



Determinants of classroom engagement: a prospective test based on self-determination theory

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ABSTRACT

This research has a dual purpose: to translate into Spanish and validate a classroom engagement measure and, over a semester, to analyse the effect of students' perception of autonomy support on the need for autonomy and the effect of autonomy, in turn, on four types of engagement. Data were collected at three time points from 448 undergraduate students via a longitudinal design. The results revealed adequate psychometric properties for the engagement scale, and the hypothesised effects were supported. Autonomy support was a significant predictor of the need for autonomy, which, in turn, predicted changes in four types of classroom engagement. Emotional engagement displayed the strongest relationship with need for autonomy. Moreover, need for autonomy mediated the relationship between perceived autonomy support and each indicator of student engagement. The findings are interpreted as supporting self-determination theory's motivation mediation model and could be considered in future intervention programmes to improve the teaching-learning process in education.

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Introduction

In recent years, engagement has become particularly relevant due to its meaningful relationships with many important variables in the academic context, such as performance (Archambault & Vandebosche-Makombo, 2014), academic adjustment (van Rooij, Jansen, & van de Griftdropout, 2017), dropout (Wang & Fredricks, 2014), psychological well-being (Wang, Chow, Hofkens, & Salmela-Aro, 2015), and classroom discipline (Hagenauer, Hascher, & Volet, 2015). The experience of students in the classroom during a semester can be productive and beneficial if they perceive autonomy support from their teachers, satisfy the psychological need for autonomy, and engage during classroom instruction (Jang, Kim, & Reeve, 2016). Self-determination theory (SDT) is a macro-theory of human motivation and personality that analyses these relationships and explains the positive functioning of students in the classroom. SDT has examined how autonomy-supportive environments affect well-being, performance,

and engagement in various domains of activity including education, organisations, and sport and physical activity. Specifically, in the context of education, SDT is supported by numerous studies conducted over the last three decades. The reason is its integrating nature and focus on people who enjoy, are interested, and who find satisfaction in the development of a task and people who are more self-realised, more competent, and more self-determined than others (Csikszentmihalyi, 2003).

SDT comprises six mini-theories, including cognitive evaluation theory, which emphasises the effect of social factors such as teaching style on the increase in intrinsic motivation, which is critical in education, as well as basic psychological needs theory, which refers to three innate, universal, and essential psychological needs for psychological growth, integrity, and well-being (Deci & Ryan, 2000): autonomy, competence, and relatedness. The satisfaction of these needs entails positive outcomes that result in a better functioning of the student in the classroom. SDT suggests that the social conditions that support the individual's experience of autonomy, competence, and relatedness promote the highest-quality types of engagement in activities.

SDT is a mediational model in which the teacher's teaching style in the classroom is essential and acts as a facilitator of classroom engagement. In this sense, if the teacher provides autonomy support in the classroom, then doing so will nurture and meet the basic psychological needs of the student (i.e. autonomy, competence, and relatedness), which, in turn, will predict the amount of classroom engagement.

Autonomy support is a contextual factor affecting individual functioning. Deci and Ryan (1991) state that autonomy support promotes choice, minimises the pressure to perform tasks in a certain way, and encourages initiative. Several conditions are necessary for individuals to feel that their autonomy is supported: providing meaningful rationales, acknowledging negative feelings, using non-controlling language, offering meaningful choices, nurturing inner motivational resources, providing unconditional positive regard, and displaying patience to allow time for self-paced learning to occur (Núñez & León, 2015). A wide range of research has demonstrated that autonomy-supportive teaching is related to multiple educational benefits such as well-being, performance, and learning (see Núñez & León, 2015, for an overview). SDT explains that autonomy support leads to important psychological benefits for the student because it promotes the satisfaction of the needs for competence, relatedness, and especially autonomy (Reeve, Deci, & Ryan, 2004). Several studies confirm that teacher-provided autonomy support predicts student-perceived autonomy (Reeve & Jang, 2006; Reeve & Tseng, 2011).

