



Motivation to learn: an international multilevel study on student autonomy and teacher emphasis on content usefulness

Juan Antonio Moreno-Murcia¹, Elisa Huéscar Hernández^{*1}, Jaime León², Gracielle Fin³, Rudy José Nodari Júnior⁴, Alfonso Valero-Valenzuela⁵, José Tristan⁶, Gabriel Gastélum-Cuadras⁷, María del Carmen Zueck Enríquez⁷, Rodrigo Vargas Vitoria⁸, Luís Cid^{9,10}, Diogo Monteiro^{10,11} and Diogo Teixeira^{12,13}

1 Centro de Investigación del Deporte, Miguel Hernández University of Elche (Spain)

2 Departamento de Educación; Universidad Las Palmas de Gran Canaria (Spain)

3 Mestrado em Biociências e Saúde, Universidade do Oeste de Santa Catarina (Brasil)

4 International Human Motricity Network, Salus Dermatoglfia (Brasil)

5 Departamento Actividad Física y Deporte, Universidad de Murcia (Spain)

6 Facultad Organización Deportiva, Universidad Autónoma de Nuevo León (México)

7 Facultad Ciencias de la Cultura Física, Universidad Autónoma de Chibnahua (México)

8 Departamento Ciencias de la Actividad Física, Universidad Católica del Maule (Chile)

9 Sport Sciences School of Rio Maior, Polytechnic of Santarém (ESDRM-IPSantarém), Rio Maior (Portugal)

10 Research Center in Sport, Health and Human Development (CIDESE), V'ila Real, (Portugal)

11 ESECS—Polytechnic of Leiria, Leiria (Portugal)

12 Faculty of Physical Education and Sport, Lusófona University (ULHT/FEFD), Lisboa (Portugal)

13 Research Center in Sport, Physical Education, Exercise and Health (CIDEFES), Lisboa (Portugal)

Título: Motivación para aprender: un estudio internacional multinivel sobre la autonomía de los estudiantes y el énfasis de los docentes en la utilidad del contenido.

Resumen: En la educación superior, pocos estudios relacionan factores contextuales en la clase, como el énfasis del profesor en la utilidad del contenido y las características motivacionales de los estudiantes. El objetivo fue probar un modelo multinivel sobre la relación entre el énfasis del docente en la utilidad del contenido durante la clase, la autonomía de los estudiantes y, a su vez, la motivación para aprender. Participaron 3033 estudiantes universitarios matriculados de 1º a 4º grado de Ciencias de la Actividad Física y del Deporte, de universidades de España ($N = 602$), Portugal ($N = 469$), México ($N = 1177$), Chile ($N = 372$), y Brasil ($N = 413$). Se realizó un modelo de ecuaciones estructurales multinivel, en el que los participantes respondieron preguntas sobre el énfasis del profesor en la utilidad del contenido de la clase, la autonomía y la motivación para aprender. Se hipotetizó que el énfasis del profesor en la utilidad del contenido predecía la autonomía del estudiante que, por su vez, predecía la motivación para aprender. Los resultados, a nivel grupal e individual, indican que el énfasis del docente en la utilidad del contenido predijo la autonomía del estudiante, y la autonomía predijo la motivación para aprender.

Palabras clave: Teoría de la autodeterminación. Motivación intrínseca para aprender. Educación superior. Estudiantes. Calidad de la enseñanza.

Abstract: Teacher autonomy support is related to improved student learning. In higher education, few studies relate classroom contextual factors, such as teacher emphasis on content usefulness, and students' motivational characteristics. The aim was to test a multilevel model about the relation between the extent of teachers' emphasis on the usefulness of class content with student autonomy, and, in turn, on motivation to learn. The participants were 3033 university students enrolled from 1st to 4th grade of Sciences of the Physical Activity and Sport, from universities in Spain ($N = 602$), Portugal ($N = 469$), Mexico ($N = 1177$), Chile ($N = 372$), and Brazil ($N = 413$). A multilevel structural equation model was performed, in which participants answered questions about the teacher's emphasis on the usefulness of class content, basic psychological need for autonomy, and motivation to learn. At the group and individual levels, the hypothesis is that the teacher's emphasis on the usefulness of class content predicted the student autonomy, in turn, student autonomy predicts student motivation to learn. Results found at the group level and at the individual level the strength of teacher emphasis on class content predicted student autonomy; student autonomy predicted student motivation to learn.

Keywords: Self-determination theory. Intrinsic motivation to learn. Higher education. Students. Teaching quality.

