

The Relationship among Student Psychological Need Satisfaction, Approaches to Learning, Reporting of Avoidance Strategies and Achievement

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Abstract

Introduction. This study examines the relationship between student psychological need satisfaction (autonomy, competence, relatedness and belonging), their reporting of approaches to learning (deep and surface), their reporting of avoidance strategies (avoidance of effort and challenge, avoidance of help seeking and preference to avoid novelty) and achievement in subject-matter domains.

Method. The sample was composed of 157 Spanish undergraduate students. Self-report questionnaires were used to measure the construct selected for this study and their interrelationships were examined using structural equation procedures.

Results. In general terms, we have proved that basic needs satisfaction, when satisfied, encourage the use of the deep approach to learning and, in turn, the decrease of students' avoidance strategies. In contrast, when these needs are not satisfied, the use of the surface approach to learning is encouraged, consequently, leads to an increase in students' avoidance strategies and achievement.

Conclusions. The results suggest that approaches to learning and avoidance strategies may play a mediator role between student psychological needs and student achievement. Implications for pedagogical practice are discussed.

Keywords. Psychological needs, approaches to learning, avoidance strategies, student achievement.

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Resumen

Introducción. Este estudio examina la relación entre las necesidades psicológicas básicas de los estudiantes (autonomía, competencia, relación y pertenencia), enfoques de aprendizaje (profundo y superficial), estrategias de evitación (evitación al esfuerzo y desafíos, evitación en pedir ayuda, y evitación de la novedad) y rendimiento en varias situaciones educativas universitarias.

Método. La muestra estaba compuesta por 157 estudiantes universitarios. Para medir los constructos seleccionados se utilizaron escalas de auto-informe. La relación entre dichos constructos se examinó a través de modelos de ecuaciones estructurales.

Results. En general se ha constatado que cuando las necesidades básicas de los estudiantes son satisfechas promueven la utilización de enfoques de aprendizaje profundo lo que a su vez repercute en una menor utilización de estrategias de evitación y un mayor rendimiento escolar. Por el contrario, cuando no son satisfechas promueven a la utilización de enfoques de aprendizaje superficial, lo que a su vez repercute en una mayor utilización de estrategias de evitación y un menor rendimiento escolar.

Conclusions. Los resultados obtenidos sugieren que los enfoques de aprendizaje y las estrategias de evitación pueden jugar un papel mediador entre las necesidades psicológicas de los estudiantes y el rendimiento escolar. Por último se discuten las implicaciones prácticas que pueden tener estos hallazgos en la educación universitaria.

Keywords. Necesidades psicológicas, enfoques de aprendizaje, estrategias de evitación, rendimiento escolar.

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Introduction

This study examines the relationship among students reporting psychological need satisfaction (Autonomy, Competence, Relatedness and Belonging), their reporting of both approaches to learning (deep and surface), avoidance strategies (avoidance of effort and challenge, avoidance of help seeking and preference to avoid novelty) and achievement in Spanish undergraduate students.

This research is addressed to go deep into the role played by psychological needs in students learning and how their satisfaction can promote academic achievement in the classroom context. The importance of this study is threefold: first, it could help build bridges between different domains of Educational Psychology; second, by examining the connections the variables considered, this research may help to understand the processes by which basic need satisfaction affects achievement; and third, due to the practical implications that can be extracted for teaching and learning.

Besides to extend previous research conducted in this field (Turner, Meyer, Anderman, Midgley, Gheen, & Kang, 2002; Black & Deci, 2000), the main contribution of the present study is to help explain the connections among avoidance strategies, approaches to learning, and achievement in specific subject-matter domains. Another contribution is to help explain why students use negative strategies in their learning process. This research could provide useful information about how to improve students learning and achievement.

Student Psychological need satisfaction

Deci and Ryan's (1985, 2000) self-determination theory (SDT) is an organismic theory of optimal human motivation, extensively supported over the last three decades by a number of studies in the field of education, particularly at primary and secondary school levels (Ryan & Stiller, 1991; Sheldon & Biddle, 1998). According to the SDT, three basic psychological needs (autonomy, competence, and relatedness) undermine or support peoples' intrinsic motivation to engage in a given behavior. For example, educational research derived from this theory has

shown that teachers' supportiveness of autonomy is an important factor for maximal learning, growth, and creativity in students.

Autonomy occurs when people feel they are the cause of their behavior (Deci & Ryan, 1985). "Autonomy is not independence or total freedom, but rather an internal acceptance of, and engagement with, one's motivated behavior. Supporting autonomy means taking the student's perspective, providing choice, and providing a meaningful rationale when choice is not possible" (Filak & Sheldon, 2003, p. 235). *Competence* occurs when one feels effective in one's behavior. Competence comes close to self-efficacy and can be seen when one takes on and masters challenging tasks. "Supporting competence means conveying confidence in the students' ability to surmount challenges, and providing sensitive mentoring and feedback" (Filak & Sheldon, 2003, p. 237). *Relatedness* occurs when one feels connected to, or understood by, others. This construct is similar to the need for belongingness posited by Baumeister and Leary (1995), but is more general, including interpersonal as well as group connections (Filak & Sheldon, 2003). Supporting relatedness means providing acceptance, respect, and a feeling of caring.

According to the SDT, when these three needs are satisfied, they encourage psychological well-being and enable students to achieve optimal academic performance. In contrast, when these needs are not satisfied, students fail to thrive. Previous research (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Sheldon, Ryan, & Reis, 1996; Sheldon, Elliot, Kim, & Kasser, 2001) has provided empirical evidence of these assumptions. Previous research has also proved the positive effect of psychological need satisfaction and achievement (Black & Deci, 2000), however, studies focused on examining the relationship between students' psychological needs and achievement in specific subject-matter domains are scarce. Finally, the SDT further suggests that satisfaction of the three basic psychological needs will enhance employees' intrinsic motivation and that this will in turn yield important outcomes such as "effective performance, particularly on tasks requiring creativity, cognitive flexibility, and conceptual understanding"(Gagné & Deci, 2005, p. 337).

Approaches to Learning

A general consensus exists among authors to adopt the classification of surface and deep approaches to learning (Biggs, 1987, Ramsden & Entwistle, 1981). The deep approach is characterized by an intention to seek meaning in, and an understanding of, the material being studied by using the material to elaborate and transform it (Dart, Burnett, Purdie, Boulton-Lewis, Campbell, & Smith, 2000). This approach to learning is associated with constructivist teaching (Biggs & More, 1993). With the surface approach, the material being studied is reproduced using routine procedures and is related to the traditional transmission model of teaching in which learners assume passive roles (Dart, et al., 2000). Some authors have also verified the existence of a certain relationship between the motivation type and approaches to learning. Hence, the student's predominant motivation type could be significantly related to the use of certain learning strategies and, consequently, to the approach that he or she uses (Biggs, 1989, Entwistle, 1987, Schmeck 1988). The motive-strategy relationships that form and define each approach explain the way of learning followed by students who adopt one approach or the other. Thus, students who adopt a surface approach develop certain strategies designed to learn the information mechanically and repetitively in order to reproduce it at the appropriate time. On the other hand, students who adopt a deep approach show an intrinsic interest in, and involvement with, the subject to be learned. These students characteristically focus their intentions on reaching a significant understanding of the learning content by developing strategies aimed to discover the meaning of what he or she will learn by establishing relationships with his or her most salient previous knowledge. Finally, approaches to learning were found to predict academic achievement (Diseth & Martinsen, 2003).

Avoidance Behaviors

According to Covington (1992), when students want to protect self-worth because they are uncertain of their ability to be competent at school, they may develop strategies that deflect attention from their ability. In this way, they protect their public image of competence. There are diverse strategies available to students for deflecting attention from their ability, such as avoiding help seeking, avoiding novelty in academic work, avoiding effort and challenges, withdrawing effort (self-handicapping), and so forth. Although these avoidance strategies may protect students from negative judgments by both teachers and classmates, they may also affect performance

negatively. Previous research (Nichols & Miller, 1984) has revealed that avoidance behaviors are more frequent in young adolescents because, at this age, children switch from the conception of ability as something modifiable with effort to a fixed notion. If students perceive that their basic needs are supported by the teacher, they will feel more satisfied and more at ease in the classroom. Consequently, they will worry less about protecting their self-worth.