The need for autonomy is innate and universal and refers to the experience of will and psychological freedom, and it is determined by the level of external pressure when performing an action (Deci & Ryan, 1985). Autonomy promotes volitional functioning, that is, the degree to which the behaviour and objectives of a student agree with his/her values and interests; thus, they have a feeling of psychological freedom and authenticity (Soenens, Vansteenkiste, Van Petegem, Beyers, & Ryan, 2018). The scientific literature has shown that there are reasons to expect that autonomy is key to understanding the classroom engagement (Hafen et al., 2012).

Engagement refers to a student's active involvement in a learning activity (Christenson, Reschly, & Wylie, 2012). According to Reeve and Tseng (2011), engagement is a multidimensional construct composed of four mutually dependent components: behaviour,

emotion, cognition, and agency. Behavioural engagement refers to the student's attention, effort, and persistence when involved in the learning activity (León, Núñez, & Liew, 2015; Skinner, Kindermann, & Furrer, 2009). Emotional involvement refers to the presence of positive emotions (e.g. interest) and the absence of negative emotions (e.g. anxiety) during task involvement (Skinner et al., 2009). Cognitive engagement refers to the use of deep learning strategies such as elaboration instead of superficial learning strategies such as memorisation when the student tries to learn (Walker, Greene, & Mansell, 2006). Finally, agentic engagement refers to the extent to which students contribute to the flow of instruction they receive in terms of asking questions, expressing preferences, and demanding what they need (Reeve, 2013). Each component has its own role in the internal dynamics of engagement (Skinner, Furrer, Marchand, & Kindermann, 2008).

According to the hierarchical model of intrinsic and extrinsic motivation, education is situated at the contextual level. At this level, individuals develop moderately stable motivation, and social factors (e.g. the teacher) have an important impact (Núñez & León, 2018). Research suggests that the relationship between contextual characteristics and students' psychological needs influences classroom engagement. The teacher acts as a contextual facilitator of students' need satisfaction. Thus, the autonomy support provided by teachers enhances student engagement (Hospel & Galand, 2016; Jang, Reeve, & Deci, 2010; Reeve, Jang, Carrell, Jeon, & Barch, 2004) because this support satisfies students' need for autonomy, meaning the experience of a sense of volition. Autonomy has consistently been shown to be a significant predictor of changes in engagement (Skinner et al., 2008) and, if it is satisfied, leads to more positive emotional, cognitive, and behavioural outcomes (Jang, Kim, & Reeve, 2012).

Jang et al. (2012) assessed students' perceptions of teacher-provided autonomy support, students' autonomy need satisfaction, and the extent of classroom engagement over a semester. They found that teacher-provided autonomy support predicted changes in students' need for autonomy, which, in turn, predicted subsequent changes in engagement. Recently, using a three-wave longitudinal research design, Jang et al. (2016) concluded that perceived autonomy support longitudinally increased student engagement because it nurtured changes in need satisfaction.

Unfortunately, the four aspects of engagement have been treated as a single latent factor (Jang et al., 2016; Reeve & Lee, 2014); this procedure does not make it possible to know the differential contribution of the studied determinants (i.e. autonomy support and need for autonomy). However, in this study, each aspect of engagement is analysed separately. This procedure helps uncover the contributions of autonomy support and autonomy to these different facets of engagement.

The present research

The present study had two goals and two hypotheses. Since there is no measure in Spanish available to evaluate the four different types of classroom engagement, the first goal was to translate into Spanish and validate the 12-item engagement measure developed by Jang et al. (2012). The second goal of this research was to analyse, over a semester, the effect of students' perception of the autonomy support provided by their teachers on need for autonomy and the effect of autonomy, in turn, on each of the four aspects of engagement. The following hypotheses were tested: H1: autonomy

support at Time 1 (T1) (beginning of the semester) will have an effect on autonomy at Time 2 (T2) (two months later); H2: autonomy at T2 will have effects on the four types of classroom engagement differentially at Time 3 (T3) (two months after T2); and H3: autonomy will mediate the relationship between autonomy support and engagement.