Introduction

From primary school through the secondary education years, the study of the processes involved in learning has become fundamental in the educational process to show students to think critically and to act autonomously. There are many factors involved in the learning process, among them the cognitive and motivational aspects that are considered central elements and which allow teachers to use the necessary strategies to achieve better academic outcomes and greater participation of their students in the learning process (Núñez & León, 2016; Yang, 2012).

The learning context is determined by many factors including the educational and institutional environment, the perception of importance and usefulness of the contents, and the students' interaction with the colleagues and with the teacher. The success of the study method used are closely linked to the cognitive and motivational factors that shape each student, since there is a relation between motivation and the learning approach adopted (Vermote et al., 2020).

Teachers assume an important mediational role in the learning process in accordance with how they present and structure course content and in relation to the design and structure of learning opportunities that they provide for their students (Marsh et al., 2012). The learning environment created by the teacher can determine the student's participation and the way in which they approach learning tasks. Therefore, the methodology used in the teaching process can meaningfully influence student learning (Jang et al., 2016).

* Correspondence address [Dirección para correspondencia]:

Elisa Huéscar Hernández, Universidad Miguel Hernández de Elche, Edificio Altamira, Avenida de la Universidad, s/n. 03202 Elche, Alicante (Spain).
E-mail: ehuascar@umh.es

(Article received: 24-05-2023; revised: 08-08-2023; accepted: 11-08-2023)

In higher education, appropriate pedagogical approaches can stimulate student autonomy, increase their motivation to learn and engagement in the learning process, and enable them to take initiative in their own learning processes in relation to their anticipated profession.

In creating a positive classroom environment, it is essential that teachers provide an attainable goal through a consideration of the individual capacities of each student (Cheon & Reeve, 2015). A non-controlling teaching style that allows for autonomous student motivation will be particularly important in contributing to these desired outcomes. Intrinsic motivation to learn in students will be apparent when they approach learning with the desire and willingness to learn new content without expecting any reward (Taylor et al., 2014). Intrinsically motivated students put more effort into accomplishing schoolwork, display greater persistence, and employ a greater number of learning strategies than do students whose approach to learning is less intrinsically motivated.

Intrinsic motivation can be strengthened by a teaching style that supports student autonomy and the provision of teacher autonomy has additional positive consequences in satisfying students' psychological needs (Froment, et al., 2023; Núñez & León, 2015) and autonomy-supportive style has been associated with positive outcomes for students including enabling greater autonomy and persistence in the learning process (Sparks et al., 2015; Van den Berghe et al., 2016).

Self-Determination Theory (*SDT*, Ryan & Deci, 2017) has been widely used in recent years as a theory that considers different motivational perspectives, contextual influences, and interpersonal perceptions that can influence whether students are voluntarily and autonomously engaged in the learning process or not. The motivational model proposes a continuum of self-determination in which a person may be more or less self-determined to perform a task. In self-determination theory (*SDT*) intrinsic motivation involves engaging for the reward of the activity itself, rather than for outcomes external to the activity, and extrinsic motivation is observed when actions are regulated by external factors, rewards or pressures (Deci & Ryan, 2000).

Within this theory, autonomy is essential to intrinsic motivation to learn allowing students to energize their classroom engagement and learning (Cheon et al., 2016; Patall et al., 2018; Ryan & Deci, 2017). Autonomy refers to feelings of self-governance and acting for oneself and on one's own accord (Niemic et al., 2010) but without feeling the necessity to be dependent on other people in the process (Vansteenkiste et al., 2004). In order to satisfy student's, it is essential that teaching behaviors contribute to students' intrinsic motivation through the use of non-controlling and informative language and being willing to accept student perspectives. It is important to provide challenging activities that involve student's individual interests and allow them to identify some of their own learning opportunities and to de-

termine some of the goals and desired outcomes in the learning process (Reeve et al., 2008).

Motivation to learn is a topic of interest in scientific literature because of its effect on school performance (Leroy & Bressoux, 2016) and its effects on the learning process itself (Núñez & León, 2016; Roth et al., 2007; Stoeber et al., 2011). The self-regulated learning model (Zimmerman et al., 2017), is also an object of study, as it argues that effective teaching is that which creates a teaching-learning environment that encourages students to engage in their own learning. The Theory of Self- vs External-Regulation Behavior (de la Fuente et al., 2020; de la Fuente, Pachón-Basallo, et al., 2022) has integrated the variables of achievement emotions and of academic engagement and proposed different types of relations among levels of variables in personal self-regulation and regulatory teaching to predict the meta-cognitive, meta-motivational and -emotional variables of learning, and of Academic Achievement in Higher Education (de la Fuente et al., 2017). In recent years, many studies have emerged trying to understand relevant considerations that affect student motivation to learn in relation to their perceptions of autonomy and certain teaching pedagogical behaviors.

