Difference among unit-level variables (Higher than individual level): The probability of difference among mean value of unit-level variables (variable of school-bounding in this research) should be examined in multi-level analyses among units. So in the absence of any difference, no one can explore the phenomenon by them. As a result, any unit-level variable, which its mean has no significant difference in these units, may not be included in multi-level study. Thus, the including hypotheses will not be testable. The significance of difference among mean variables within several groups can be explored by ANOVA (Klien, Katherine, Kozlowski, & Steve, 2000).

3) Within group agreement: The unit-level variables should be estimated before conducting multi-level analyses. If unit-level variables are of the same kind with common features, the level of their origin is placed at individual level. In other words, data should be collected from individual level and then aggregated at unit-level, but this addition is logical when the individuals have agreed in evaluation of the given variable and they have no high variance. Namely, the intergroup agreement should be at high level (low intragroup variance) in unit-level variables. The most prevalent parameter is the intergroup evaluation for Likert RWG scales (Klien, Katherine, Kozlowski, & Steve, 2000).

The cross-level models are analyzed by means of hierarchical linear modeling technique that is done in 2 phases: The intercepts-as-outcomes model and slops-as-outcomes model (Klien, Katherine, Kozlowski, & Steve, 2000).

1) Intercepts-as-outcomes model: At this step, direct effect of unit-level variables on the variable of individual level is examined. This effect is explored through regression of the fixed figure in regression equation at individual level to unit-level variable. In fact, in this model, the fixed figure of equation is assumed as regression of the variables at individual level as an dependent variable (outcome) and unit-level variables as independent variables (Klien, Katherine, Kozlowski, & Steve, 2000).

2) Slopes-as-outcomes model: The adjustment effect of unit-level variables on the relationship among independent and dependent variables at individual level may be examined by regression of slope in regressive equation at individual level to unit-level variables. In fact, this model is a well-known slopes-as-outcomes model. Slope or coefficient of regression for variables at individual level is considered as dependent variable (outcome) and also unit-level variables are assumed as independent variables for that coefficient (Klien, Katherine, Kozlowski, & Steve, 2000).

Metacognitive Questionnaire (MCQ-30): This scale is composed of several metacognitive parameters, some of them are pivotal in metacognitive model of mental disorders. This questionnaire has been designed based on S-REF Model (Wells & Mathews, 1996) and includes 30 items with 5 micro scales and its choices are scored by 4-point Likert-type scale (4=total agreed to 1=totally disagreed). In fact, this scale is MCQ short form (65-item form, Cartwright-Hatton & Wells, 1997). This questionnaire was designed to measure individual differences regarding positive and negative beliefs about worry and intrusive thoughts.

The metacognitive supervision and judgment about cognitive efficiency is the other reason for designing this questionnaire. It seems that this scale is reasonably reliable and valid (Cartwright-Hatton & Wells, 1997; Wells & Paparegeorgio, 1998; Wells & Cortez 2000, quoted from Wells, 2000). This scale was implemented on 182 students to examine its validity and reliability.

The rates of internal consistency for total scale were reported as 0.93 and for subscales of cognitive trust, positive beliefs, cognitive self awareness, negative beliefs, and need to control of thought as 0.93, 0.92, 0.90, 0.91, and 0.72, respectively. The correlation of total scale with Penn State Worry questionnaire (PSWQ) and anxiety trait were respectively reported as 0.54 and 0.53, and correlation of subscales with the aforementioned scales was within 0.73-0.25 range. Reliability of retest for total scale within 4 weeks interval was reported as 0.75 and reliability of 5 subscales was reported within 0.59-0.87 range. These values signify the acceptable validity and reliability of the scale to measure metacognitive beliefs (Wells & Cartwright-Hatton, 2004).