Psychological Needs, Approaches to Learning and Avoidance Behaviors

To our knowledge, no attempts to relate student need satisfaction with both approaches to learning and avoidance behaviors have been made, but connections among them can be established. Studies have found that students' perceptions of their learning environments have a significant influence on their approaches to learning and also on the quality of their learning outcomes (e.g. Doyle, 1977; Fraser, 1989, 1998; Ramsden, 1992; Waxman, 1991). More specifically, a number of studies that relate approaches to learning to the perceptions of the psychological classroom environments have been undertaken in the last two decades (e.g., Dart, Burnett, Boulton-Lewis, Campbell, Smith, & McCrindle, 1999; Cleave-Hogg & Rothman, 1991; Ramsden, Martin, & Bowden, 1989; Yuen-Yee & Watkins, 1994). According to the SDT, the classroom environment (included teaching strategies) should be designed in order to meet students' psychological needs as it enhances intrinsic motivation for learning. As Valas and Sovik (1993) claim: "to what extent a student is intrinsically motivated for an activity depends on how far this activity and the related context can meet these needs", p. 282). Consequently, it can be inferred that psychological students' perceptions of psychological needs satisfactions (learning environment) may be related to the learning approach they adopt. Furthermore, the SDT postulates that satisfying basic psychological needs provides the nutrients for intrinsic motivation and internalization (Gagné & Deci, 2005) and, as we argue above, the student's predominant motivation type could be significantly related to the use of certain learning strategies and, consequently, to the approach that he or she uses (Biggs, 1989, Entwistle, 1987, Schmeck 1988). Moreover, the motive-strategy relationships that form and define each approach suggest that the connections between psychological needs and approaches to learning could be important. If intrinsic motivation will be facilitated by conditions that lead to psychological need satisfaction (Deci & Ryan 2000), and intrinsic motivation is involved in deep approaches (since the student

who adopts a deep approach shows an intrinsic interest in, and involvement with, the subject to be learned), positive connections can be inferred between psychological needs satisfaction and deep approaches to learning. Previous studies also confirmed that intrinsic motivation is associated with better learning, performance and well-being (Valas & Sovik, 1993). In contrast, negative connections with the surface approach can be inferred since the student who adopts a surface approach develops certain strategies designed to learn the information mechanically and repetitively in order to reproduce it at the appropriate time.

As we pointed out before, the SDT psychological needs satisfaction enhances students' intrinsic motivation. Intrinsic motivation "is manifested as curiosity and interest, which motivate task engagement even in the absence of outside reinforcement or support..." (Ryan, Connell, & Grolnick, 1992, p.170). Thus, students with intrinsic motivation will be more involved in their learning process and, consequently, avoidance strategies will reduce. In contrast, when psychological needs are not satisfied, intrinsic motivation may change into amotivation (the opposite pole in the self-determination continuum). According to the SDT, people are likely to be amotivated when they lack either a sense of efficacy or a sense of control to a desired outcome (Deci & Ryan 2000). Thus based on the SDT, the use of avoidance strategies could be explained as a consequence of students' amotivation. Based on these considerations, negative connections can be inferred between psychological needs and avoidance strategies.

Hypotheses

In accordance with the above rationale and the conceptual model proposed, the objective of this study was to examine the relationships among student need satisfaction, students' approaches to learning, avoidance strategic and student achievement in subject-matter domains in the classroom context. The relationships among the variables hypothesized are structured into three sequential phases where psychological needs satisfaction (depending on the students' perception of their learning environment) are considered input variables, students' approaches to learning and avoidance strategy are considered process variables, and achievement is taken as an output variable. We took psychological needs as a superordinate factor (latent variable) rather

than independent predictors given the substantial correlations observed among them. The general model hypothesized is shown in Figure 1.

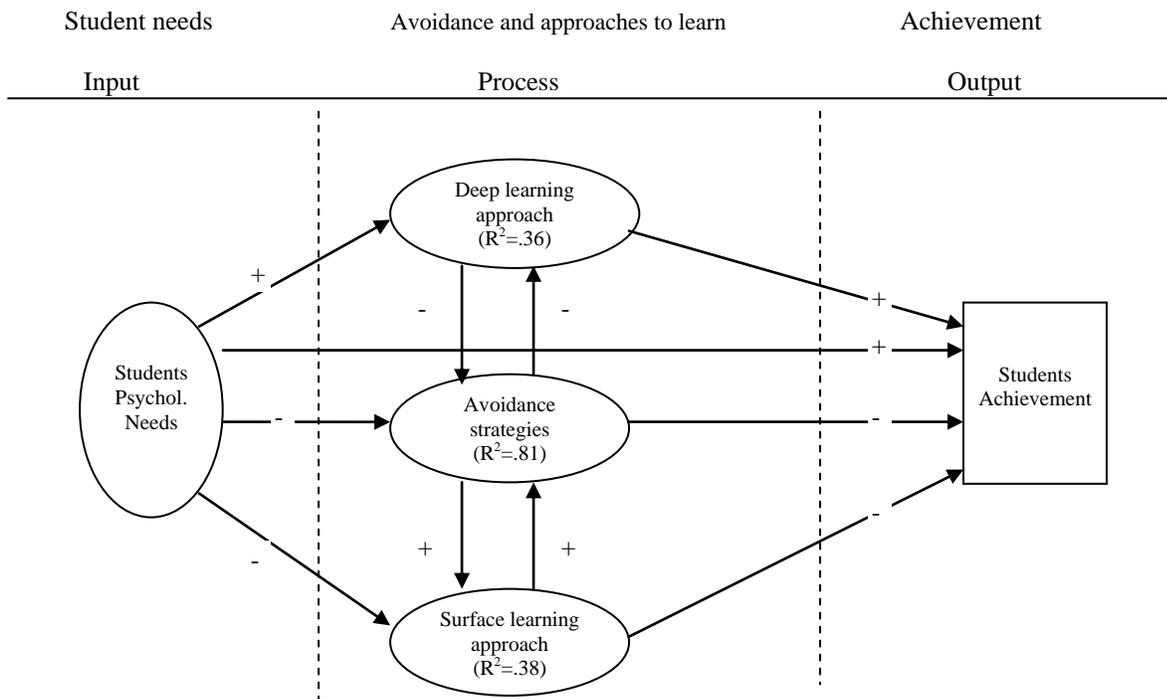


Figure 1. Structure of the general model hypothesized

Based on the model configuration, we predict (Hypothesis 1) that student psychological need satisfaction will relate positively to the deep approach and negatively to the surface approach. In turn, both deep and surface approaches will be positively and negatively related to student achievement, respectively. Finally, need satisfaction will be related to students achievement. If the student perceives that the teacher provides support to his or her basic psychological needs, his or her intrinsic motivation will be enhanced and, consequently, the student will tend to adopt a deep approach to learning. However, if the student perceives that the teacher does not lend support to these needs, he or she will tend to adopt a surface approach. As a result, achievement will be affected.

We also predict (Hypothesis 2) that student psychological need satisfaction will be negatively related to avoidance strategies (avoidance of effort and challenge, avoidance of help seeking help, and a preference to avoid novelty), in turn, avoidance strategies will be negatively related to student achievement. Finally, need satisfaction will be positively related to student achievement. When students perceive that their basic needs are satisfied, they will be more intrinsically motivated. Intrinsic motivation “is manifested as curiosity and interest, which motivate task engagement even in the absence of outside reinforcement or support...” (Ryan, Connell, & Grolnick, 1992, p.170). Consequently, students will be more involved in their learning process and avoidance strategies will reduce, and vice versa. As a result, achievement will be positively affected.

Given that “students who adopt a surface learning approach: (a) see the task as a demand to be met, a necessary imposition if some other goal is to be reached -a qualification for instance-; (b) see the aspects or parts of the task as discrete and unrelated either to reach other or to other tasks; (c) are worried about the time the task is taking; d) avoid personal or other meanings the task may have; and (e) rely on memorization, attempting to reproduce the surface aspects of the task” (Biggs 1987, p. 15), it seems logical to think that avoidance strategic will be positively related with surface approach and negatively related to the deep approach. However since the current investigation is a cross-sectional study, we cannot assume causality in a specific direction, that is, students who use avoidance strategies, adopting a minimal effort approach to learn, will probably take a surface approach of learning, and vice versa. Based on these considerations, previous models have been expended and the following connections are predicted. On the one hand, student psychological need satisfaction will have a positive effect on the deep approach, and a negative effect on the surface approach and avoidance approaches. It is also expected that the deep learning approach will have a negative effect on avoidance strategies whereas the effect of surface approach on avoidance strategies is expected to be positive. Finally, students’ achievement will be affected positively by the deep approach and negatively by the surface approach and avoidance strategies (Hypothesis 3). On the other hand, it is also expected that avoidance strategies have a positive effect on the surface approach and a negative effect on the deep approach. Finally, students’ achievement will be affected positively by the deep approach and negatively by the surface approach and avoidance strategies (Hypothesis 4).