Method

Participants

The participants were 448 undergraduate students (77.8% female). The mean age was 20.97 years ($SD = 3.93$). A total of 325 participants (76.6% female, $M = 20.81$, $SD = 4.12$) completed the instruments at T1; 274 students (79.3% female, $M = 20.85$, $SD = 4.56$) completed the questionnaires at T2 two months later; and 287 students (76.0% female, $M = 20.67$, $SD = 3.16$) completed the questionnaires at T3 two months after T2.

Measures

To examine scale reliability, McDonald's omega (1999) was used instead of Cronbach's alpha because the latter requires the factor loadings to be not different for all items (Zhang & Yuan, 2016) and the nature of the data to be continuous (Bonanomi, Cantaluppi, Nai Ruscone, & Osmetti, 2015). Furthermore, McDonald's omega has shown evidence of better accuracy than Cronbach's alpha (Revelle & Zinbarg, 2009). Considering that the student ratings were on Likert-type scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), Zumbo, Gadermann, and Zeisser's (2007) recommendations were followed to treat the data as categorical measures and to compute ordinal McDonald's omega values. Similarly to Cronbach's alpha, McDonald's omega values above .70–.80 are indicators of reliability.

For evidence of construct validity, a confirmatory factor analysis (CFA) for each scale was performed using the Mplus 7.4 software (Muthén & Muthén, 2017). More information about the method used to estimate the parameters and standard errors can be found in the data analysis section.

Autonomy support

To assess autonomy support in the classroom, students responded to the Spanish short version of the Learning Climate Questionnaire (Núñez, León, Grijalvo, & Martín-Albo, 2012). This version consists of five items (e.g. 'My teacher offers me options and lets me choose'). The scale showed evidence of reliability in this study ($\omega = .93$) and in previous studies (Núñez, Fernández, León, & Grijalvo, 2015; Núñez et al., 2012). All standardised loadings were between .78 and .89. Regarding the CFA, the χ^2 value and fit indexes were as follows: $\chi^2(321, 5) = 69.29$ ($p = .00$), root mean square error of approximation (RMSEA) = .20 [.16, .24], confirmatory fit index (CFI) = .98, and Tucker-Lewis index (TLI) = .96. In summary, the CFI and TLI display evidence of fit; however, the χ^2 values and RMSEA are high, which is expected due to the sample size and the simplicity of the model (Kenny, Kaniskan, & McCoach, 2015).

Autonomy need satisfaction

To measure autonomy, the autonomy subscale from the Basic Psychological Needs Satisfaction Scale was used (León, Domínguez, Núñez, Pérez, & Martín-Albo, 2011). This instrument consists of five items (e.g. ‘I feel free in my decisions’). The scale showed evidence of reliability in this study ($\omega = .87$) and previous studies (León et al., 2015; Núñez et al., 2015). All standardised loadings were between .67 and .83. Regarding the CFA, the χ^2 value and fit indexes were as follows: $\chi^2(322, 5) = 25.98$ ($p = .00$), RMSEA = .11 [.07, .16], CFI = .99, and TLI = .99. In summary, the CFI and TLI display evidence of fit; however, the χ^2 values and RMSEA are high, which is expected due to the sample size and the simplicity of the model (Kenny et al., 2015).

Engagement

The four aspects of student engagement, i.e. agentic, behavioural, emotional, and cognitive engagement, were assessed through the scale developed by Jang et al. (2012). This scale consists of 12 items, four for each subscale (Table 1). Jang et al. (2012) used items from previously validated measures, such as the following: Skinner et al.’s (2009) Behavioural Engagement and Emotional Engagement subscales from their Engagement Versus Disaffection with Learning measure to assess behavioural and emotional engagement; Wolters’ (2004) Metacognitive Strategies questionnaire on motivation, cognition, and achievement (adapted from Pintrich, Smith, Garcia, & McKeachie’s, 1993 Motivated Strategies for Learning Questionnaire) to assess cognitive engagement; and Reeve and Tseng’s (2011) Agentic Engagement Questionnaire to assess agentic engagement. The 12-item classroom engagement scale was translated into Spanish following the guidelines recommended by Hambleton (1996). Thus, the items were translated from English into Spanish, subsequently back translated into English, and then compared with the original items. These items were evaluated by a committee of three experts who considered the adequacy of the items to the construct of interest.