The psychometric traits of this scale were also examined in an Iranian sample (Shirinzadeh, 2008). In the study of Shirinzadeh, factor structure of MCQ-30 was acquired based on exploratory factor analysis and analysis on main elements through varimax rotation method. In this regard, a sample of 250 participants was recruited for conducting factor analysis and the same 5 factors were identified in this study as well. To analyze

synchronous reliability, 2 questionnaires of MCQ-30 and Spillberger's anxiety-trait were employed at the same time in which the correlation value of metacognitive scale with Spillberger's anxiety-trait questionnaire was found as 0.45. The Cronbach α test and the resultant data from 250 study samples were used to determine reliability of MCQ-30 questionnaire using internal consistency method. The coefficients of internal consistency were derived 0.91 for total scale and 0.71-0.87 for the subscales. These figures suggested the favorable reliability of total scale and its subscales. A total of 50 respondents of sample were voluntarily chosen and tested 2 times within 4 weeks to determine reliability of MCQ-30 retest. Total value of coefficients was derived as 0.73 and this value was obtained for subscales of uncontrollability and risk (0.59), positive beliefs (0.83), cognitive self-awareness (0.81), low cognitive ability (confidence) (0.64), and necessity for controlling thought (0.65). On the whole, the resultant reliability coefficients indicate the favorable reliability of MCQ-30 and its subscales (Shirinzadeh, 2008) and also the reliability coefficient was derived as 0.82 with Cronbach α test.

Questionnaire of School Bounding: This inventory was designed by Panaghi et al. (2010) to examine the connectedness of students with the school and includes 21 questions. The answers are scored within 5-point Likert-type scale that ranges from score 1 (very low) to score 5 (very high) while questions numbers 7, 16, 17, and 18 are scored reversely. In this scale, the high score indicates the least connectedness between students and school. This scale is composed of 4 factors of belonging (attachment), obligation, commitment, and relations with coevals in the school. This questionnaire possesses the appropriate face validity, content validity, and the construct validity to measure the relations between students and the school. The internal consistency technique and calculation of the Cronbach α were employed to obtain reliability value of this scale. The coefficients of Cronbach α were calculated for total questionnaire (0.84), variables of attachment (0.83), obligation (0.81), commitment (0.58), and relations with coevals (0.50) and at the same time the reliability coefficient was obtained as 0.80 by means of the Cronbach α test.

Readiness for addiction scale: The readiness for addiction scale was designed by Wade and Butcher (1992) and several efforts have been made to determine its validity in Iran. This inventory is similar to Iranian addiction potential scale that was designed with respect to the psychosocial conditions in Iranian community by Zargar (2006) (as cited in Zargar, Najarian & Naami, 2008).

This questionnaire is composed of 2 factors and 36 articles plus a polygraph. Any question is scored on a continuum (appendix) ranged from 0 (totally disagreed) to 4 (totally agreed). Two methods were adapted to compute validity of this scale. The questionnaire of readiness for addiction has distinguished well 2 groups of addicted and non-addicted persons in criterion validity. The construct validity has been calculated by its correlation with 25-item Syndrome Clinical List (SCL-25) scale as 0.45 (a significant value). The reliability of this scale was computed 0.90 by the Cronbach α at favorable level (ibid). The reliability coefficient was derived 0.79 by the Cronbach α technique in the present research.