Method

Participants and student grouping

The sample was made up of 157 subjects, 132 female (84.1%) and 25 male (15.9%), who studied different subjects at the university: Instructional Psychology (n=84, 53.5%), Psychological Basis of Special Education (n=50, 31.8%), and Programs and Techniques of Early intervention (n=23, 14.6%).

Instructional Psychology (IP) is an annual core subject in the Psychology degree and comprises 9 credits (6 theoretical, 1.5 practical and 1.5 laboratory). It is taught in the third year of the Psychology degree at Universitat Jaume I in Castellón (East Spain). Psychological Basis of Special Education (PBSE) is a semester core subject in the Teacher Training degree and comprises 4.5 credits (3 theoretical and 1.5 practical). It is taught in the third year of the Teacher Training (Primary Education) degree at Universitat Jaume I (Spain). Programs and Techniques of Early Intervention (PTEI) is a semester core subject in the Educational Psychology degree, and comprises 5.5 credits (4.5 theoretical and 1 practical). It is taught in the second or third year of the Educational Psychology degree at Universitat of València (East Spain).

Measures

The scales listed below were used to collect information from students on the variables considered in the present study. A summary of the factor analyses carried out in each scale can be seen in Table 1.

Basic psychological needs scale (17 items). This instrument was constructed to be based on the Basic Psychological Needs Scale developed by Ilardi, Leone, Kasser, and Ryan (1993). However, we expanded the original structure of the scale composed of three basic needs (Autonomy, Competence and Relatedness) by adding another important need (belonging) in

accordance with previous studies (Goodenow, 1992), referring to the student's feeling of belonging to a group/class formed by students of the same degree course year.

A preliminary factor analysis (principal component with oblimin rotation) was conducted on the whole scale composed of 20 items. Three items were removed in order to clarify construct interpretation since they presented substantial loadings (.30 or greater) in more than one factor. A second factor analysis (principal component with oblimin rotation) was conducted on the remaining 17 items. Four factors were extracted corresponding to the four needs considered: Autonomy (4 items, $\alpha = 0.76$), Competence (4 items, $\alpha = 0.65$), Relatedness (4 items, $\alpha = 0.82$) and Belonging (5 items, $\alpha = 0.86$). See the Appendix for the complete questionnaire. Four-point Likert scales were used for each statement, ranging from 1 (I quite disagree) to 4 (I quite agree).

Student learning approach scale (20 items). This scale was based on the revised two-factor version of the Study Process Questionnaire (R-SPQ-2F) developed by Biggs, Kember and Leung (2001). Following an adaptation for Spanish undergraduates, this scale was used to assess the approaches to learning (deep and surface) used by psychology students in the sample. The R-SPQ-2F questionnaire contains four subscales with five items each: deep motivation (DM), deep strategy (DS), surface motivation (SM) and surface strategy (SS). In the original scale, items ranged from 1 (never or only rarely true of me) to 5 (always or almost always true of me). In the Spanish version, items ranged from 1 (I quite disagree) to 4 (I quite agree). To check the adequacy of the R-SPQ-2F questionnaire factor structure for this sample (previously translated into Spanish and adapted for this investigation), the procedure described by Burnett and Dart (1997) was employed. This resulted in three items being retained for the DM subscale, four items for the DS subscale, four for the SM subscale, and three for the SS subscale (see Justicia, Pichardo, Cano, Berbén & De la Fuente, 2008, for more details about R-SPQ-2F structure validated with Spanish samples). The internal consistencies of the four subscales were generally acceptable ($\alpha = 0.68$, $\alpha = 0.65$, $\alpha = 0.83$, and $\alpha = 0.61$, respectively) and were similar to the original scale except the SM scale which was higher in this case). The items used in each scale can be seen in the Appendix I.

Avoidance strategies scale (15 items). This scale is made up of three subscales: avoiding novelty (5 items), avoiding help seeking (5 items) and avoiding effort and challenges (5 items). The two first avoidance strategies scales (avoiding novelty and avoiding help seeking) were adapted for this study from those used by Turner, Meyer, Anderman, Midgley, Gheen, and Kang (2002) for sixth grade elementary school students, whereas, the third (avoiding effort and challenges) was constructed especially for the present study. Participants responded to the items on a scale ranging from 1 (*not at all true*) to 5 (*very true*). A principal-components factor analysis with oblimin rotation was conducted on the fourteen items collectively. This analysis yielded three factors for this sample in accordance with the three avoidances considered: *Avoiding Novelty* (made up of 5 items, $\alpha = 0.76$), *Avoiding Help Seeking* (made up of 5 items, $\alpha = 0.73$) and *Avoiding Effort and Challenges* (made up of 5 items, $\alpha = 0.84$). See the Appendix for the complete questionnaire.

Achievement measure. The students academic achievement was measured with the marks obtained by students in an individual test undertaken to evaluate their theoretical knowledge of the subject matter being taught. Marks ranged from 1 (minimum) to 10 (maximum).

Procedure

The questionnaires were administered during two lectures at the end of the second semester and collected by the authors. After providing verbal information about the research work and once doubts were clarified, participants were requested to answer all the items in the scales. All participating students were volunteers.

Statistical analysis

To carry out the statistical analyses, the programs SPSS (Norusis, 1999) and EQS (Bentler, 1990, 1995) were used. The first program (SPSS) was used to test the construct validity and internal consistency of scales, as well as the Pearson's bivariate correlation analysis between the variables considered. The second program (EQS) enabled us to examine the structural relations hypothesized (maximum-likelihood method), according to the theoretical model proposed.

Results

Structure and internal consistency of the measures

The mean, standard deviation, reliability and structure of the scales are shown in Table 1. A principal-components factor analysis with oblimin rotation was conducted on all the sets of items for each scale used to test their construct validity. In general, the analyses confirmed the original structure and configuration of the scales and subscales used, and the Cronbach's α test showed acceptable alpha reliabilities (0.61 to 0.86). As seen in Table 1, the lowest alpha values were obtained for approaches to learning subscales (ranging from 0.61 to 0.79). However they were similar to the original scale (see the validation scale in Biggs, Kember and Leung, 2001) and to later studies (see Leung & Kember, 2003). It must be also taken into account that the alpha values are affected by the number of items in a scale (Lord & Novick, 1968), and that the subscales we are referring to are made up of three and four items. Furthermore, it ought to be pointed out that reliability may be underestimated when a multidimensionality scale was measured (Schmitt, 1996). A construct measure was obtained by averaging the items included in each factor.

Table 1. *Summary of the factor analysis and internal consistency of the scales (n=157).*

	Factors	Items	Mean	S. D.	%Variance	Cronbach's α
<i>Students' needs</i>						
Belonging	1	5	2.92	0.62	28,82%	0.86
Autonomy	1	4	3.31	0.53	14,57%	0.76
Relatedness	1	4	3.39	0.57	11,24%	0.82
Competence	1	4	2.95	0.56	6,83%	0.65
Total	4	17			61,47%	
<i>Approaches to learning</i>						
Surface Motivation	1	4	1.95	0.67	37,15%	0.79
Surface Strategies	1	3	2.05	0.68	9,90%	0.61

Deep Motivation	1	3	2.97	0.66	9,43%	0.68
Deep Strategies	1	4	2.29	0.65	7,38%	0.66
Total	4	14			63.88%	

Avoidance strategies

Avoiding effort and challenges	1	5	2.26	0.76	31,81%	0.84
Avoiding novelty	1	5	2.33	0.75	15,34%	0.76
Avoiding help seeking	1	5	2.23	0.68	11,01%	0.73

Total	3	15			58.16%	
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Correlation between variables

Subsequently, Pearson's bivariate correlations between constructs were also calculated. In general, the correlations obtained (see Table 2) were in accordance with our expectations. On the one hand, significant and positive correlations could be seen between most students' need satisfaction (competence, relatedness and belonging) and the deep approach, while significant and negative correlations were noted between most students' need satisfaction (competence, relatedness and belonging) and the surface approach. However, autonomy was not associated with approaches to learning. On the other hand, correlations between students' needs and avoidance strategies (avoidance of effort and challenges, avoidance of help seeking, and a preference to avoid novelty) were in the same direction, and as before, the need of Autonomy was not associated with any avoidance strategies. Finally, we wish to indicate that low correlations were obtained between students' need satisfaction and academic achievement, whereas significant correlations were observed between approaches to learning (above all with surface strategies; $r = -.334$, $p < .001$) and achievement, and also between some avoidance strategies (above all with avoidance of effort and challenges; $r = -.380$, $p < .001$) and achievement. See Table 2 for details.

