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Perceptions of Classroom Environment, Satisfaction of Basic Psychological Needs, and Academic Emotions: The Mediating Role of Basic Psychological Needs

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Abstract

The present study aimed to investigate the mediating role of basic psychological needs in the relationship between students' perceptions of classroom environment and their academic emotions. A total of 268 students (137 males and 131 females) were selected from high schools located in Yasouj (Iran) via multistage cluster sampling. The participants filled out the Pekrun, Goetz, and Frenzel's (2005) Achievement Emotions Questionnaire, Learning Environment Inventory, and Basic Needs Satisfaction. The proposed model was assessed by Structural Equation Model (SEM) using AMOS. Results indicated that the suggested model had a good fit with the empirical data. Furthermore, students' perceptions of classroom environment had a positive and significant relationship with psychological needs satisfaction and academic emotions. In addition, satisfaction of basic psychological needs significantly and positively influenced academic emotions. Overall, findings demonstrated that satisfaction of basic psychological needs played a mediating role in the relationship between students' perceptions of classroom environment and academic emotions.

Keywords

Perceptions of classroom environment

Basic psychological needs satisfaction

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Introduction

Students experience different emotions in academic settings. Emotions and feelings, as integral parts of students' personality traits in learning processes, play a crucial role in their academic achievement (Wentzel, 1999). Identifying these emotions and the factors affecting them is a major issue for enhancing students' active participation in learning processes. Education is an invaluable emotional process for students, teachers, and parents (Schutz & DeCuir, 2002). Therefore, considerable attention should be to the effect of social and emotional factors on students' academic achievement. Educators' attention has been drawn to emotional elements of classroom environment. In fact, there are multiple emotional experiences in classroom atmosphere which involve emotions related to academic success or failure, acceptance or rejection by peers, etc., which result in the introducing emotional structures and academic emotions.

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Pekrun (2006) introduced special emotions associated with learning, education, and academic achievement by considering their academic emotions. Academic emotions are directly related to academic activities or outcomes and classified as positive emotions (pleasure, hope, and pride) and negative emotions (anger, anxiety, shame, disappointment, and fatigue). Academic emotions are generally defined as emotions directly associated with achievement-oriented outcomes or activities.

It is highly important to identify concomitant factors of emotions due to their significance and necessity in class. Basic psychological needs satisfaction is an important factor which can affect students' academic emotions in classroom. In fact, their important could be due to their stability and strength over time, profound and fundamental effects on behavior and personality, key role in developmental stages, and positive and negative consequences in intrapersonal and interpersonal fields. Therefore, a growing body of research on psychological needs-based theories has focused on these needs.

Self-determination theory examines basic needs such as autonomy, competence, and relatedness. The need for autonomy refers to the experience of choosing, approving, initiating, continuing, and completing behavioral activities. The need for competence is related to the feeling of effectiveness while people interact with their physical and social world. The need for relatedness is related to receiving attention and having intimacy in interactions with colleagues for obtaining a general sense of belonging and attachment (Ryan & Deci, 2007). Deci and Ryan (2011) assert that support, as one of the basic psychological needs, can predict most motivational, behavioral, and emotional outcomes.

According to control-value theory, control and value assessment is highly important as much as the prediction of learners' model of emotional experience. Pekrun, Goetz, Frenzel, Barchfeld, and Perry (2011) maintained that the feeling of pleasure is excited when an activity is perceived as completely controllable (Pekrun, 2006, 2016). For instance, a learner enjoys studying when s/he feels competent enough to master the subjects of learning. Therefore, achieving independence and competence in classroom activities (a basic psychological need) can lead to a sense of pleasure and satisfaction among students. Several studies have examined the relationship between psychological needs satisfaction and students' positive and negative emotions (Furrer & Skinner, 2003; Goetz, Pekrun, Hall, & Haag, 2006; Pekrun & Stephens, 2010; Quested et al., 2011; Vlachopoulos & Michailidou, 2006; Wentzel,1999; Wigfield et al., 2007).

In addition, the control-value theory further emphasizes that specific features of social and classroom environments can affect achievement emotions (Pekrun, Goetz, Titz, & Perry, 2002). Accordingly, the environment or external stimulus is another factor associated with learners' emotions. Classroom environment plays a vital role in students' academic, psychological, and behavioral performance (Kuperminc, Leadbeater, & Blatt, 2001). Based on Pekrun's (2006) model, classroom or social environments can excite students' academic emotions. Classroom learning environment is a setting where learners and teachers interact with each other and use various tools and information resources to pursue learning activities. These interactions are at several levels such as teacher-student, student-teacher, and student-student interactions, as well as the general atmosphere of classroom (Gazelle, 2006).