3. Results

Descriptive data

The data in this survey were collected from 1000 students (493 males and 507 females) who studied in 24 high schools in 6 cities of Kerman Province (169 students from Kerman; 163 from Bardsir; 172 from Shahrebabak; 169 from Baft; 168 from Sirjan; and 159 from Zarand). These students were studying in the first, second, third, and fourth grades of high schools (secondary units) with 219, 236, 417, and 128 students in each grade, respectively.
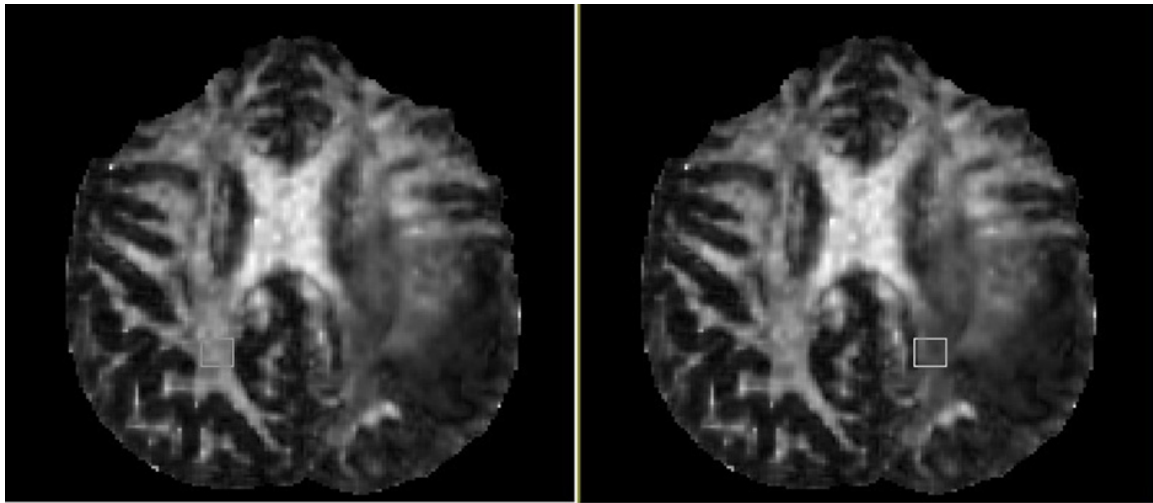
Test of Hypotheses at students' level

The students' level has two independent variables and one dependent variable. To test the hypotheses, multivariate regression analysis was utilized. The results of the analysis are shown in the following Tables:

Tables 1 and 2 indicate that the fix number of equation and negative beliefs and positive beliefs about worry are significant at 99% level of confidence. Thus, Hypotheses 1 and 2 are confirmed.

Prerequisites for conducting multi-level analysis

In this study, the intraclass correlation is equivalent to the rate of variance in the variable of students' tendency to drug abuse that is derived from difference among groups (schools). The intraclass correlation of tendency to addiction was obtained 0.39 (greater than 0.05). As a result, it is possible to conduct multi-level analysis. The results of ANOVA showed that mean value of school-bounding had significant differences among 24 schools.

Thus, variable of school-bounding can enter into the multi-level analysis and its hypotheses could be tested. Similarly, the variable of school-bounding in this study

Figure 1. The research hypotheses are proposed according to the presented model as follows.

is a type of common variables since the needed data have been collected from students' level for measurement. The index of intergroup agreement was obtained 0.80 for the variable of school-bounding, i.e. this variable is appropriately convergent in the schools and is testable.

Test of cross-level hypotheses

The regression equations derived for testing the fixed numbers detailed model as outcomes in this investigation are as follows:

Level-One Model

$Y=B0+B1\times(positive\ beliefs\ about\ worry)+B2\times(negative\ beliefs\ about\ worry)+R$

Level-Two Model

$B0=G00+G01\times(school\ bounding)+U0$

$B1=G10$

$B2=G20$

The unit-level model is a model that has been already verified according to the results of testing hypotheses at students' level. Based on this model, 2 variables of negative and positive beliefs for worry at students' level affect students' tendency to drug abuse. The level-two model includes this hypothesis that tendency to drug abuse is directly affected by the variable of school-bounding at school level. The results of computations of fixed-number model have been summarized as outcomes by HLM software in Table 3.

Table 1. ANOVA test results.

Sources of variance	Sum of squares	Degree of freedom	Mean squares	F	Sig. level
Regression	59379.539				0.000
Residue	370891	997	29689.770		
Total	430279.9	999	372.007		

Table 2. Coefficient values.

Coefficients	Non-standard		Standard coefficients	T-statistic	Sig. level
	Beta coefficient	Error	Beta coefficient		
Fixed coefficient	26.884	3.039		8.846	0.000
Negative beliefs	0.449	0.123	0.110	3.674	0.000
Positive beliefs	1.676	0.154	0.329	10.881	0.000

Table 3. The results of fixed numbers model as outcomes.