Table 2. Pearson's bivariate correlations between constructs (n=157).

	1.AUTON	2.COMP	3.RELAT	4.BELON	5. DM	6. DS	7.SM	8.SS	9.NOVE	10.HELP	11.EFFOR	12.ACHIEV
1. NEED AUTONOMY	1											
2. NEED COMPETENCY	.175(*)	1										
3. NEED RELATEDNESS	.214(**)	.430(**)	1									
4. NEED_BELONGING	.057	.355(**)	.343(**)	1								
5. APROACH_DM	.081	.259(**)	.233(**)	.256(**)	1							
6. APROACH_DS	-.033	.208(**)	.135	.158(*)	.256(**)	1						
7. APROACH_SM	.040	-.549(**)	-.347(**)	-.282(**)	-.289(**)	-.254(**)	1					
8. APROACH_SS	-.030	-.381(**)	-.261(**)	-.169(*)	-.379(**)	-.274(**)	.691(**)	1				
9. AVOID NOVELTY	-.041	-.289(**)	-.098	-.188(*)	-.063	-.041	.448(**)	.292(**)	1			
10. AVOID HELP SEEKING	.051	-.199(*)	-.249(**)	-.119	-.067	-.115	.395(**)	.290(**)	.201(*)	1		
11. AVOID EFFORT-CHALLENGES	.151	-.482(**)	-.299(**)	-.232(**)	-.120	-.383(**)	.737(**)	.590(**)	.328(**)	.345(**)	1	
12. ACHIEVEMENT	.066	.243(**)	.161(*)	.147	.103	.281(**)	-.258(**)	-.334(**)	-.128	-.294(**)	-.380(**)	1

** p< 0.01. * p < 0.05

Since the sample was produced from three different courses (Instructional Psychology-IP, Psychological Basis of Special Education-PBSE and Psychological Basis of Special Education-PBSE) belonging to two different universities, we checked whether there were significant differences across courses on avoidance strategies, learning approaches and psychological needs. To explore whether significant differences exist among the three university class groups on avoidance strategies, learning approaches and psychological needs, analyses of variance (ANOVA) were conducted. Subsequent post hoc comparisons using the Bonferroni procedure displayed several significant differences in two avoidance strategies (avoiding novelty and avoiding effort and challenges) between the PTEI and the PBSE groups ($p=0.02$, $p=0.003$ respectively; indicating that the PTEI students reported a more significant use of these strategies and on the three avoidance strategies between IP and PBSE ($p=0.026$, $p=0.020$, $p=0.000$), respectively; this indicates that the IP students reported a more significant use of these strategies). Significant differences were also obtained for the deep approach (DM and DS) between the IP and PBSE groups ($p=0.000$, $p=0.000$, respectively, indicating that students from the PBSE group reported a more significant use of deep strategies), and between the IP and PTEI groups ($p=0.000$, $p=0.000$ respectively; indicating that students from the PBSE group reported a more significant use of deep strategies). However, no significant differences in psychological needs were obtained among the three groups, except for relatedness between the IP and PTEI groups ($p=0.011$; indicating that students from the PTEI group had a significantly more positive perception of satisfying this need).

Structural equation modeling

The evaluation of the Models hypothesized were tested by the EQS program (Bentler, 1995). The procedure was conducted in two steps. Firstly, by calculating the global fit indices to check the extent to which each model reproduces the relationships that exist in the correlation matrix of the empirical data. Secondly, by analyzing the system of relationships among the variables considered. All models were tested with standardized coefficients obtained from the maximum likelihood method of estimation. Since the chi-square test is sensitive to sample size, the use of relative fit indices such as the CFI, the NNFI and the RMSA, is strongly recommended

(Bentler, 1990). Values smaller than .05 for RMSEA indicate a good fit, whereas values up to .08 indicate a poor fit (Browne & Cudeck, 1993). For NNFI and CFI, values greater than .90 indicate a good fit (Hoyle, 1995).

The hypothesized connections predicted among student need satisfaction, approaches to learning and student achievement were tested (Hypothesis 1). The fit indices values obtained (N= 150, $\chi^2 = 42.64$; $p = .005$, D.F.= 22; NFI= .87; NNFI=.88; CFI = .93; GFI= .94; AGFI= .88;RMSEA = .079) indicated that the model poorly fits the data. Regarding the relationships between variables, as seen in Figure 2, the latent variable deep learning approach and the latent variable surface learning approach were well accounted for by students' basic needs ($R^2 = .42$ and $R^2 = .50$, respectively). However, the effects of approaches to learning on student achievement were not significant (see Figure 2 for details). According to the data, hypothesis 1 was poorly supported.

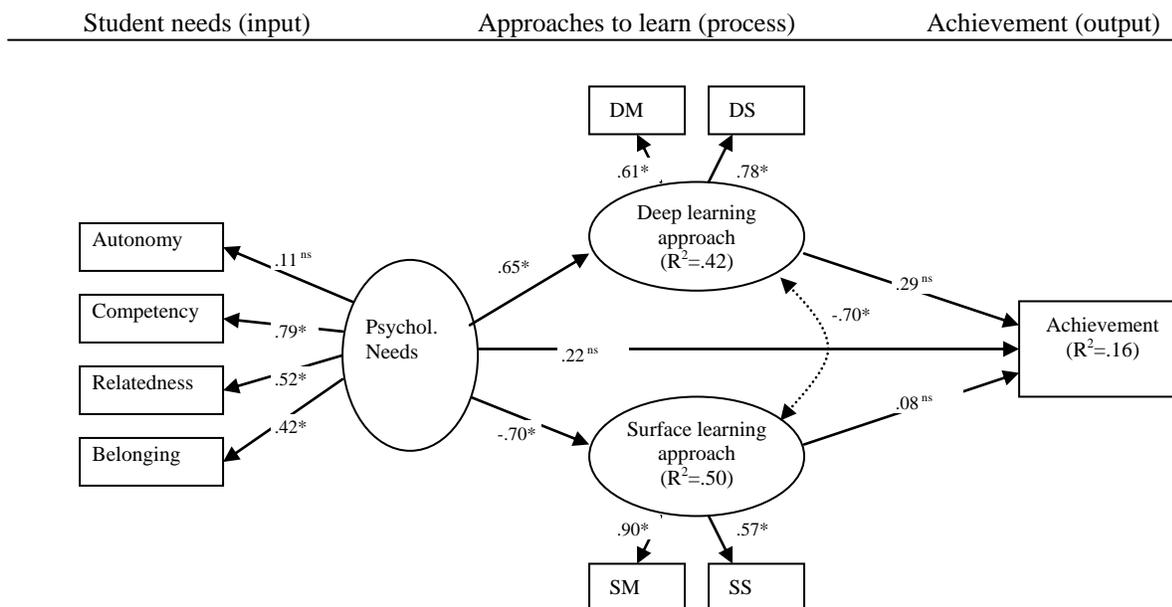


Figure 2. Relationship among needs, approaches to learning and student achievement. Structural configuration, standardized coefficients and fit indices are displayed (some cases were skipped because a variable was missing, n=150 valid cases)

Notes: * = significant ($p < .05$), ns = not significant

Fit indices: Goodness-Of-Fit Statistics: Chi-Square = 42.64; D.F.= 22; $p = .005$

Bentler-Bonett Normed Fit Index (NFI) = .87 Bentler-Bonett Non-Normed Fit Index (NNFI) = .88; Comparative Fit Index (CFI) = .93; Lisrel GFI Fit Index = .94; Lisrel AGFI Fit Index = .88; Root Mean-Square Residual (RMR) = .029; Root Mean-Square Error Of Approximation (RMSEA) = .079

Regarding the second connections predicted among, student need satisfaction, avoidance strategies and achievement were tested (Hypothesis 2). The fit indices values obtained (N= 157, $\chi^2 = 30.02$; $p = .03$, D.F.= 18; NFI= .86; NNFI= .90; CFI = .94; GFI= .95; AGFI= .91; RMSEA = .066) indicated that the model tested shows a satisfactory fit to the data. Regarding the relationships between variables, the latent variable F1 (Avoidance strategies) was well accounted for by students' basic needs ($R^2 = .45$). The effect of F1 (Avoidance strategies) on student achievement is both negative and significant ($R^2 = .13$). However, achievement is not affected by psychological needs as expected. See Figure 3 for details. According to the data, we can assert that Hypothesis 2 was supported.