Students' perceptions of the environment are linked with their underlying and personal characteristics, which can affect how they consider their social world and approach to the environment (Patrick, Knee, Canevello, & Lonsbary, 2007). Thus, students' perception of the learning environment can affect their participation in classroom activities and peer relationships. Research indicates that classroom perception is significantly associated with negative and positive academic emotions

(Bieg et al., 2017; Frenzel, Pekrun, & Goetz, 2007; Goetz et al., 2006; Lazarides & Buchholz, 2019; Sakiz, Pape, & Hoy, 2012; Skinner, Johnson, & Snyder, 2005).

Furthermore, some studies conducted on the perception of the classroom environment and psychological needs satisfaction showed that classroom climate can play a key role in meeting students' basic needs. Basic psychological needs satisfaction can foster the growth of human beings in social environments. In other words, responsive and supportive social environments could satisfy basic needs, which may lead to better adaptation and higher levels of social psychosocial functioning (Ryan & Deci, 2017). Deci and Ryan (2008) indicated that positive perceptions of school environment and communication with teachers could help students meet their basic needs in school educational environment. As a result, students would have timely attendance and be motivated and active in learning, which can result in their well-being and vitality.

Based on self-determination theory, when teacher-student relationships are based on students' independent behaviors and participation, basic needs satisfaction is facilitated, which can lead to psychological adjustment and well-being (Deci et al., 2001; Ryan & Deci, 2011; Wilson, Mack, & Grattan, 2008). Therefore, the perceptions of classroom environment can predict basic psychological needs satisfaction and are related to students' classroom emotions. The satisfaction of students' psychological needs in classroom is more concerned with students' classroom emotions. Accordingly, it would be interesting to examine the mediating role of psychological needs satisfaction in the relationship between perceptions of classroom environment and academic emotions.

The review of previous research shows that the perceptions of classroom environment, basic psychological needs satisfaction, and academic emotions have not been simultaneously investigated. Additionally, this assumption that perceptions of classroom environment can indirectly affect academic emotions through basic psychological needs satisfaction was neglected. Thus, the present study aims to investigate the mediating role of psychological needs satisfaction in the relationship between perceptions of classroom environment and academic emotions. Hence, perceptions of the classroom environment, basic psychological needs satisfaction, and academic emotions are considered as predictor, mediating, and criterion variables in this study, respectively. Fig. 1 presents the conceptual model of the present study.

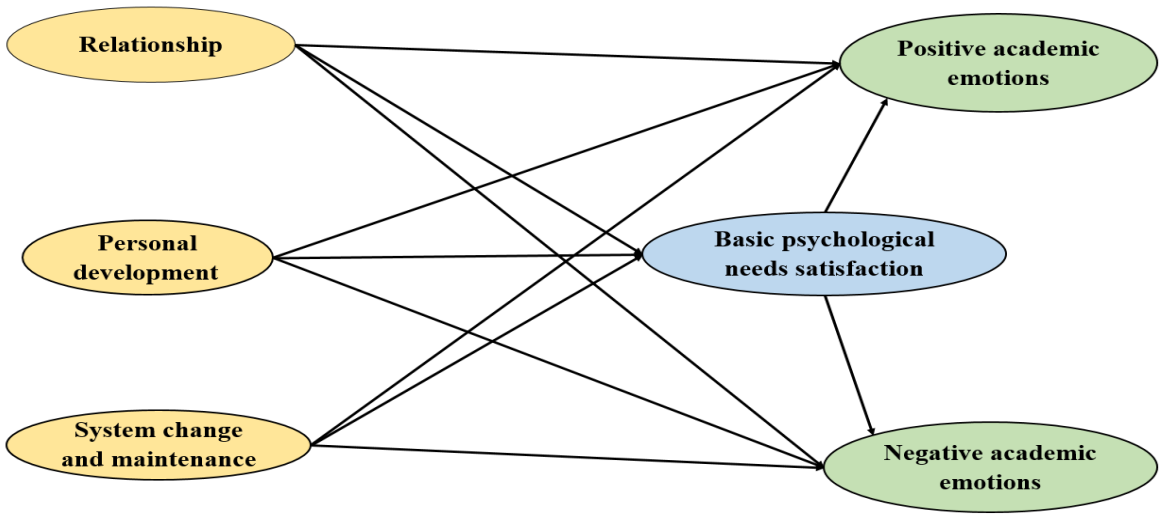

Figure 1. Conceptual model of the relationship between classroom perceptions, basic psychological needs satisfaction, and academic emotions