An increasing number of studies now show that teaching autonomy-supportive relates to improved student learning. However, few studies have been conducted in the higher education context that have directly examined the relation between classroom contextual factors, such as teacher emphasis on the usefulness of course content, and student motivational characteristics (Ruiz-Alfonso & León, 2017) and no studies have been found that consider different populations, in this case Iberian and Ibero-American university students, with these variables. Recently, the *SDT* has recognized after two decades of research the need to conduct new studies focused on the study of the generality (versus variability) of the effects of different need satisfactions across different cultural and demographic contexts (Vansteenkiste et al., 2020). Some of the reasons for this strong revival come from the great advances and trends of contemporary research on the variables involved in people's motivational processes, generating new research questions that allow us to advance in a deeper understanding of the aspects involved from new extensions to basics relations already known. This study was designed with the intention of addressing this topic and also had the purpose of conducting an international examination with a sample of university students similar language countries, from Iberian and Ibero-American nationalities (Spain, Portugal, Chile, Mexico and Brazil).

The aim of this study was to examine how the teachers' extent of emphasis on the usefulness of their course content contributes to our understanding of student autonomy and, in turn, student motivation to learn. So, this international focus can contribute to the generalizability of findings in relation to the conceptual models of interest.

In this regard, the hypothesis is that the teacher's emphasis on the usefulness of class content predict the student au-

tonomy. In turn, student autonomy predicts student motivation to learn.

Method

Sample

The sample was comprised of a total of 3,033 (2,051 female and 982 male), university students, ranged in age from 17 to 63 years ($M = 21.51$ yrs., $SD = 3.71$ yrs.), enrolled from 1st to 4th grade of Sciences of the Physical Activity and Sport, from different universities in Spain ($N = 602$), Portugal ($N = 469$), Mexico ($N = 1177$), Chile ($N = 372$), and Brazil ($N = 413$). A non-probability sampling technique was used for convenience (Morrison, 2011). It was a disproportionate stratified sampling where the target population (university students) was defined, the identified the stratification variable (Physical Activity and Sports Sciences) and the number of strata to be used (1st-4th grade) was determined.

Measures

Teacher emphasis on the usefulness of class content. In order to determine the perception of students about the extent to which teachers emphasized the usefulness and interest of their class content, we used the items from the selected dimension of scale that designed to assess teaching quality (Leon et al., 2017). Following (Muñiz et al., 2013) the translation of the scale was carried out through a reverse translation of the items of the questionnaire, transcribed by an independent translator. This dimension consists of nine items (e.g., "My teacher discusses various topics when doing class work") preceded by the phrase, "In the subject..." and students respond to a five-point Likert-scale ranging from "1" (strongly disagree) to "5" (strongly agree). In this study, Cronbach's alpha value of .96 was obtained as an index of the intrascale reliability for the items on this scale.

Autonomy. The Scale of Basic Psychological Need Satisfaction (*Échelle de Satisfacción des Besoins Psychologiques*) (León et al., 2011) was used in this research and was designed for use in the educational context. Following (Muñiz et al., 2013) the translation of the scale was carried out through a reverse translation of the items of the questionnaire, transcribed by an independent translator. For this work, only the dimension of autonomy was assessed. Five items on the scale were preceded by the statement, "In my class..." and the instrument assessed feelings of student autonomy (e.g., "I feel free to make my decisions"). The responses were provided in relation to a Likert-scale format ranging from "1" (totally disagree) to "5" (totally agree). The internal consistency of this instrument as expressed by Cronbach's alpha value was .88.

Motivation to learn. To measure student motivation, the intrinsic motivation subscale (Alonso et al., 2005) of Valle-land and colleagues' Scale of Motivation in Education (Valleland et al., 1989) was used. Following (Muñiz et al., 2013) the translation of the scale was carried out through a reverse

translation of the items of the questionnaire, transcribed by an independent translator. This instrument includes four items (e.g., "For the pleasure I feel in expanding my knowledge on topics that interest me") and each item is preceded by the phrase, "Why do you study?". Responses are provided on a Likert-scale format with response opportunities ranging from "1" (strongly disagree) to "7" (strongly agree). A Cronbach's alpha value of .84 was obtained for the instrument's internal reliability in the present study.