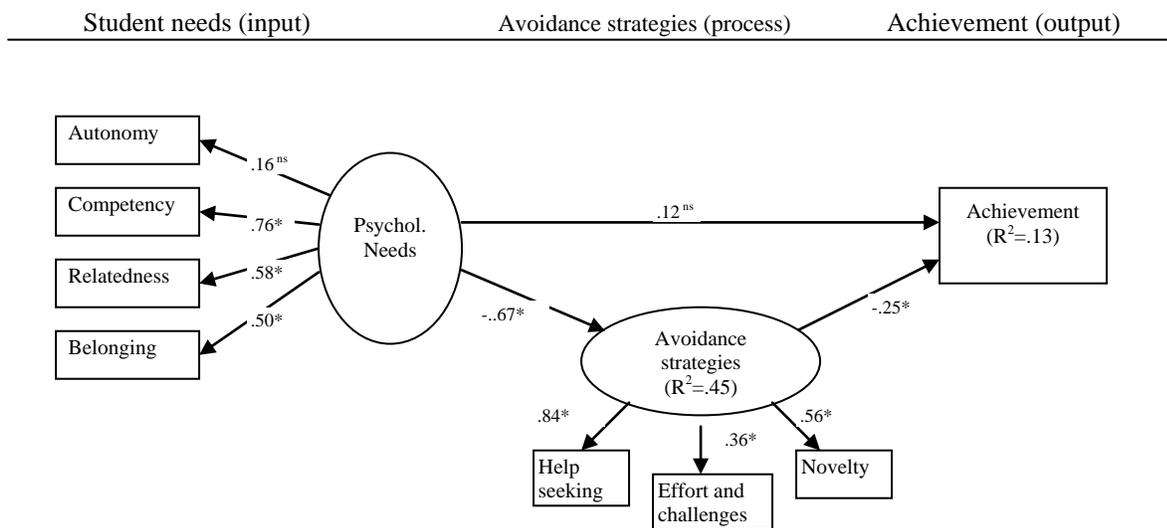


Figure 3. Relationship among needs, avoidance strategies and student achievement. Structural configuration, standardized coefficients and fit indices are displayed (some cases were skipped because a variable was missing, n=157 valid cases)

Notes:

* = significant ($p < .05$), ns = not significant, # = marginally significant

Fit indices: Goodness-Of-Fit Statistics: Chi-Square = 30.02; D.F.= 18; $p = .037$

Bentler-Bonett Normed Fit Index (NFI) = .86 Bentler-Bonett Non-Normed Fit Index (NNFI) = .90; Comparative Fit Index (CFI) = .94; Lisrel GFI Fit Index = .95; Lisrel AGFI Fit Index = .91; Root Mean-Square Residual (RMR) = .038; Root Mean-Square Error Of Approximation (RMSEA) = .066

In relation to the expanded model, all the variables were tested simultaneously in a first step considering avoidance strategies as predictors of learning approaches (Hypothesis 3), and in a second step considering learning approaches as predictors of avoidance strategies (Hypothesis 4). The fixed indices values obtained for the connections predicted in Hypothesis 3 ($N = 139$, $\chi^2 = 89.57$; $p = .00$, D.F.= 47; NFI= .83; NNFI= .88; CFI = .91; GFI= .92; AGFI= .86; RMSEA = .078) and Hypothesis 4 ($N = 139$, $\chi^2 = 98.31$; $p = .00$, D.F.= 47; NFI= .82; NNFI= .86; CFI = .89; GFI= .90; AGFI= .84; RMSEA = .083) indicated that the models poorly fit the data. Subsequently, and following the recommendations from the Wald and Lagrange multiplier test for adjusting parameters, an optimized model was obtained. The fit indices values ($N = 139$, $\chi^2 = 62.30$; $p = .01$, D.F.= 39; NFI= .88; NNFI= .92; CFI = .95; GFI= .94; AGFI= .87; RMSEA = .063) indicated a good fit to the data. The structural configuration, standardized coefficients and fit indices are displayed in Figure 4. The results revealed interesting connections between variables that support the expected relationship hypothesized in Figure 1 to a certain extent. Student need satisfaction (input factor) has a significant positive effect on the deep approach to learning ($R^2 = .31$) whereas the effect on the surface approach to learning is significant but negative ($R^2 = .32$). In turn, the surface approach to learning has a significant and positive impact on avoidance strategies ($R^2 = .54$). Finally, achievement receives a significant and negative impact from avoidance strategies, and a significant and positive impact from the deep approach to learning ($R^2 = .16$). These results provide some support for Hypotheses 3 and 4.

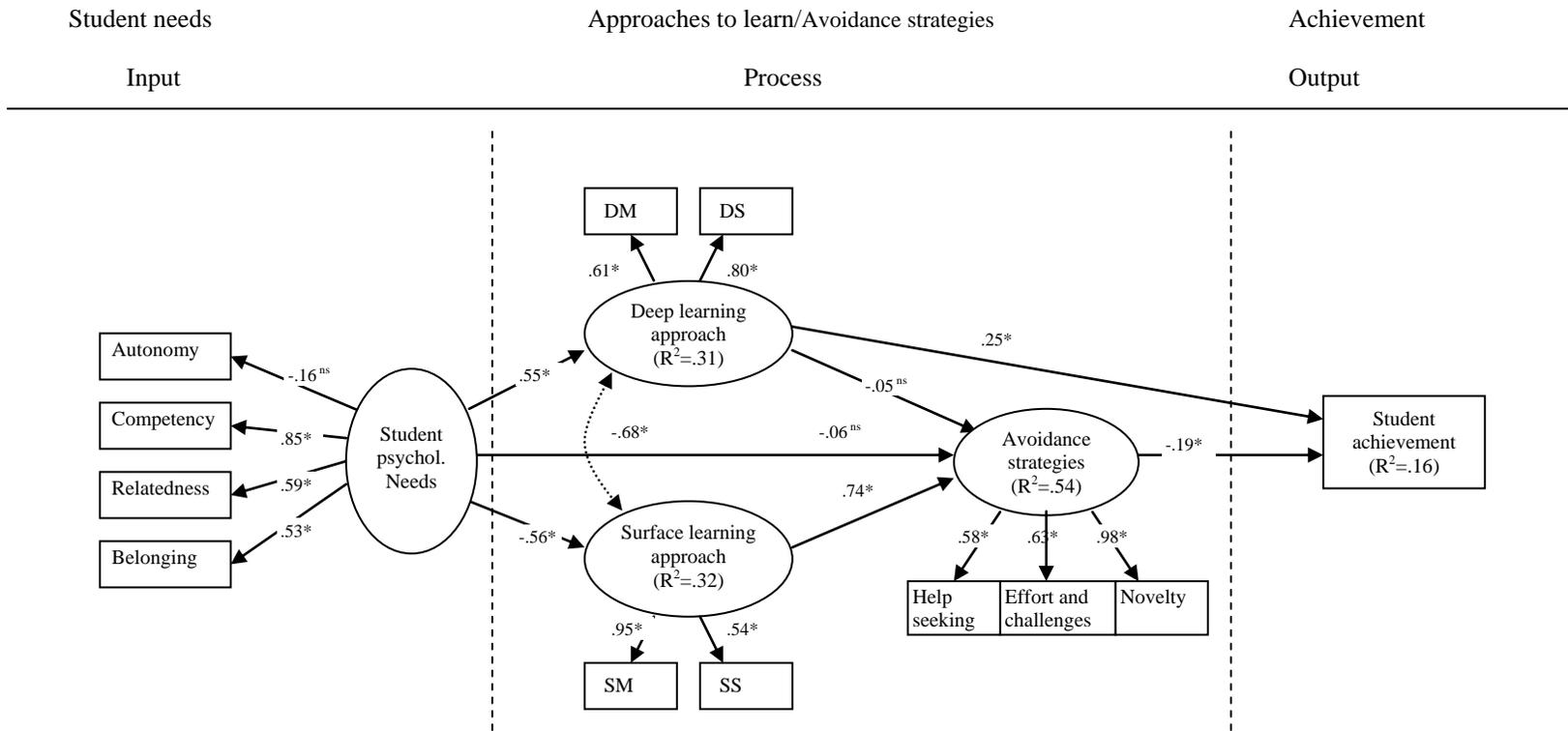


Figure 4. Optimized model regarding the relationship among needs, avoidance strategies, approaches to learning and student achievement. the structural configuration, standardized coefficients and fit indices are displayed (some cases were skipped because a variable was missing, n=139 valid cases)