Method

Sampling

In the present multivariate correlation method, the statistical population included all high school students in Yasouj (Iran) from 2016 to 2017. Multistage cluster sampling was used to select 300 students. Thirty-two questionnaires were removed due to lack of precision, and the data related to 268 students (137 males and 131 females) were analyzed.

Instruments

The academic emotions questionnaire is a self-report instrument designed and developed by Pekrun et al. (2005) to measure students' achievement emotions in academic situations. The questionnaire items focus on emotions experienced in three contexts: class attendance, learning, and testing. There are eight sub-scales in each part. The class-related subscales contain 80 items measuring eight emotions such as enjoyment, hope, pride, relief, anger, anxiety, shame, and boredom. It should be noted that Pekrun et al. (2005) developed the items in such a way that they could assess each part of the emotional experience in three different situations. For example, the sub-section for classroom emotions includes questions about the emotions experienced before, during, and after class participation. Given the objectives of the present study, the subscales of class attendance emotions (50 items) including enjoyment (10 items), hope (8 items), anger (8 items), anxiety (13 items), and boredom (11 items) were used. The Cronbach's alpha for the subscales of this questionnaire was .75-.95 in the original study, which indicated good reliability. The Cronbach's alpha coefficients for different subscales in the present study were .80 (enjoyment), .84 (hope), .76 (anger), .73 (anxiety), and .85 (boredom).

The What Is Happening In this Class? (WIHIC) questionnaire (Fraser, McRobbie, & Fisher, 1996) is a 56-item questionnaire designed to measure students' perceptions of the classroom. The items of this questionnaire reflect the individual's interpretation of classroom and class activities. The questionnaire was scored based on a 5-point Likert scale ranging from *never* to *always* in three aspects of relationships, personal development, and system maintenance as well as system change in seven sub-scales of student cohesiveness, teacher support, involvement, investigation, task orientation, cooperation, and equity. Dorman (2009) reported the Cronbach's alpha coefficients were .89 (student cohesiveness), .93 (teacher support), .91 (involvement), .94 (investigation), .89 (task orientation), .92 (cooperation), and .95 (equity). The reliability coefficients in the present study were .77 (student cohesiveness), .85 (teacher support), .84 (involvement), .86 (investigation), .81 (task orientation), .85 (cooperation), and .87 (equity)

Deci and Ryan (2000) designed the basic needs satisfaction scale measuring the satisfaction of needs related to autonomy, competence, and relatedness. This 21-item questionnaire is scored on a 7-point Likert scale ranging from completely wrong (1) to completely true (7) and has shown high validity in different studies (e.g., La Guardia, Ryan, Couchman, & Deci, 2000). The Cronbach's alpha coefficient for this scale was computed as .83 in a study conducted by Deci et al. (2001). In the present study, the Cronbach's alpha coefficients were .76 (autonomy), .67 (competence), and .67 (relatedness).

Confirmatory factor analysis was run in AMOS to evaluate the construct validity of all three scales. Table 1 shows model fit indices which are acceptable for all three scales, indicating that the questionnaires had good construct validity.

Table 1. Model fitness indices of the research instruments

Model fit index	X^2	Df	X^2/df	GFI	AGFI	IFI	CFI	RMSEA
Perception of the classroom environment	195.03	74	2.64	0.91	0.87	0.92	0.91	0.08
Psychological needs	525.18	183	2.87	.83	.79	.80	.78	.076
Academic emotions	16.98	4	4.25	.97	.91	.97	.97	.07

Procedure

A list of secondary high schools was prepared to collect field research information. Six high schools were selected by random sampling through drawing lots after obtaining the approval of the Ethics Committee of the university research vice-chancellor and a license for implementation as well as coordination with Yasuoj Education Department. Then, in-person references to these schools were consulted with principals and teachers for cooperation. All selected schools stated their readiness for cooperation. After attending classes and explaining the questionnaires, the students were asked to consult with their parents and obtain their permission to participate in the study. Then, the questionnaires were distributed, completed, and collected from students who had obtained written consent from their parents.