Procedure

The research was approved by the Ethics Committee (registration number: 191007203011) and carried out in accordance with the Declaration of Helsinki of 1964 and its subsequent amendments. All the questionnaires were adapted to the language of the country (Spanish or Portuguese), the adjustment was even differentiated within the Portuguese language of the same (Portugal or Brazil).

Administrators and relevant faculty from the participating universities were contacted by means of a letter explaining the objectives of the research and how it was to be carried out with the inclusion of informed consent forms and the actual instrument to be distributed.

The questionnaires were sent either through Google Docs Questionnaires or in paper format for those sites that were more immediately accessible to the researchers. All of the participants were informed of the objectives of the study and of their rights as participants, including the protection of their confidentiality, protection of their responses and their voluntary participation. Students needed approximately ten minutes to complete the instrument.

Data analysis

Hypothesis testing was conducted through a multilevel structural equation model. At the group and individual levels, the teacher emphasis on the usefulness of class content was hypothesized to predict motivation to learn via student autonomy. To gather evidence of the indirect effect of student autonomy we compared the proposed model (full indirect) with a nested model (partial mediated) where teacher emphasis on the usefulness of class content also predicted motivation to learn (Morin et al., 2014). If the proposed model fits as well as the nested model (less parsimonious), we would gather evidence of the indirect effect of autonomy on the relation between teacher emphasis on class content usefulness and student autonomy. In order to estimate the confidence interval of the indirect effect we used the delta method (Hayes, 2018). With regard to the estimation method, we used weighted least square mean and variance adjusted method (WLSMV), because this approach does not require data to be continuous.

To test if the proposed model was similar across the samples from the different countries, we performed a multiple group analysis (Pendergast et al., 2017). Specifically, we

tested four nested models with the following specifications: 1) free loadings, thresholds, factor means and regressions between factors across countries; 2) fixed loadings and thresholds, but different factor means and regressions between factors across countries; 3) fixed loadings, thresholds, and factor means, but different regressions between factors across countries; and 4) fixed loadings, thresholds, factors means, and regressions between factors across countries. If a more parsimonious model (*i.e.*, Model 2 vs. Model 1), did not provide a poorer fit, it can be concluded that the parameters (*i.e.*, loadings and thresholds) were not different across countries. It is important to note that Mplus does not allow for the test of a multiple group analysis with a multilevel structure using

WLS estimators. Therefore, we performed a multiple group comparison in a single level structure. All analyses were performed with Mplus 8.4 (Muthén & Muthén, 2019).

Results

Descriptive Analysis

As Table 1 shows, motivation to learn was the variable with the highest mean and highest variability, while autonomy showed greater similarity within the same class ($ICC = .12$). The strongest relation between variables was between teacher emphasis on class contents and autonomy ($r = .34$).

Table 1
Descriptive Analysis, intraclass correlation and correlation among variables

	Mean	SD	ICC	1	2	3
1. Content emphasis	4.12	.88	.11			
2. Autonomy	3.82	.87	.12	.52		
3. Motivation to learn	5.74	1.12	.07	.25	.19	

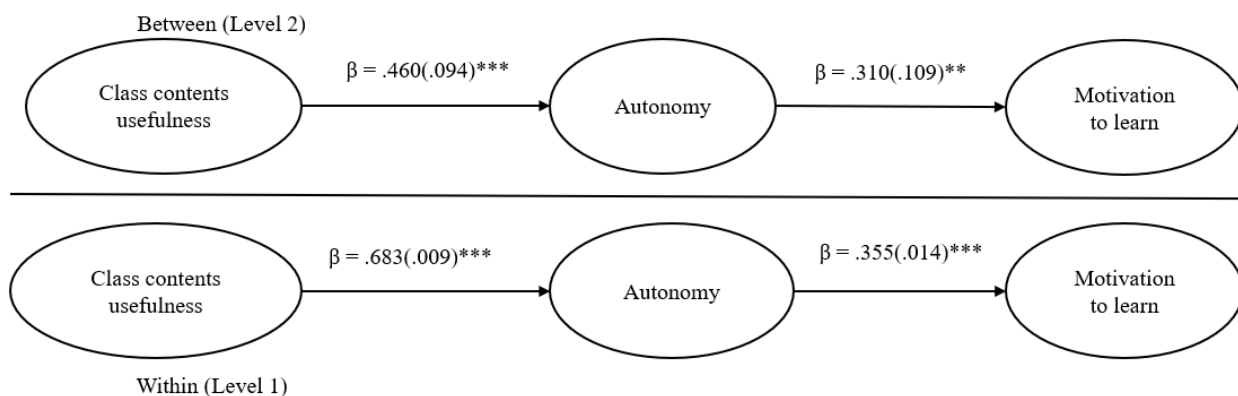
Note. SD = standard deviation. ICC = intraclass correlation. Group-level correlations are displayed in the upper diagonal triangle, while individual-level correlations are in the lower diagonal triangle.