Notes: * = significant ($p < .05$), ns = not significant

Fit indices: Goodness-Of-Fit Statistics: Chi-Square = 62.30; D.F.= 39; $p = .010$

Bentler-Bonett Normed Fit Index (NFI) = .88 Bentler-Bonett Non-Normed Fit Index (NNFI) = .92; Comparative Fit Index (CFI) = .95; Lisrel GFI Fit Index = .94; Lisrel AGFI Fit Index = .87; Root Mean-Square Residual (RMR) = .031; Root Mean-Square Error Of Approximation (RMSEA) = .063

Note: covariance between avoidance variables errors and between psychological need errors were established.

Discussion and conclusions

The relationships among student psychological need satisfaction, students' approaches to learning in the classroom, their use of avoidance strategies, achievement in a sample of undergraduate students, are discussed.

Regarding the first hypothesis, the path analyses carried out to test the hypothesized model revealed that, in general, student basic needs considered in this study were good predictors of both approaches (deep and surface). However, the contribution of autonomy is less clear since it provides no significant contribution to the superordinate factor defined by the four student needs considered. Standardized coefficients show substantial and positive associations (except autonomy) between basic needs and the deep approach, and negative associations (except autonomy) between basic needs and the surface approach. In general, the data from the first model indicate that students who perceived their basic needs being more satisfied (except autonomy) tended to adopt a deep approach, and conversely, students who perceived their basic needs being less satisfied (except autonomy) tended to adopt a surface approach. This situation emphasizes the importance of some instructional aspects under teacher control (teaching methodology, task proposed, classroom layout, interaction with students, and so on) because, according to the decisions teachers adopt toward such aspects, they showed students how much attention they would pay on satisfying their basic needs. This will obviously have an effect on student learning and achievement. According to the self-determination theory, when basic needs are satisfied, they promote psychological well-being and enable students to reach optimal academic performance. In contrast, when these needs are not satisfied, students fail to thrive (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Sheldon, Ryan, & Reis, 1996; Sheldon, Elliot, Kim, & Kasser, 2001).

Regarding the second hypothesis, the path analyses carried out to test the hypothesized model revealed that the model fits the data well. As seen in Figure 3, student need satisfaction does not have a direct impact on student achievement, but rather the impact on achievement is indirect, via avoidance strategies. That is, basic need satisfaction has a significant and negative impact on avoidance strategies. In turn, avoidance strategies have a significant and negative

impact on student achievement. It seems that avoidance strategies play a mediator role between students' needs and achievement (Baron and Kenny, 1986). Again, the need of autonomy does not have a significant contribution on the superordinate factor defined by the four psychological needs as a latent variable. Previous research based on the self-determination theory have provided considerable evidence about how psychological needs have a direct impact on well-being and motivation, but the mechanism by which need satisfaction promotes achievement is less clear. These results may provide valuable information for understanding the underlying processes that explain the psychological needs-achievement relationship.

Regarding the third and fourth hypothesis, the path analyses identified in the optimized model (Figure 4) revealed that the latent variable students need satisfaction is associated with learning approaches with the same relationship pattern that was identified in the first model hypothesized. In turn, a deep approach to learning is positively associated with achievement, whereas a surface approach is negatively associated with achievement via avoidance strategies. Once more, the need of autonomy does not significantly contribute to the latent variable defined by psychological needs. This extended model provides complementary information to the previous model tested, about the process mechanism that connects psychological needs to achievement. Although more research is needed, the results seem to indicate that processes connecting psychological needs to achievement can be explained, in part, by approaches to learning and avoidance strategies. In other words, approaches to learning and avoidance strategies may play a mediator role between the psychological needs-achievement relationship. We also wish to note the negative impact that the surface approach has on avoidance strategies. These findings suggest that students who adopt a surface approach not only tend to use certain strategies addressed to learn mechanically and repetitively, but they also tend to conduct strategies to avoid novelty in academic work, to avoid help seeking, and also to avoid effort and challenges which, in turn, lead to lower achievement.

Contrary to what was expected, it seems that the need of autonomy does not go in the same direction as the remaining needs. Students with high scores on the autonomy scale are students who perceived that his/her teacher encouraged autonomous and independent learning, whereas students with low scores represent the student who perceives that his/her teacher

encouraged traditional learning, and that the need of autonomy was not satisfied. We found three possible explanations for this fact. The first is that the autonomy need is ambiguous since the degree of autonomy required by students may change according to their level of education (primary, secondary or higher). Regarding this issue, an important question emerges which justifies the need to create a valid scale: what is the students' need concerning autonomy? Or, more specifically, what degree of autonomy do undergraduate students need? Examples of items included in the scale were: "I have been able to freely decide my own pace of learning in this subject" "the teacher has allowed students to work independently and autonomously", may be interpreted as the teacher providing students with assignments, and who then misunderstand their learning, when the idea to express the items should be that, although the teacher actually encourages students to work independently, students will still be guided and orientated by their teacher. Therefore, it would be more appropriate when writing items to specify and emphasize clearly when referring to independent work assignments that are teacher-guided. The second explanation is that, contrary to the other needs (competence, relatedness and belonging) that are always perceived positively, autonomy can be assessed by students as either a positive or negative element for their learning process, according to their personal variables such as learning or thinking style. Based on his theory of "mental self-government", Sternberg (1997) introduced the concept of thinking style. Thinking style refers to what a person prefers to do, and how they like to do it. For example, according to Sternberg (1997), executive people like to be told what they should do or how they should do it. They prefer to work on tasks with clear instructions and structures. Conversely, legislative people like doing things in their own way. They prefer to work on tasks that require creative strategies. Regarding this issue, two important questions emerge, what are the predominant students' thinking style in Spanish universities? (traditional teaching methodology, related to executive style, could be preferred by certain undergraduate Spanish students according to García-Ros, Pérez-González, & Talaya, 2008), and how are they related to learning approaches? According to Sternberg's theory (1997), individuals should be more comfortable and effective when their predominant thinking styles fit well with what the context demands, and in this case, with the way that that course is conducted and organized or, in other words, with the teaching style(s) used by the teacher (Doménech-Betoret, 2007). Therefore from this perspective, autonomy could act as a stimulus to activate intrinsic interest, and involvement with the subject to be learned, or the exact opposite. The third regards the cognitive evaluation

theory CET). The CET was presented by Deci and Ryan (1985) as a subtheory within the Self-Determination theory. CET specifies that feelings of competence will not enhance intrinsic motivation (related to a deep approach) unless accompanied by a sense of autonomy (Ryan & Deci, 2000). Alternatively it could also possible that the feeling of autonomy will not enhance intrinsic motivation (related to a deep approach) unless accompanied by a sense of competency. Covington (1992) asserted that search for self-acceptance is the highest human priority and that “in schools, self-acceptance comes to depend on one’s ability to achieve competitively” (p.74). These considerations may suggest that perhaps the feeling of autonomy is not enough to make students adopt a deep learning approach where intrinsic motivation is involved. Rather, it may be as a result of the interaction between autonomy and another individual variable such as competence (or self-efficacy) or thinking style.

In sum, this study highlights the importance of supporting students’ needs in the classroom, which are linked to intrinsic motivation (Deci, 1971). In general terms, we have proved that basic needs satisfaction, when satisfied, encourage the use of the deep approach to learning and, in turn, the decrease of students’ avoidance strategies. In contrast, when these needs are not satisfied, the use of the surface approach to learning is encouraged, consequently, leads to an increase in students’ avoidance strategies and achievement.