Results

Path analysis method was employed using the AMOS software to investigate the relationship between the research variables. The classroom atmosphere perception was considered as an exogenous variable while basic psychological needs satisfaction and academic emotions were regarded as endogenous variables. Table 2 demonstrates the fit functions, distribution of the participants' scores in each latent variable, mean indices, standard deviations, and minimum and maximum scores.

Table 2. Descriptive statistics of the research variables

Variables	Mean	SD	Min.	Max	Kurtosis	Skewness
Relationship	82.82	15.94	36	120	.212	-.148
Personal development	80.81	16.08	26	120	.167	.530
System maintenance and change	28.29	7.09	8	40	.351	.579
Basic psychological needs satisfaction	77.58	15.43	40	116	.086	.225
Positive academic emotions	64.98	11.81	23	90	.476	.587
Negative academic emotions	90.21	20.70	35	145	.057	.01

Table 3 presents the correlation matrix for endogenous and exogenous variables. As can be seen, all the relationships are significant at P <.01 level, except for the relationship between negative academic emotions and basic psychological needs satisfaction, which is significant at P <.05 level. The highest coefficient correlation among research variables was the association between the relationship dimension and personal development of class atmosphere perception (.69). The lowest coefficient was observed for the relationship between classroom environment perceptions and basic psychological needs satisfaction (.17). These correlation analyses provided good insights into two-variable relationships between the research variables.

Table 3. Matrix of the correlation coefficients between the latent variables

Relationship	1					
Personal development	.69**	1				
System maintenance and system change	.54**	.56**	1			
Basic psychological needs satisfaction	.30**	.21**	.17**	1		
Positive emotions	.53**	.62**	.40**	.47**	1	
Negative emotions	-.23**	-.28**	-.28**	-.33**	-.40**	1

Structural Equation Modeling (SEM) was used to simultaneously examine the suggested relationships. Before data analysis, they were assessed to ensure that they estimated the underlying assumptions of the path analysis model. Thus, certain important assumptions of the model such as normality and multi-collinearity were checked. Skewness and kurtosis were considered to check the normal distribution of variables, which is an important assumption of path analysis. As Table 3 shows, the observed skewness values of all the variables fall in the range of 2 to -2. These variables are normal in terms of skewness and are symmetric in their distribution. Additionally, their kurtosis is in the range of 2 to -2, which indicates that the distribution of the variables is normal. Multi-collinearity is another important assumption of path analysis, which means that more than two predictor variables are significantly correlated with each other. Tolerance statistics and variance inflation factor (VIF) were used to investigate multi-collinearity. Tolerance statistics is a portion of the total variance which is not explained by other variables and is calculated by 1-R2 formula. Tolerance values of less than .10 indicate multi-collinearity among the variables. Other multi-collinearity problems showed that the significant correlation between the predictor variables increases the coefficient standard, which means the values of these variables considerably vary from one study to another. This phenomenon is known as the variance inflation factor (VIF) which is calculated by $\frac{1}{1-R^2}$. A VIF value of higher than 10 indicates that it is an additional variable. In this study, the multi-collinearity of variables was evaluated using tolerance statistics and VIF.

Based on the results in Table 4, tolerance values for the variables are higher than .10, which indicate the absence of multi-collinearity between the variables. Furthermore, the VIF value obtained for the variables is less than .10, which shows no multi-collinearity**.**

Table 4. Results of the multi-collinearity of the research variables

Variables	**Multi-collinearity indexes**	
	Tolerance statistics	**VIF**
Aspect of relationship	.473	2.116
Aspect of personal development	.481	2.078
Aspect of system maintenance and system change	.641	1.560
Basic psychological needs satisfaction	.913	1.095

Classroom environment perceptions (relationships, personal development, system maintenance, and system change), basic psychological needs satisfaction, and negative and positive emotions are three variables in the proposed model of this study. The fit of the main model was evaluated before examining the structural coefficients. The model fit with the data was demonstrated based on the fit indices in Table 5, which indicates its acceptable fit.