Multilevel Structural Equation Model

Overall, the proposed model provided an adequate fit to the data: $\chi^2(3032, 128) = 3,187$ ($p < .001$) as expressed by the various fit indices, $RMSEA = .08$; $SRMR_{within} = .06$; $SRMR_{between} = .08$; and $CFI = .95$. At the group level, the strength of teacher emphasis on class content predicted stu-

dent autonomy ($\beta = .46$; $SE = .09$; $p < .001$), and student autonomy predicted student motivation to learn ($\beta = .31$; $SE = .10$; $p < .01$). At the individual level, the variable of teacher emphasis on class content predicted student autonomy ($\beta = .66$; $SE = .01$; $p < .001$), and student autonomy predicted student motivation to learn ($\beta = .35$; $SE = .01$; $p < .001$). These relations are presented in Figure 1.

Figure 1
Multilevel Structural Equation Model



Indirect Effects

The examination of the fit of the nested model where we added an additional path from teacher emphasis on the usefulness of class contents to motivation to learn did not provide a better fit to the data: $\chi^2(3032, 126) = 3745.94$ ($p < .001$), $RMSEA = .10$, $SRMR_{within} = .05$, $SRMR_{between} = .09$, and $CFI = .95$. In addition, the added parameter at the group level showed a low value ($\beta = .02$; $SE = .16$; $p = .89$), while at the individual level it was $\beta = .07$; $SE = .02$; $p < .001$). In

the proposed model, the indirect effect of autonomy in the relation between teacher emphasis on class contents and motivation to learn at the group level was $\beta = .11$; $SE = .05$; $p = .05$. While, at the individual level it was $\beta = .04$; $SE = .01$; $p < .01$.

Multiple Group Analysis

Model comparison did not reveal substantial improvement relative to the more parsimonious model. As can be

seen in Table 2, only a small improvement was detected when comparing a model with fixed loadings and a threshold versus a model with factor means was similar across countries. These findings suggested a similar model across countries.

Table 2
 χ^2 test and fit indexes for multiple countries comparisons

Model	χ^2		RMSEA	CFI
	Value	DF		
1	1599.36	491	.06	.95
2	1733.65	543	.06	.95
3	1521.86	555	.05	.96
4	1427.88	563	.05	.96

Note. Model 1: Free loadings, thresholds, factor means and relation. Model 2: Fixed loadings and thresholds. Model 3: Fixed loadings, thresholds and factor means. Model 4: Fixed loadings, thresholds, factor means and regressions between factors.

Discussion

This study was designed to test a multilevel (group and individual levels) model about the relation between the extent of teachers' emphasis on the usefulness of class content with student autonomy, and, in turn, on motivation to learn. Our findings extend previous research and also present unique knowledge since the study included university students from different countries with a unique set of measured variables.

The findings provided support for the hypotheses since at both the group and individual level student perceptions of the perceived usefulness of the class content contributed to the explanation of student autonomy which, in turn, helped to explain student motivation to learn as a robust and generalizable relation.

To date, limited research has been conducted linking self-determination variables with instructor emphasis on class content usefulness. However, some studies have found a link between the content usefulness variable and intrinsic motivation in relation to students' feelings of passion for the subject matter. Predictive models (Bonneville-Roussy et al., 2011; Ruiz-Alfonso & León, 2017) have also found a positive relation between these two variables, providing evidence that university students who perceive greater support for teacher autonomy manifest higher levels of harmonious passion than those who believed their teachers preferred a controlling teaching environment.

Several studies have also provided support for the expectation that student autonomy perceptions are related to intrinsic motivation and contribute to their subject matter engagement and academic achievement (Howard et al., 2021; Jang et al., 2010; Leon et al., 2017; Yoon et al., 2020). Our research provides support for the belief that teachers' emphasis on the usefulness of class content will contribute to support for student autonomy and motivation to learn. Therefore, it is important that teachers use appropriate methodologies and pedagogical tools that allow students to better appreciate why they learn specific classroom content and link theory to practice in order to promote greater stu-

dent engagement in their university learning experience. Explaining the usefulness of class content is a strategy to support student autonomy (Leon et al., 2017). It is also strongly recommended that teachers do not use controlling language and that they recognize students' individual differences and respect students' feelings. In addition, instructors can provide opportunities for students to plan and prepare for classes in advance and to provide challenges and positive feedback to students (Guay, 2022).