Table 1. The 12 scale items for assessing the four aspects of classroom engagement (grouped by the four types of engagement).

Items for assessing agentic engagement
1. During this class, I ask questions to help me learn.
2. I let the teacher know what I am interested in.
3. During this class, I express my preferences and opinions.
Items for assessing behavioural engagement
1. I try hard to do well in this class.
2. In this class, I work as hard as I can.
3. I pay attention in class.
Items for assessing emotional engagement
1. When I am in this class, I feel good.
2. When we work on something in this class, I feel interested.
3. I enjoy learning new things in this class.
Items for assessing cognitive engagement
1. Before starting an assignment for this class, I try to figure out the best way to do it.
2. In this class, I keep track of how much I understand the work, not just if I am getting the right answers.
3. If what I am working on in this class is difficult for me to understand, I figure out how to change the way I learn the material.

In the present study, all four engagement scales showed acceptable levels of reliability. The omega values for each subscale were .83 for behavioural (e.g. 'I try hard to do well in this class'), .84 for emotional (e.g. 'When I am in this class, I feel good'), .77 for cognitive (e.g. 'In this class, I keep track of how much I understand the work, not just if I am getting the right answers'), and .84 for agentic (e.g. 'During this class, I ask questions to help me learn') engagement. All standardised loadings were between .67 and .88. Every aspect of classroom engagement was treated as a separate indicator. The factor structure of the scale had a satisfactory fit: $\chi^2(324, 48) = 142.09$ ($p = .00$), RMSEA = .07 [.06, .09], CFI = .99, and TLI = .98.

Procedure

Participants were recruited from three bachelor's courses (i.e. social education, primary education, and childhood education) taught at an urban university in Spain. The researcher visited the same classes at the same hour across all three waves of data collection, thereby ensuring that the students always referred to the same teacher and the same class when completing the questionnaires. The aims of this study were explained to the students, and participation was voluntary and confidential. Moreover, the students were urged to complete the questionnaires as honestly as possible. The researcher provided students with the necessary support to successfully complete the questionnaires. The time needed for the students to complete the questionnaires was approximately 5 min. This research has been approved by the ethics committee of the organisation responsible for funding.

Data analyses

Descriptive analyses were conducted, including Pearson's correlations between the major variables. The effects of sample attrition were considered. The hypotheses were tested by using structural equation modelling (SEM). The indicators of the latent variables in the SEM consisted of all the items of the scales. Because the observed variables (items) were ordered categorically (Flora & Curran, 2004), weighted least squares mean and variance-adjusted (WLSMV) estimation was used. Importantly, to avoid the underestimation caused by the violations of independency because students were grouped by classes (Stapleton, McNeish, & Yang, 2016), standard errors were estimated using a sandwich-type estimator (Muthén & Muthén, 2017).

To address our goal, first, a baseline model was fitted to assess the direct effect of autonomy support on engagement. Then, autonomy between the independent variable and the dependent variable was incorporated. To test the indirect effects, we used the delta method (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). To gather evidence of mediation, the 0 value should not be in the confidence interval (95%) around the indirect effect (multiplication of the effect of autonomy support on autonomy by the effect of autonomy on engagement). Finally, to estimate missing data, full information maximum likelihood estimation (Asparouhov & Muthén, 2010) was used. All of the calculations were performed with Mplus 7.4.

Table 2. Means, standard deviations, and Pearson's correlations.

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Autonomy support	4.54	1.35					
2. Autonomy	4.89	1.09	.55				
3. Agentic engagement	4.52	1.43	.28	.41			
4. Behavioural engagement	5.24	1.04	.30	.40	.54		
5. Cognitive engagement	5.16	1.09	.29	.40	.63	.74	
6. Emotional engagement	5.28	1.07	.39	.46	.68	.77	.80

All coefficients are significant ($p < .01$).

Results

Preliminary analyses

The descriptive statistics (means and standard deviations) and Pearson's correlations for the major variables are displayed in Table 2. The correlations among all variables were positive, significant, and in the expected direction.