Table 5. Fit indices related to the final modified model

Model fit index	**X^2**	**Df**	**X^2/df**	**GFI**	**AGFI**	**IFI**	**CFI**	**NFI**	**RMSEA**
Final modified model	344.233	189	1.821	.90	.87	.94	.93	.87	.055

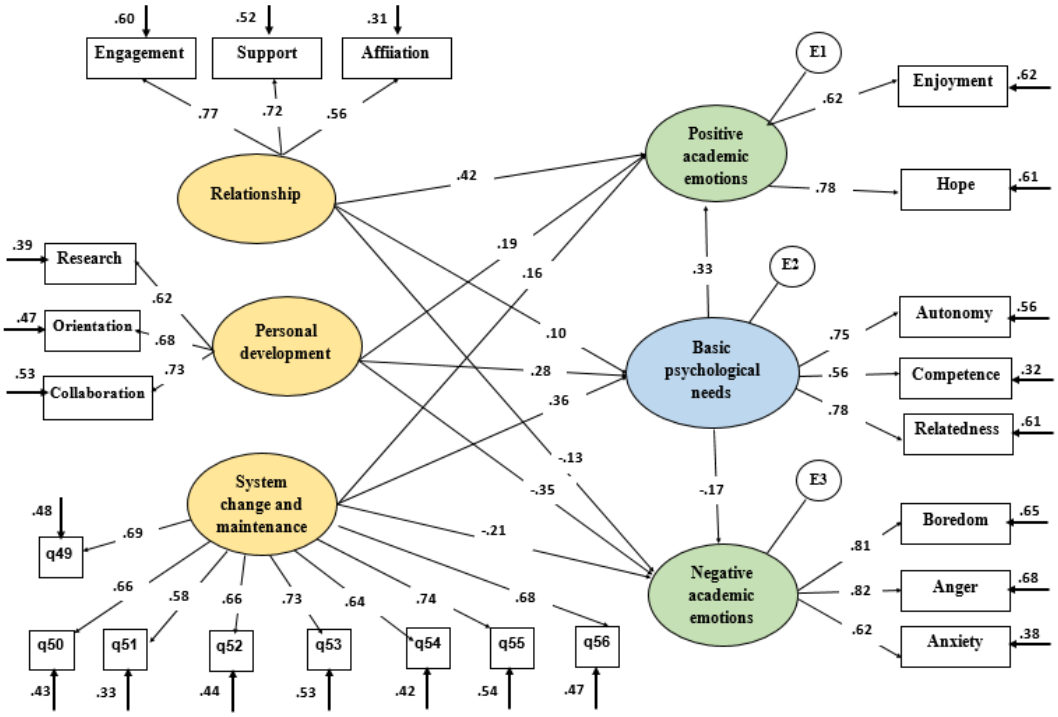

Figure 2. The final model with path coefficients

Figure 2 presents the final model of the present study along with its path coefficients. Table 6 shows the results of bootstrapping in relation to the indirect path of the classroom environment perceptions to positive emotions with the mediating role of basic psychological needs satisfaction.

Table 6. The results of bootstrapping with respect to the indirect path of classroom environment perceptions to positive emotions by considering the mediating role of basic psychological needs satisfaction

Path	Data	Bootstrap	Bias	SE	Min.	Max.
Aspect of relationship→ basic psychological needs satisfaction→ positive academic emotions	.4150	.4126	.0024	.0809	.1263	.4123
Aspect of personal development→ basic psychological needs satisfaction→ positive academic emotions	.2817	.2801	.0001	.0710	.0280	.1470
Aspect of System Maintenance and System Change → basic psychological needs satisfaction→ positive academic emotions	.1315	.1302	.0001	.0832	.2466	.5953

The confidence intervals of the path shown in Table 6 indicate that zero is not located at these distances in relation to the three indirect paths, Therefore, all three paths are significant (i.e., the indirect path of the classroom environment perceptions to positive academic emotions with the mediating role of basic psychological needs satisfaction). The confidence level of this interval is 95%, and the bootstrapping sampling rate is 1000. Hence, the major mediating role of the basic psychological needs satisfaction regarding the association between the dimensions of classroom environment perception and positive academic emotions.

Table 7 shows the results of bootstrapping in relation to the indirect path of classroom environment perceptions to negative emotions with the mediating role of basic psychological needs satisfaction. The confidence intervals for the path shown in Table 7 indicate that zero is not located at these distances in relation to the three indirect paths. Therefore, all three paths are significant (i.e., the

indirect path of the classroom environment perceptions to negative academic emotions with the mediating role of basic psychological needs satisfaction). The confidence level for this interval is 95%, and the bootstrapping sampling rate is 1000. Accordingly, the satisfaction of basic psychological needs plays a mediating role in the relationship between the dimensions of classroom environment perceptions and negative academic emotions.