Some studies in higher education explored the influence of Self- vs External-Regulation Behavior Theory on student behavior and related that factors such as feedback from instructors, grading systems, and academic policies, were found to impact students' study habits, engagement, and motivation (de la Fuente, Martínez-Vicente, et al., 2022; Guo, 2020). Understanding these theories can inform educators and policymakers in creating environments that promote student autonomy, motivation, and academic achievement.

This research did not find a difference in the pattern of relations among university students from different countries involved in this study. These findings highlight the need for additional to consider possible differences in pedagogical delivery and student motivation from an international perspective helping to draw new future directions (Vansteenkiste et al., 2020). This study was not without its limitations, since it assessed only the psychological need of autonomy so it is proposed that additional research could be conducted to include the variables of competence and relatedness. We can also suggest that in future studies other variables can be used to evaluate the teacher's perception as well, on the variables that influence their classes, such as the perception of success during the class. The inclusion of other kinds of motivation (e.g., identified regulation; or modeling autonomous vs. controlled motivation), as well as perhaps additional teaching strategies, and other outcomes such as learning outcomes. It highlights the need for more studies that consider methodological differences and curricular training in higher education, since the countries have different characteristics for training in higher education.

Conclusion

In closing, we found that the student perceptions of the perceived usefulness of the course content contributed to the explanation of student autonomy which, in turn, helped to explain student motivation to learn as a robust and generalizable relation. These results are meaningful given the large and diverse sample of university students from various countries that were involved in this research and the international implications for these findings.

Complementary information

Conflict of interests.- The authors of this article declare no conflict of interest.

Financial support.- No funding.