Attrition

The effects of attrition were analysed because only approximately 37% of the original sample took part in one of the three stages, 30% in two stages and 33% in all three stages. Participants with and without complete data were compared using multivariate analysis of variance (MANOVA). The results for students who took part in only one stage were significantly lower in autonomy support [$F(2, 319) = 3.87, p = .02$], but no differences in autonomy or engagement were observed.

Structural equation modelling

This study tested the hypothesised model, in which autonomy support acts as a determinant of autonomy, which, in turn, predicts the four aspects of classroom engagement. The χ^2 test and the fit indexes were $\chi^2(487, 198) = 281.88$ ($p = .00$), CFI = .99, TLI = .98, and RMSEA = .03 [.02, .04]. Figure 1 shows the parameters, which were all significant and in the expected direction. The model explained 41% of the variance in autonomy, 30% of that in agentic engagement, 27% of that in behavioural engagement, 27% of that in cognitive engagement, and 40% of that in emotional engagement.

Regarding the indirect effect of need for autonomy between autonomy support and the four aspects of classroom engagement, the indirect effect of autonomy on agentic engagement, emotional engagement, cognitive engagement, and behavioural engagement was .35 [.26, .44], .33 [.35, .48], .25 [.26, .41], and .26 [.27, .41], respectively.

Discussion

In the academic context, engagement is a construct of interest. Jang et al. (2012) developed a scale based on previously validated measures to assess four aspects of classroom engagement. Until now, there was no measure available in Spanish to evaluate the four different aspects of classroom engagement. Therefore, the first goal of this paper was to translate into Spanish and validate a measure of classroom

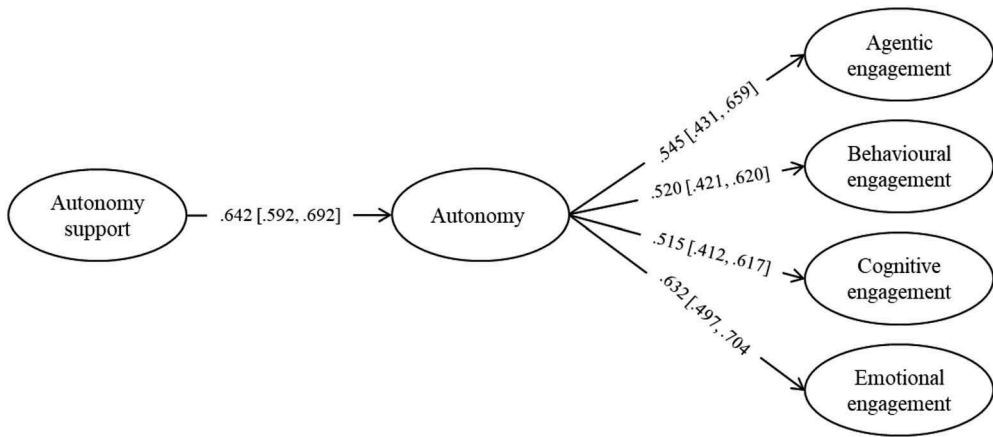


Figure 1. Parameters and confidence intervals of the structural equation model.

engagement. The results showed that the Spanish version presented evidence of validity and reliability. With regard to construct validity, the factor structure solution via CFA was analysed. The results indicated an adequate fit to the data yielding a four-factor structure. Concerning reliability, the omega values were acceptable and similar to the levels of internal consistency obtained by Jang et al. (2012).

The second goal of this study was to analyse, over a semester, the effect of the student-perceived autonomy support provided by students' teachers on their autonomy and the effect of autonomy, in turn, on each of the four aspects of classroom engagement. A prospective study was conducted and found support for this goal. Specifically, the findings gathered evidence of the first hypothesis proposed (autonomy support at T1 will have an effect on autonomy at T2). Autonomy support was a significant predictor of the need for autonomy. This effect is in line with the postulates of SDT, where basic psychological needs are met via the autonomy supportiveness of the social context. Similarly, the results were consistent with other recent research in the academic context; Núñez et al. (2015) and Jang et al. (2016) found that perceived autonomy support predicted longitudinal changes in the need for autonomy in Spanish and Korean high school students, respectively. Autonomy support predicted the need for autonomy at the beginning of the semester, as stated by Jang et al. (2012). Thus, changes will occur in students' autonomy over time if teachers understand and accept their decisions and negative feelings, provide meaningful rationales, suggest alternative solutions, and offer choices between different tasks in the classroom.