Tablo 7. The results of bootstrap in relation with the indirect path of classroom environment perception to negative emotions with the mediating role of basic psychological needs satisfaction

Path	Data	Bootstrap	Bias	SE	Min.	Max.
Aspect of relationship→ basic psychological needs satisfaction→ negative academic emotions	.2981	.2970	.0002	.0392	.2304	.5144
Aspect of personal development→ basic psychological needs satisfaction→ negative academic emotions	.2364	.2350	.0001	.0516	.1974	.4891
Aspect of System Maintenance and System Change → basic psychological needs satisfaction→ negative academic emotions	.4290	.4279	.0013	.0731	.0341	.1816

Discussion and Conclusion

The present study examined the mediating role of basic psychological needs satisfaction in the relationship between classroom environment perceptions and academic emotions. The model fit indices indicated a relatively good fit of the proposed model with the empirical data. In other words, basic psychological needs satisfaction plays a mediating role in the relationship between the dimensions of the classroom environment perceptions and academic emotions.

Students' relationships with their teachers and classmates is one of the effective sources of support for their developmental needs (Skinner, Zimmer-Gembeck, Connell, Eccles, & Wellborn, 1998). Environmental support leads to the selection of beneficial behaviors and satisfaction of basic psychological needs in individuals. Students who consider interpersonal interactions in their classes as attractive, homework assignments as challenging at an acceptable level, and class attendance and homework assignments as meaningful can collaborate with one another in doing their assignments, provide each other with required resources, and gradually develop positive attitudes towards their competence beliefs and relatedness, which could lead to the satisfaction of their basic psychological needs. For example, a supportive, encouraging, and caring environment created by the teacher renders it more facile for students to ask questions since there is little concern as to their teachers' doubts about the students' ability (Ryan, Pintrich, & Midgley, 2001). Therefore, students feel more comfortable in a classroom environment providing them with opportunities to choose (the need for autonomy is somewhat satisfied), followed by positive emotions and higher levels of well-being (Skinner et al., 2005). Deci and Ryan (2004, 2008) found that teacher is the most important factor in determining students' self-reliance and autonomy.

Students' needs are met when there is warmth, friendship, and respect in their social relationships. Therefore, creation of an intimate and supportive atmosphere in classroom is highly conducive to satisfaction of learners' need for relatedness and security. Additionally, dealing with the same behaviors, giving equal opportunities in educating all learners, and providing a setting for the growth of all students can pave the way for competence beliefs, autonomy, and relatedness. According to Reeve, Nix, and Hamm (2003), students' enthusiasm and dynamism in classroom are dependent on the educational environment created by teachers. Students feel competent and independent when teacher-student interactions are highly constructive, i.e., teachers act as the provider and facilitator of learning opportunities.

Supporting basic psychological needs can directly predict motivational, behavioral, and emotional outcomes (Deci & Ryan, 2011). Competitive and autonomous beliefs, which are basic psychological needs, can promote positive emotions (e.g., interest and passion) (Furrer & Skinner, 2003). Pekrun's (2006) model can help explain the relationship between basic needs satisfaction and academic emotions. Achieving a sense of competence and autonomy can promote students' beliefs in terms of controllability and value, i.e., classroom activities leading to students' sense of competence and autonomy will be considered as valuable. Based on this model, high levels of control and activity values result in experiencing activity-related positive emotions (e.g., classroom enjoyment). In addition, negative academic emotions will be less experienced when the beliefs of value and control are high.

Previous research on basic psychological needs has emphasized various benefits of fulfilling these needs. Students who believe that they are able to master academic requirements have positive expectations for success, involving their cognition, behaviors, and emotions. Furrer and Skinner (2003) found that students having autonomy and competence beliefs experienced fewer negative academic emotions such as anxiety, boredom, and fatigue. Therefore, satisfaction of psychological needs (sense of competence, autonomy, and relatedness) can stimulate students' positive emotions (e.g., enjoyment and enthusiasm).

Perceptions about classroom environment can predict students' academic emotions, which is in line with the results of previous studies (e.g., Frenzel et al., 2007; Goetz et al., 2006). A supportive classroom environment can affect students' perceptions of the school and stimulate adolescents' cognitive, emotional, and behavioral outcomes (Roeser & Eccles, 1998). Pekrun's (2006) model assumes that peer and teacher's respect, and quality of education can shape value judgments. Positive emotions are experienced when the valuation is high. Punishing students for their failures could increase the sense of defeat and failure to control them, which results in experiencing negative emotions such as anxiety and anger. Students feel less likely to succeed in classes with much competition and little collaboration since the success of some students depends on the failure of others, which leads to negative emotions (Frenzel et al., 2007).