References

- Alonso, J. L. N., Lucas, J. M.-A., & Izquierdo, J. G. N. (2005). Validación de la versión española de la Échelle de Motivation en Éducation. [Validity of the Spanish version of the Échelle de Motivation en Éducation.]. *Psicothema*, 17, 344–349.
- Bonneville-Roussy, A., Lavigne, G. L., & Vallerand, R. J. (2011). When passion leads to excellence: The case of musicians. *Psychology of Music*, 39, 123–138. <https://doi.org/10.1177/0305735609352441>
- Cheon, S. H., & Reeve, J. (2015). A classroom-based intervention to help teachers decrease students' amotivation. *Contemporary Educational Psychology*, 40, 99–111. <https://doi.org/10.1016/j.cedpsych.2014.06.004>
- Cheon, S. H., Reeve, J., & Song, Y.-G. (2016). A Teacher-Focused Intervention to Decrease PE Students' Amotivation by Increasing Need Satisfaction and Decreasing Need Frustration. *Journal of Sport & Exercise Psychology*, 38(3), 217–235. <https://doi.org/10.1123/jsep.2015-0236>
- de la Fuente, J., Amate, J., González-Torres, M. C., Artuch, R., García-Torrecillas, J. M., & Fadda, S. (2020). Effects of Levels of Self-Regulation and Regulatory Teaching on Strategies for Coping With Academic Stress in Undergraduate Students. *Frontiers in Psychology*, 11. <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.00022>
- de la Fuente, J., Martínez-Vicente, J. M., Pachón-Basallo, M., Peralta-Sánchez, F. J., Vera-Martínez, M. M., & Andrés-Romero, M. P. (2022). Differential Predictive Effect of Self-Regulation Behavior and the Combination of Self- vs. External Regulation Behavior on Executive Dysfunctions and Emotion Regulation Difficulties, in University Students. *Frontiers in Psychology*, 13. <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.876292>
- de la Fuente, J., Pachón-Basallo, M., Martínez-Vicente, J. M., Peralta-Sánchez, F. J., Garzón-Umerenkova, A., & Sander, P. (2022). Self- vs. External-Regulation Behavior Scale™ in different psychological contexts: A validation study. *Frontiers in Psychology*, 13, 922633. <https://doi.org/10.3389/fpsyg.2022.922633>
- de la Fuente, J., Sander, P., Martínez-Vicente, J. M., Vera, M., Garzón, A., & Fadda, S. (2017). Combined Effect of Levels in Personal Self-Regulation and Regulatory Teaching on Meta-Cognitive, on Meta-Motivational, and on Academic Achievement Variables in Undergraduate Students. *Frontiers in Psychology*, 8, 232. <https://doi.org/10.3389/fpsyg.2017.00232>
- 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, 227–268. https://doi.org/10.1207/S15327965PLI1104_01
- Froment, F., Gutiérrez, M. D. B., & Flores, J. G. (2023). Efecto del apoyo a la autonomía sobre la satisfacción académica: la motivación y el compromiso académico como variables mediadoras. *Revista de Investigación Educativa*, 41(2), 479–499.
- Guay, F. (2022). Applying Self-Determination Theory to Education: Regulations Types, Psychological Needs, and Autonomy Supporting Behaviors. *Canadian Journal of School Psychology*, 37(1), 75–92. <https://doi.org/10.1177/08295735211055355>
- Guo, W. (2020). Grade-Level Differences in Teacher Feedback and Students' Self-Regulated Learning. *Frontiers in Psychology*, 11. <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.00783>
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis* (2^o ed). Guilford Press.
- Howard, J. L., Bureau, J., Guay, F., Chong, J. X. Y., & Ryan, R. M. (2021). Student Motivation and Associated Outcomes: A Meta-Analysis From Self-Determination Theory. *Perspectives on Psychological Science*, 16(6), 1300–1323. <https://doi.org/10.1177/1745691620966789>
- Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology*, 102, 588–600. <https://doi.org/10.1037/a0019682>
- Jang, H., Reeve, J., & Halusic, M. (2016). A new autonomy-supportive way of teaching that increases conceptual learning: Teaching in students' preferred ways. *Journal of Experimental Education*, 84, 686–701. <https://doi.org/10.1080/00220973.2015.1083522>
- León, J., Domínguez, E., Núñez, J. L., Pérez, A., & Martín-Albo, J. (2011). Traducción y validación de la versión española de la Échelle de Satisfacción des Besoins Psychologiques en el contexto educativo. *An. psicol.*, 405–411.
- Leon, J., Medina-Garrido, E., & Núñez, J. L. (2017). Teaching Quality in Math Class: The Development of a Scale and the Analysis of Its Relationship with Engagement and Achievement. *Frontiers in Psychology*, 8. <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00895>
- Leroy, N., & Bressoux, P. (2016). Does amotivation matter more than motivation in predicting mathematics learning gains? A longitudinal study of sixth-grade students in France. *Contemporary Educational Psychology*, 44–45, 41–53. <https://doi.org/10.1016/j.cedpsych.2016.02.001>
- Marsh, H. W., Lüdtke, O., Nagengast, B., Trautwein, U., Morin, A. J. S., Abduljabbar, A. S., & Köller, O. (2012). Classroom Climate and Contextual Effects: Conceptual and Methodological Issues in the Evaluation of Group-Level Effects. *Educational Psychologist*, 47(2), 106–124. <https://doi.org/10.1080/00461520.2012.670488>
- Morin, A. J. S., Marsh, H. W., Nagengast, B., & Scalas, L. F. (2014). Double latent multilevel analyses of classroom climate: An illustration. *The Journal of Experimental Education*, 82(2), 143–167. <https://doi.org/10.1080/00220973.2013.769412>
- Morrison, L. C., Lawrence Manion, Keith. (2011). *Research Methods in Education* (7^o ed). Routledge. <https://doi.org/10.4324/9780203720967>
- Muñiz, J., Elosua, P., & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: Segunda edición. *Psicothema*, 25.2, 151–157. <https://doi.org/10.7334/psicothema2013.24>
- Muthén, L. K., & Muthén, B. O. (2019). *Mplus user's guide* (8^o ed). Muthén & Muthén.
- Niemiec, C. P., Ryan, R. M., & Deci, E. L. (2010). Self-determination theory and the relation of autonomy to self-regulatory processes and personality development. Em *Handbook of personality and self-regulation* (p. 169–191). Wiley-Blackwell. <https://doi.org/10.1002/9781444318111.ch8>
- Núñez, J. L., & León, J. (2015). Autonomy support in the classroom: A review from self-determination theory. *European Psychologist*, 20, 275–283. <https://doi.org/10.1027/1016-9040/a000234>
- Núñez, J. L., & León, J. (2016). The Mediating Effect of Intrinsic Motivation to Learn on the Relationship between Student's Autonomy Support and Vitality and Deep Learning. *The Spanish Journal of Psychology*, 19, E42. <https://doi.org/10.1017/sjp.2016.43>
- Patall, E. A., Steingut, R. R., Vasquez, A. C., Trimble, S. S., Pituch, K. A., & Freeman, J. L. (2018). Daily autonomy supporting or thwarting and students' motivation and engagement in the high school science classroom. *Journal of Educational Psychology*, 110, 269–288. <https://doi.org/10.1037/edu0000214>
- Pendergast, L. L., von der Embse, N., Kilgus, S. P., & Eklund, K. R. (2017). Measurement equivalence: A non-technical primer on categorical multi-group confirmatory factor analysis in school psychology. *Journal of School Psychology*, 60, 65–82. <https://doi.org/10.1016/j.jsp.2016.11.002>
- Reeve, J., Ryan, R., Deci, E. L., & Jang, H. (2008). Understanding and promoting autonomous self-regulation: A self-determination theory perspective. Em *Motivation and self-regulated learning: Theory, research, and applications* (p. 223–244). Lawrence Erlbaum Associates Publishers.
- Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology*, 99, 761–774. <https://doi.org/10.1037/0022-0663.99.4.761>
- Ruiz-Alfonso, Z., & León, J. (2017). Passion for math: Relationships between teachers' emphasis on class contents usefulness, motivation and grades. *Contemporary Educational Psychology*, 51, 284–292. <https://doi.org/10.1016/j.cedpsych.2017.08.010>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness* (p. xii, 756). The Guilford Press. <https://doi.org/10.1521/978.14625/28806>
- Sparks, C., Dimmock, J., Whipp, P., Lonsdale, C., & Jackson, B. (2015). “Getting connected”: High school physical education teacher behaviors that facilitate students' relatedness support perceptions. *Sport, Exercise, and Performance Psychology*, 4, 219–236. <https://doi.org/10.1037/spy0000039>
- Stoerber, J., Childs, J. H., Hayward, J. A., & Feast, A. R. (2011). Passion and motivation for studying: Predicting academic engagement and burnout