Hypothesis 2 (autonomy at T2 will have effects on the four types of classroom engagement differentially at T3) was also confirmed. It was observed that autonomy predicted changes in the four types of classroom engagement. In this sense, students with a greater sense of autonomy in classroom settings have better academic outcomes such as classroom engagement. These results are in line with those provided by Reeve and Tseng (2011), who conclude that psychological needs significantly influence each of the four types of classroom engagement. It should be noted that autonomy had a similar effect on agentic, behavioural, and cognitive engagement and a stronger effect on emotional engagement. This result is consistent with Skinner et al. (2008), who

showed that the main contributor to classroom engagement was the need for autonomy; therefore, this need is considered the strongest predictor of changes in emotional engagement. Students who begin the course high in autonomy (i.e. no external or internal pressures) are more likely to show improvements in their enjoyment, interest, enthusiasm, vitality, and satisfaction over time.

Moreover, the results indicate that autonomy mediates the relationship between perceived autonomy support and each indicator of student engagement. This result means that teachers' provision of autonomy affects students' autonomy, which, in turn, promotes student engagement. This finding is in line with Jang et al. (2016), who observed that need satisfaction mediated the relationship between perceived autonomy support and engagement.

Limitations and future perspectives

This study focused exclusively on students' autonomy need satisfaction, but it is possible to include perceived competence and perceived relatedness need in the motivational model. Future research could relate student engagement and achievement (grades, performance, and academic progress) at the class level and establish the mediating role of the four types of engagement. Only undergraduate students were sampled; thus, it would be interesting to include students of different grade levels and students of different ethnic and cultural backgrounds. An interesting question for future research would be to analyse whether emotional engagement is more predictive of student outcomes. Future studies could explore the effects of longer time interval on the studied variables. Finally, our data were self-reported from the students' perspective; other researchers could rely on teachers' perceptions or diaries and study the relationships between different sources of information.

Implications for education

University teachers must become aware of the benefits of generating an autonomy-supportive climate in the classroom. Students benefit from teachers' perceived autonomy support, satisfying the need for autonomy, which, in turn, promotes greater classroom engagement over time. This engagement affects how well students perform in university (van Rooij et al., 2017).

This fact suggests that the development of intervention programmes to guide teachers to support student autonomy is an effective way to help students feel autonomous and achieve positive outcomes, such as classroom engagement (Jang et al., 2012). Guidance talks could provide a first step in explaining to teachers the factors that improve engagement in university. In this sense, we could suggest to teachers the implementation of interesting experiences in the classroom, propose self-regulated learning strategies, stimulate curiosity, search for attractive and understandable academic contents, and design fun and challenging tasks. Doing so might improve academic adjustment and reduce students' dropout risk in the early years of university (van Rooij et al., 2017).

Specifically, teachers should pay special attention to the emotional benefits of autonomy support in the classroom. If students have satisfied their need for autonomy, then they will feel more positive emotions in the classroom, will be interested and

enthusiastic, and will have more energy and vitality while performing classroom tasks. Students need to become excited when they learn, and the teacher can contribute to excitement in a meaningful way. Then, students will make every effort to perform tasks, pay more attention to the teacher, use more elaborate learning strategies, and feel free to express preferences and demand what they need in the classroom.

Conclusions

The Spanish version of the scale for assessing the four types of engagement showed evidence of reliability and validity. The findings from our prospective study suggest that emotional engagement is emerging as the type of engagement that is most favoured when the teacher supports the autonomy of his/her students. Therefore, it is a fundamental element in maintaining academic motivation during learning activities. In this sense, emotions are shown to be a very important key in obtaining positive academic outcomes in the classroom context. In short, these findings are interpreted as supporting SDT's motivation mediation model: perceived autonomy support longitudinally predicted student engagement because it nurtured changes in autonomy. This result could be considered in future intervention programmes to improve the teaching–learning process in the classroom.

Disclosure statement

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