The present study examined three important aspects of classrooms, namely, relationships (teacher-student relationship, student-student relationship, and participation in class activities), personal development (class orientation, cooperation, and investigation), and classroom system maintenance and system change (equity). Student-student relationship and student-teacher relationship enhance the value of class activities based on Pukran's model and increase the sense of autonomy and control. Roeser and Eccles (1998) suggested that teachers who discriminate in terms of gender and race reduce students' academic motivation and enthusiasm (academic value), increase their emotional stress (anger and sadness), and lower academic achievement in early adolescence.

Bush (2006) found that student-teacher interaction positively correlated with students' perceived autonomy, and student-student interactions were the strongest predictors of autonomy. Furthermore, students engaged in classroom activities considered doing homework as highly important for their personal development, were aware of their class goals, collaborated with other students, searched for answers to their questions (personal development), received appropriate and equal feedback from their teacher (managerial dimension), and felt more valuable. Thus, higher scores in these subscales indicated more positive emotions, while fewer negative emotions means that students' positive perception of the class reflects the value of class activities and the feeling of control results in experiencing positive emotions.

The results of the present study indicated that satisfaction of psychological needs could play a mediating role in the relationship between perceptions of classroom environment and academic emotions. Hence, it is suggested that teachers and educators take measures to ensure that students have a positive perception of their classes. In addition, satisfaction of students' psychological needs in classroom should be highly considered.

This study has some limitations. First, the participants were only high school students in Yasouj. Therefore, care should be taken in generalizing the findings to other participants in different settings. Second, given that this study was correlational, any causal inferences based on the findings should be avoided. Furthermore, self-report questionnaires were used to collect data. Future studies can use other data collection instruments. Further, basic needs were considered as a general variable in data analysis in this study. The way the dimensions of classroom perception are related to the satisfaction of each of the basic needs separately, and the question of which academic emotion is associated with satisfaction of each of the basic needs can be considered as the topics for future research.

References

Bieg, M., Goetz, T., Sticca, F., Brunner, E., Becker, E., Morger, V., … Hubbard, K. (2017). Teaching methods and their impact on students' emotions in mathematics: An experience-sampling approach. *ZDM*, *49*(3), 411-422.

Bush, A. M. (2006). *What comes between classroom community and academic emotions: Testing a self-determination model of motivation in the college classroom* (Doctoral dissertation). University of Texas at Austin, Austin.

Deci, E. L., & Ryan, R. M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268.

Deci, E. L., & Ryan, R. M. (Eds.). (2004). *Handbook of self-determination research*. University Rochester Press, USA.

Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie Canadienne*, *49*(1), 14-23.

Deci, E. L., & Ryan, R. M. (2011). Levels of analysis, regnant causes of behavior and well-being: The role of psychological needs. *Psychological Inquiry*, *22*(1), 17-22.

Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and Social Psychology Bulletin*, *27*(8), 930-942.

Dorman, J. P. (2009). Partitioning the variance in scores on classroom environment instruments. *Australian Journal of Educational & Developmental Psychology*, *9*, 18-31.

Fraser, B. J., McRobbie, C. J., & Fisher, D. (1996). Development, validation and use of personal and class forms of a new classroom environment questionnaire. In *Proceedings Western Australian Institute for educational research forum*. Retrieved from http://www.waier.org.au/forums/1996/fraser.html

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classrooms. *Learning and Instruction*, *17*(5), 478-493.

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology*, *95*(1), 148-162.

Gazelle, H. (2006). Class climate moderates peer relations and emotional adjustment in children with an early history of anxious solitude: A child x environment model. *Developmental Psychology*, *42*(6), 1179-1192.

Goetz, T., Pekrun, R., Hall, N., & Haag, L. (2006). Academic emotions from a social-cognitive perspective: Antecedents and domain specificity of students' affect in the context of Latin instruction. *British Journal of Educational Psychology*, *76*(2), 289-308.

Kuperminc, G. P., Leadbeater, B. J., & Blatt, S. J. (2001). School social climate and individual differences in vulnerability to psychopathology among middle school students. *Journal of School Psychology*, *39*(2), 141-159.