- in university students. *Educational Psychology*, 31(4), 513–528. <https://doi.org/10.1080/01443410.2011.570251>
- Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., & Koestner, R. (2014). A self-determination theory approach to predicting school achievement over time: The unique role of intrinsic motivation. *Contemporary Educational Psychology*, 39, 342–358. <https://doi.org/10.1016/j.cedpsych.2014.08.002>
- Vallerand, R. J., Blais, M. R., Brière, N. M., & Pelletier, L. G. (1989). Construction et validation de l'échelle de motivation en éducation (EME). [Construction and validation of the Motivation toward Education Scale.]. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement*, 21, 323–349. <https://doi.org/10.1037/h0079855>
- Van den Berghe, L., Cardon, G., Tallir, I., Kirk, D., & Haerens, L. (2016). Dynamics of need-supportive and need-thwarting teaching behavior: The bidirectional relationship with student engagement and disengagement in the beginning of a lesson. *Physical Education and Sport Pedagogy*, 21, 653–670. <https://doi.org/10.1080/17408989.2015.1115008>
- Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, 44, 1–31. <https://doi.org/10.1007/s11031-019-09818-1>
- Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating Learning, Performance, and Persistence: The Synergistic Effects of Intrinsic Goal Contents and Autonomy-Supportive Contexts. *Journal of Personality and Social Psychology*, 87, 246–260. <https://doi.org/10.1037/0022-3514.87.2.246>
- Vermote, B., Aelterman, N., Beyers, W., Aper, L., Buysschaert, F., & Vansteenkiste, M. (2020). The role of teachers' motivation and mindsets in predicting a (de)motivating teaching style in higher education: A circumplex approach. *Motivation and Emotion*, 44(2), 270–294. <https://doi.org/10.1007/s11031-020-09827-5>
- Yang, Y.-T. C. (2012). Cultivating critical thinkers: Exploring transfer of learning from pre-service teacher training to classroom practice. *Teaching and Teacher Education*, 28(8), 1116–1130. <https://doi.org/10.1016/j.tate.2012.06.007>
- Yoon, S., Kim, S., & Kang, M. (2020). Predictive power of grit, professor support for autonomy and learning engagement on perceived achievement within the context of a flipped classroom. *Active Learning in Higher Education*, 21, 233–247. <https://doi.org/10.1177/1469787418762463>
- Zimmerman, B. J., Schunk, D. H., & DiBenedetto, M. K. (2017). The role of self-efficacy and related beliefs in self-regulation of learning and performance. Em *Handbook of competence and motivation: Theory and application*, 2nd ed (p. 313–333). The Guilford Press.