Fixed effects	Coefficients	Standard error	T-statistic	Degrees of freedom	Sig. level
B0 for fixed number 1					
G00 fixed number 2	122.5652	11.51008	10.649	22	0.000
G01-school bounding	-1.251521	0.166628	-7.511	22	0.000
B1 slope for negative belief					0.000
G10 fixed number 2	0.706623	0.095281	7.416	996	0.000
B2 slope for positive belief					0.000
G20 fixed number 2	0.328037	0.1342209	2.444	996	0.015

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Table 4. The results of slopes-as-outcomes model.

Fixed effects	Coefficients	Standard error	T-statistic	Degrees of freedom	Sig. level
B0 for fixed number 1					
G00 fixed number 2	193.47668	22.499560	8.599	22	0.000
G01 school- bounding	-2.316926	0.323027	-7.173	22	0.000
B1 slope for negative belief					
G10 fixed number 2	-0.791557	0.484609	-1.633	994	0.102
G11 school- bounding	0.023325	0.007937	2.939	994	0.004
B2 slope for positive belief					
G20 fixed number 2	-1.872163	0.972664	-1.925	994	0.054
G21 school- bounding	0.032271	0.015130	2.133	994	0.033

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In Table 3, coefficient G01 indicates the negative and significant effect of school-bounding on students' tendency towards drug abuse (P<0.01). As a result, H3 cross-level hypothesis is approved.

The regressive equations for testing slopes-as-outcomes model are given in this research, as follows:

Level-One Model

Y=BO+B1×(positive beliefs about worry)+B2×(negative beliefs about worry) + R

Level-Two Model

B0=G00+G01×(school bounding)+U0

B1=G10+G11×(school bounding)

B2=G20+G21×(school bounding)

Level-one model is the model, which has already been confirmed according to results testing hypotheses at individual level. Level-two model includes the hypotheses in which the variable of school-bounding affects the relationship between positive beliefs about worry and tendency to drug abuse as well as relationship among negative beliefs about worry and students' tendency to drug abuse.

As we observe in Table 4, coefficient G11 shows the effect of school-bounding on significant relationship between negative beliefs about worry and students' tendency to drug abuse (P<0.05). Similarly, coefficient G21 indicates the effect of school-bounding on significant relationship between positive beliefs about worry and students' tendency to drug abuse (P<0.05). Thus H4 and H5 cross-level hypotheses are approved.

4. Discussion

In this study, we suggested and examined the cross-level model, which shows the relationship of negative and the positive beliefs about worry with students' tendency

toward drug abuse, with regard to the cross-level effect of school-bounding.

The multi-level approach was taken in this research because the tendency to drug abuse at students' level might be due to the variables at different levels. The tendency to addiction in students will be accurately recognized when the independent variables are studied simultaneously at different levels. Accordingly, the variable of outcome for tendency to addiction was explored here at both levels of students and schools.

The results of testing hypotheses at students' level approved those hypotheses. The current research shows that the negative and positive beliefs about worry have positive and significant relationship with students' tendency to drug abuse. These results are consistent with the findings of Spada and Wells (2008), Spada and Wells (2006), Spada and Zandvoort, and Wells (2007), and finally Spada and Nikcevic et al. (2007). Also, the results of this study indicate that the effect of positive beliefs about worry is stronger than negative beliefs. The results of testing cross-level hypotheses showed that the variable of school-bounding has negative and significant effect on students' tendency to drug abuse and this finding is in line with the results of studies conducted by Dixon (2007), Hawkins et al. (2000), Battistich and Hom (1997), McPartland and Mcdill (1977), Aminian and Seyed Mirzaee (2010), and finally Moeini and Allahverdipoor (2010).

Furthermore, the cross-level analysis of hypotheses H4 and H5 suggests that school-bounding affects significantly the relationship between negative beliefs about worry and tendency to drug abuse. Also, the variable of school-bounding affects positive beliefs about worry and tendency to drug abuse. These 2 findings are new and have not been mentioned in previous research. This issue indicates the importance of positive and negative beliefs about the worry and the effect of school-bounding on these beliefs. With respect to proposing and testing the cross-level model in this study and its restriction to two levels while the variables at higher and lower levels may also affect students' tendency to drug abuse, it is suggested that researchers design models at 3 levels of tendency to drug abuse in their future investigations.

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