La Guardia, J. G., Ryan, R. M., Couchman, C. E., & Deci, E. L. (2000). Within-person variation in security of attachment: A self-determination theory perspective on attachment, need fulfillment, and well-being. *Journal of Personality and Social Psychology*, *79*(3), 367-384.

Lazarides, R., & Buchholz, J. (2019). Student-perceived teaching quality: How is it related to different achievement emotions in mathematics classrooms?. *Learning and Instruction*, *61*, 45-59.

Patrick, H., Knee, C. R., Canevello, A., & Lonsbary, C. (2007). The role of need fulfillment in relationship functioning and well-being: A self-determination theory perspective. *Journal of Personality and Social Psychology*, *92*(3), 434-457.

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315-341.

Pekrun, R. (2016). Academic emotions. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 120-144). Londra: Routledge.

Pekrun, R., Goetz, T., & Frenzel, A. C. (2005). *Academic emotions questionnaire–mathematics (AEQ-M)–user's manual*. University of Munich: Department of Psychology.

Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, *36*(1), 36-48.

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, *37*(2), 91-105.

Pekrun, R., & Stephens, E. J. (2010). Achievement emotions: A control-value approach. *Social and Personality Psychology Compass*, *4*(4), 238-255.

Quested, E., Bosch, J. A., Burns, V. E., Cumming, J., Ntoumanis, N., … Duda, J. L. (2011). Basic psychological need satisfaction, stress-related appraisals, and dancers' cortisol and anxiety responses. *Journal of Sport and Exercise Psychology*, *33*(6), 828-846.

Reeve, J., Nix, G., & Hamm, D. (2003). Testing models of the experience of self-determination in intrinsic motivation and the conundrum of choice. *Journal of Educational Psychology*, *95*(2), 375-392.

Roeser, R. W., & Eccles, J. S. (1998). Adolescents' perceptions of middle school: Relation to longitudinal changes in academic and psychological adjustment. *Journal of Research on Adolescence*, *8*(1), 123-158.

Ryan, A. M., Pintrich, P. R., & Midgley, C. (2001). Avoiding seeking help in the classroom: Who and why?. *Educational Psychology Review*, *13*(2), 93-114.

Ryan, R. M., & Deci, E. L. (2007). Active human nature: Self-determination theory and the promotion and maintenance of sport, exercise, and health. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 1-19). Leeds: Human Kinetics Europe Ltd.

Ryan, R. M., & Deci, E. L. (2011). A self-determination theory perspective on social, institutional, cultural, and economic supports for autonomy and their importance for well-being. In V. I. Chirkov, R. M. Ryan, & K. M. Sheldon (Eds.), *Human autonomy in cross-cultural context: Perspectives on the psychology of agency, freedom, and well-being* (pp. 45-64). Almanya: Springer Science + Business Media. doi:10.1007/978-90-481-9667-8_3

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. USA: Guilford Publications.

Sakiz, G., Pape, S. J., & Hoy, A. W. (2012). Does perceived teacher affective support matter for middle school students in mathematics classrooms?. *Journal of School Psychology*, *50*(2), 235-255.

Schutz, P. A., & DeCuir, J. T. (2002). Inquiry on emotions in education. *Educational Psychologist*, *37*(2), 125-134.

Skinner, E., Johnson, S., & Snyder, T. (2005). Six dimensions of parenting: A motivational model. *Parenting: Science and Practice*, *5*(2), 175-235.

Skinner, E. A., Zimmer-Gembeck, M. J., Connell, J. P., Eccles, J. S., & Wellborn, J. G. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development*, *63*(2/3), v-220.

Vlachopoulos, S. P., & Michailidou, S. (2006). Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The basic psychological needs in exercise scale. *Measurement in Physical Education and Exercise Science*, *10*(3), 179-201.

Wentzel, K. R. (1999). Social-motivational processes and interpersonal relationships: Implications for understanding motivation at school. *Journal of Educational Psychology*, *91*(1), 76-97.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R. W., & Davis-Kean, P. (2006). Development of achievement motivation. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 933-1002). USA: John Wiley & Sons, Inc.

Wilson, P. M., Mack, D. E., & Grattan, K. P. (2008). Understanding motivation for exercise: A self-determination theory perspective. *Canadian Psychology/Psychologie Canadienne*, *49*(3), 250-256.