The higher education learning environment is characterized by an overloaded curriculum where pressure to achieve may also prevent students from being interested in the subject matter. This may lead many students to adopt short-term learning strategies (Newble & Hejka, 1991) which are more in accordance with both the strategic approach (Entwistle & Waterson, 1988) and the surface approach. Based on the empirical evidence provided by this study, this disadvantage could be ameliorated or mitigated by teachers’ support of students’ basic needs, especially competence since it is the variable with a higher contribution to the superordinate factor that it belongs to.

The results obtained have also practical implications for teaching. If teachers wish their students to engage in their learning tasks in ways that enhance meaning and understanding, then it could be beneficial to create learning environments that support student basic psychological

needs. In other words, teachers are in a position to facilitate students meaningful learning, creating a learning environment which students perceive as being supportive by offering a helpful and friendly relationship, treating students with respect, presenting opportunities for taking increasing students responsibility for their own learning, and of creating a “group feeling” within the classroom. The provision of a classroom learning environment reflecting these conditions would not only facilitate the adoption of deep approaches to learning, but would furthermore ameliorate the use of students’ avoidance strategies.

Limitations

Several limitations should be taken into account. The first of these refers to the use of self-reported data for all constructs. Experts recommend that this kind of measure should be combined with other more qualitative or observational measures. The second major limitation is related to the generalizing of these findings. The present research work was carried out in certain educational settings with specific higher education subjects. Further replication studies are therefore needed in other subject domains and at other levels of educational, whose aims are to find regularities in similar educational contexts (the same knowledge area and the same level of education). We must, therefore, be cautious about generalizing these findings to other educational settings. Thirdly, a temporal sequence between these variables is required in order to establish a rigorous cause-effect relationship. Longitudinal studies are thus necessary. In addition to the deep and surface approaches, the strategic approach (Entwistle & Waterson, 1988) should be included as it is the best predictor of academic performance in higher education (Diseth & Martinsen, 2003; Newble & Hejka, 1991), and may, perhaps, also be more closely related to avoidance strategies.

Further Research

Despite these limitations, the present study extends past findings into the relationships of students’ basic Psychological Needs, Approaches of Learning, Avoidance Strategies and Achievement, although additional research is needed which uses both quantitative and qualitative methodologies. It would be beneficial for future research to introduce additional students’ needs

which have not been considered in this study, for example, the need for cognition (Cacioppo & Petty, 1982) and the need of control over learning (Eshel & Kohavi, 2003). Moreover, it would be advisable to reproduce the items to construct a new scale which covers the need of autonomy, which emphasizes that the work referred to is of an independent nature but is also teacher-guided. It might also be interesting if future research took into account other mediator constructs related to student motivation, such as mastery and performance goal structure (Roeser, Midley, & Urban, 1996) or disorganization, persistence and effort which may have an effect on academic performance (Phan, 2009). The Models should be completed by adding procedural outcomes (not only declarative) such as endogenous or criterial variables. Finally, most research on basic needs in the field of education was carried out in the laboratory whereas experimental research in the classroom on subject-matter domains are scarce. For this reason, more research is needed to know whether the role played by autonomy is similar across different contexts and also in different stages of the life span.

References

- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Baumeister, R. F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497-529.
- Bentler, P. M. (1995). *EQS Structural equations program manual*. Encino, CA: Multivariate Software, Inc.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.
- Biggs, J. (1987). *Students approaches to learning and studying*. Melbourne, Australia: Australian Council for Educational Research.
- Biggs, J. (1989). Approaches to the enhancement of tertiary teaching. *Higher Education Research and Development*, *8*, 7-25.
- Biggs, J., & Moore, P. (1993). *The process of learning* (3rd ed.). New York: Prentice Hall.
- Biggs, J., Kember, D., & Leung, D.Y.P. (2001). The revised two-factor study Process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, *71*, 133-149.

- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models*. Beverly Hills, CA: Sage, 132-162.
- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*, 116-131.
- Cleave-Hogg, D., & Rothman, A. I. (1991). Discerning views: medical students' perceptions of their learning environment. *Evaluation and the Health Professions, 14*, 456-474.
- Covington, M. V. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. New York: Cambridge University Press.
- Dart, B. C., Burnett, P. C., Boulton-Lewis, G., Campbell, J., Smith, D., and McCrindle, A. (1999). Classroom learning environment and students' approaches to learning. *Learning Environments Research, 2*, 137-156.
- Dart, B. C., Burnett, P. C., Purdie, N., Boulton-Lewis, G., Campbell, J. & Smith, D. (2000). Students' conceptions of learning, the classroom environment, and approaches to learning. *Journal of Educational Research, 93*, 4, 262-272.
- Deci, E. (1971). The effect of externally mediate rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*, 105-115.
- Deci, E., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E., & Ryan, R. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227-268.
- Diseth, A., Martinsen, O. (2003). Approaches to learning, Cognitive Style, and Motives as Predictors of Academic Achievement. *Educational Psychology, 23*, 196-207.
- Doménech-Betoret, F. (2007). The influence of students' and teachers' thinking styles on student course satisfaction and on their learning process. *Educational Psychology, 27*, 219-234.
- Doyle, W. (1977). Paradigms for research on teacher effectiveness. In L. Shulman (Ed.), *Review of Research in Education* (Vol. 5; pp. 163-198). Ithaca, IL: Peacock.
- Entwistle, N. J. (1987). *Understanding classroom learning*. London: Hodder and Stoughton.
- Entwistle, N. J., & Waterson, S. (1988). Approaches to studying and levels of processing in university students. *British Journal of Educational Psychology, 58*, 258-265.
- Eshel, Y., & Kohavi, R. (2003). Perceived classroom control, self-regulated learning strategies, and academic achievement. *Educational Psychology, 23*, 249-260.

- Filak, V. F., & Sheldon, K. M. (2003). Student psychological need satisfaction and college teacher-course evaluation. *Educational Psychology, 23*(3), 235-247.
- Fraser, B. (1989). Twenty years of classroom climate work: progress and prospect. *Journal of Curriculum studies, 21*, 307-327.
- Fraser, B. (1998). Science learning environments: assessment, effects and determinants. In B. J. Fraser & K. G. Tobin (Eds.), *International handbook of science education* (pp. 527-564). Dordrecht, The Netherlands: Kluwer.
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*, 331-362.
- García-Ros, R., Pérez-González, F., Talaya, I. (2008). Preferencias respecto a métodos instruccionales de los estudiantes universitarios de nuevo acceso y su relación con estilos de aprendizaje y estrategias motivacionales. *Electronic Journal of Research in Educational Psychology, 6*, (3), 547-570.
- Goodenow, C. (1992). Strengthening the links between educational psychology and the study of social context. *Educational Psychologist, 27*, 177-196.
- Hoyle, R. H. (1995). The structural equation modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling, concepts, issues, and applications* (pp. 1-15). Thousand Oaks, CA: Sage.
- Ilardi, B. C., Leone, D., Kasser, R., & Ryan, R.M. (1993). Employee and supervisor rating of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting. *Journal of Applied Social Psychology, 23*, 1789-1805.
- Justicia, F., Pichardo, M. C., Cano, F., Berbén, A. B. G., De la Fuente, J. (2008). The Revised Two-Factor Study Process Questionnaire (R-SPQ-2F): Exploratory and confirmatory factor analyses at item level. *European Journal of Psychology of Education, 23* (3), 355-372.
- Leung, D. Y. P., & Kember, D. (2003). The relationship between approaches to learning and reflexion upon practice. *Educational Psychology, 23*, 61-71.
- Lord, F.M., & Novick, M. R. (1968). *Statistical theories of mental test scores*. Reading: Addison-Wesley.

- Newble, D., & Hejka, E. J. (1991). Approaches to learning of medical students and practising physicians: Some empirical evidence and its implication for medical education. *Educational Psychology, 11*, 333-342.
- Nichols, J. C., & Miller, A. T. (1984). Developments and its discontents: The differences of the concept of ability. In J. G. Nicholls (Ed.), *Advances in motivation and achievement* (pp. 185-218). Greenwich, CT: JAI Press.
- Norusis, M.J. (1999). *SPSS for Windows* (Versión 10.0). Chicago; IL: SPSS Inc.
- Phan, H. P. (2009). Pensamiento reflexivo, persistencia, desorganización y ejecución académica: un enfoque mediacional. *Electronic Journal of Research in Educational Psychology, 7*(3), 927-952.
- Ramsden, P. (1992). *Learning to teach in higher education*. London: Routledge.
- Ramsden, P., Martin, E., & Bowden, J. (1989). School environment and sixth form pupils' approaches to learn. *British Journal of Educational Psychology, 59*, 129-142.
- Ramsden, P., & Entwistle, N. (1981). Effects of academic departments on students' approaches to studying. *British Journal of Educational Psychology, 51*, 367-383.
- Reis, H., Sheldon, K., Gable, S., Roscoe, J., & Ryan, R. (2000). Daily well-being: The role of autonomy, competence and relatedness. *Personality and Social Psychology Bulletin, 26*, 419-435.
- Roeser, R. W., Midgley, C., & Urdan, T. C. (1996). Perceptions of school psychological environmental and early adolescents' psychological and behavioral functioning in school: the mediating role of goals and belonging. *Journal of Educational Psychology, 88*, 3, 408-422.
- Ryan, M. R., Connell, J. P., & Grolnick, W. S. (1992). When achievement is not intrinsically motivated: A theory of internalization and self-regulation in school. In A. K. Boggiano & T. S. Pittman (Eds.), *Achievement and motivation. A social-developmental perspective* (pp. 167-188). New York: Cambridge University Press.
- Ryan, M. R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.
- Ryan, R., & Stiller, J. (1991). The social contexts of internalization: Parents and teacher influences on autonomy, motivation and learning. In P.R. Pibtrich & M. L. Maehr (Rds),

- Advances in motivation and achievement, 7. Goals and self-regulating process* (pp. 115-149), Greenwich, CT: JAI Press.
- Schmeck, R. R. (1988). Strategies and styles of learning: An integration of varied perspectives. In Ronald Ray Schmeck (Ed) *Learning strategies and learning styles*, pp. 317-347. New York, NY, US: Plemun Press.
- Sheldon, K. M., Elliot, A.J., Kim, Y., & Kasser, T. (2001). What's satisfying about satisfying events? Comparing ten candidate psychological needs. *Journal of Personality and Social Psychology, 80*, 325-339.
- Sheldon, K., & Biddle, B. (1998). Standards , accountability and school reform: Perils and pitfalls. *Teacher College Record, 100*, 164-180.
- Sheldon, K., Ryan, R., & Reis, H. (1996). What makes for a good day? Competence and autonomy in the day and in the person. *Personality and Social Psychology Bulletin, 22*, 66-84.
- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment, 8*, 350-353.
- Sternberg, R. J. (1997). *Thinking Styles*. Cambridge University Press.
- Turner, J. C., Meyer, D. K., Anderman, E. M., Midgley, C., Gheen, M., & Kang, Y. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: a multimethod study. *Journal of Educational Psychology, 94*, 1, 88-106.
- Valas, H., & Sovik, N. (1993). Variables affecting students' intrinsic motivation for school mathematics: two empirical studies based on Deci and Ryan's theory on motivation. *Learning and Instruction, 3*, 281-298
- Waxman, H. (1991). Investigating classroom and school learning environments: a review of recent research and developments in the field. *Journal of Classroom Interaction, 26*(2), 1-4.
- Yuen-Yee, G. C. & Watkins, D. (1994). Classroom environment and approaches to learning: an investigation of the actual and preferred perceptions of Hong Kong secondary school students. *Instructional Science, 22*, 233-246.

Appendix I

Basic student needs scale (4 scales, 17 items)

Write the corresponding number you believe is more appropriate in front of each item:

4. I quite agree 3. I agree more than I disagree 2. I disagree more than I agree 1. I quite disagree

a) *Autonomy* ($\alpha = 0.76$).

- 1. I have been able to freely decide my own pace of learning in this subject.
- 2. I have been able to freely choose the tasks to be done while learning this subject.
- 3. The teacher has allowed the students to work independently.
- 4. I felt I was capable of deciding about how to learn and work this subject.

b) *Competence* ($\alpha = 0.65$).

- 1. I felt I was capable while learning this subject.
- 2. I have had the chance to show my capacities during the learning followed in this subject.
- 3. I have felt competent enough to meet the challenges and tasks posed in learning this subject.
- 4. I have been able to learn new and interesting skills in this subject.

c) *Relatedness* ($\alpha = 0.82$).

- 1. The teacher made me feel confident enough so I could ask anything freely.
- 2. The teacher has been friendly and cordial with me.
- 3. I felt that the teacher was friendly and willing to help.
- 4. The teacher has been very understanding (puts his/herself in other people's place) about students' problems.

d) *Belonging* ($\alpha = 0.86$).

- 1. There is a strong feeling of friendship in this group/class.
- 2. I have felt at ease in this group/class.
- 3. Being in this group/class feels like belonging to a large family.
- 4. I get the feeling that we form a large team in this subject.
- 5. I will remember my classmates from this group/class affectionately in the future.

*Student learning approach scale (4 scales, 14 items)*a) *Deep motivation scale (DM)* (3 items)

- 5. I believe that any theme of this subject matter may be interesting if you give it your full attention.....
- 9. I have found out that, in general, the themes of this subject matter may prove as interesting as a good book.
- 1. Studying and working on the contents of this subject matter have provided me a feeling of satisfaction.

b) *Deep strategy scale (DS)* (4 items)

- 2. I have discovered that if I am to feel satisfied with this subject matter, I had to work very hard on a given theme to be able to draw my own conclusions.
- 18. I used to ask the teacher about certain aspects of the content matter to be able to fully understand it.

..... 14. I have used part of my time searching for more information about interesting subjects that had been covered in class.

..... 6. I have spent a lot of time going deep into and extending on the teacher's notes.

c) *Surface motivation scale (SM) (4 items)*

..... 12. In general, I have limited my work to what was expected of me in this subject matter because I believed that it was not necessary to make any extra effort.

..... 4. I have tried to not do more than was expected of me, nor to make any extra effort than what was strictly necessary for this subject matter.

..... 3. My objective in this subject matter has been to get the highest mark with the minimum effort.

..... 17. My main objective has been to pass this subject matter, and I wasn't bothered if I learnt more or not.

d) *Surface strategy scale (SS) (3 items)*

..... 8. When studying this subject matter, I tried to memorize the content matter, although I did not fully understand it at times.

..... 11. I have found out that the best way to get the highest mark in the exam(s) of this subject matter is through memorization.

..... 20. I have tried memorizing the answers to the questions which might be included in the exam.

Avoidance strategies scale (3 scales, 15 items)

Write the corresponding number you believe is more appropriate in front of each item:

5. Completely true 4. Quite true 3. Undecided 2. Quite false 1. Completely false

a) *Avoid novelty ($\alpha = 0.76$).*

..... 1. Of the optional tasks proposed in this subject, I tended to do those tasks that I knew I could do without many problems, and avoided choosing the more complex tasks.

..... 2. In this subject, I prefer to do tasks that are familiar to me before attempting new ones which I still have to learn how to do.

..... 3. In this subject, I prefer to work on those concepts that are familiar to me than on those I still do not know.

..... 4. I would not like to have to learn many new concepts in this subject.

..... 5. I prefer the tasks that are familiar to me to those that include new procedures and concepts.

b) *Avoid help seeking ($\alpha = 0.73$).*

..... 1. If there is something I do not understand in this subject, I tend to solve it myself instead of seeking help .

..... 2. In this subject, I do not ask questions in class even though I do not understand what is being taught or explained.

..... 3. When I do not understand the tasks or activities that the teacher proposes in this subject, I do them as I feel is right instead of seeking help.

..... 4. Even if the tasks in this subject are too difficult to do them by myself, I do not usually ask for help.

..... 5. If the tasks that the teacher proposes in this subject are too hard for me to do, I simply opt not to do them, or copy them, instead of asking for help.

c) *Avoid effort and challenges ($\alpha = 0.84$).*

..... 1. My priority in this subject has been achieved by making the minimum effort.

- 2. I have opted to do those tasks that were easier for me in this subject, and I have avoided doing difficult challenges.
- 3. I have chosen to do those activities and tasks in this subject which I could do with the least effort.
- 4. I have not wanted to take on difficult challenges and tasks in this subject.
- 5. I have done only done what was expected of me in this subject.
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