Is resilience learned through the frustration of the BPN? An empirical study about its role in the acquisition of positive lifestyles and academic outcomes framed in SDT

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Abstract

Based on Self-Determination Theory (SDT), this research shows once again the importance of the teaching role in fostering adaptive behaviors in students. As mediators of the model are the Basic Psychological Needs (BPN) and resilience. To date, although the inclusion of a fourth BPN, called novelty, had been proposed, it had not previously been used as part of the BPN measure of satisfaction or frustration. For its part, resilience had proven its relationship in isolation with the different constructs studied here, but had never been part of an explanatory model. The main objective of this study was to perform a structural equation model based on SDT to analyze the predictive capacity of the autonomy-supportive teaching style as a trigger of BPN frustration (including novelty), its relationship with resilience, and, finally, its relationship with adaptive outcomes such as intention to be physically active, maintain a healthy diet, and academic performance. A total of 2856 subjects participated (1514 boys and 1342 girls), with a mean age of 14.31 ($SD = 1.91$). Different SEM were tested, with the one that included novelty as the fourth BPN and resilience as a coadjutant construct of the explanatory model based on SDT offering better adjustment indexes. Fostering a climate supportive of autonomy will favor the satisfaction of the BPNs and therefore resilient behaviors in students, which are related to positive consequences such as those studied in this research.

Keywords Teaching role · Novelty · Resilience · Adaptive behaviors · Motivation

Introduction

The most studied macro-theory of human behaviour in recent times, the Self-Determination Theory, has highlighted the importance of the teaching role as a predictor of adaptive and/or maladaptive consequences in students, including the practice of physical exercise, the intention to eat a balanced diet and even academic performance, among others (Ryan & Deci, 2017; Lirola et al., 2021; González-Cutre & Sicilia, 2019). Recent studies have observed that people who maintain active lifestyles through sport and/or physical activity, and healthy eating habits, following a balanced diet rich in vegetables and fruit, have a strengthened immune system and a higher quality of life (Bermon et al., 2015). Given the current coronavirus pandemic, the importance of these variables as part of the equation on the road to restoring a healthy global population is more evident than ever. Following global statistics, the sector of the population identified as key to the creation and maintenance of healthy habits has been the child and youth population (Biddle et al., 2004). Therefore, given that this sector of society spends

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a large part of its day in educational centres, they are an ideal context for accessing and studying the behaviours that they may present and for deepening the understanding of the mechanisms that lead to the development of healthy habits, such as physical exercise and maintaining a balanced diet. The subject within the educational curriculum which, in terms of content, comes closest to the habits described, would be Physical Education (PE).

Following SDT, we know that the interpersonal teaching style within PE classes has been shown to be a key element for the satisfaction or frustration of basic psychological needs in students (Fin et al., 2017; Ulstad et al., 2018; Vallerand, 2007). These BPN are key to the optimal development of the individual, and their satisfaction or frustration is related to multiple adaptive or maladaptive consequences (Mouratidis et al., 2011). BPN include autonomy, competence and relatedness to others. Autonomy is described as the need to feel free to make decisions, competence refers to feeling that one has sufficient potential to cope with the proposed tasks, and relatedness refers to being able to establish affective ties with other individuals. However, recently a proposal was made to include a fourth BPN, novelty. This refers to everything that is out of the routine and usual in the person's life and therefore involves the implementation of new skills or abilities. This new BPN, if satisfied, would help to enhance the effects of interest and curiosity about the tasks proposed in PE, which would result in a better predisposition of students to participate in classes (Bagheri & Milyavskaya, 2020; González-Cutre et al., 2020; Trigueros, Mínguez et al., 2019; Vansteenkiste et al., 2020). Therefore, the study of novelty as a fourth BPN could help to increase the explanatory rate of the behaviours under study. To date, the functioning, together with other variables, of the BPN frustration scale in which novelty is part of the BPN has not been tested. Therefore, it is of interest to test the role of novelty in an explanatory model that offers new evidence on the recent incorporation of novelty as BPN.

On the other hand, and as part of this explanatory model, based on SDT, the possibility arises of including resilience as an adjuvant and clarifying construct. Bearing in mind that novelty also implies the development of new skills that allow adaptation to the environment, resilience would be affected by the work of BPN. Resilience has proven its role alongside motivation in other research (Abualkibash & Lera, 2017; Salazar-Ayala et al., 2021). Therefore, as an additional contribution, this study proposes to address resilience as an explanatory construct of SDT.

Student perceptions of teacher behaviours

Providing stimulating and enjoyable environments for the development of physical education classes depends on the attitudes and behaviours of the teaching staff. In relation to the interpersonal teaching style, SDT suggests that it can be conceptualised on a continuum ranging from autonomy support, considered important for the satisfaction of the student's BPN (Frielink et al., 2018), to a more controlling style, related to the frustration of the same (Trigueros, Maldonado et al., 2020). The autonomy-supportive style is characterised by the fact that the person who holds a position of authority (e.g., teacher) with respect to the rest of the members of a group (e.g., students), offers listening attitudes and different possibilities of choice, in a way that encourages a model of autonomy and decision-making, without imposing obligations, among other aspects (Reeve, 2016). In contrast, the controlling style is characterised by a more traditional teaching style, where the authority figure takes the reins and sets the pace of learning, leaving no room for other possibilities for action on the part of the students (Haerens et al., 2015). More controlling teaching styles lead to promoting maladaptive consequences in their students, such as frustration of BPN and a lower physical activity, among others (Warburton et al., 2020); in contrast, autonomy-supportive teaching styles have shown positive relationships with BPN satisfaction (Chen, 2014; Zhang et al., 2011), greater intentionality to be physically active (Trigueros, Aguilar-Parra et al., 2019), greater resilience (Salazar-Ayala et al., 2021) or better academic performance (González-Cutre & Sicilia, 2019). In previous research, although the relationship of an autonomy-supportive style with BPN frustration has been studied, the inclusion of the novelty factor as a fourth BPN has not been taken into account. In this sense, novelty is expected to help explain the relationship between the two previously unrelated constructs (Tilga et al., 2019), showing a negative and significant relationship.

Frustration of BPNs

One of the SDT mini-theories presents BPNs as mediating variables in their relation to the development of healthy lifestyles and possible more or less adaptive consequences (Ryan & Deci, 2017). BPNs are namely autonomy, competence and relatedness; however, a possible new BPN has recently been proposed as novelty (González-Cutre et al., 2016; Sevil-Serrano et al., 2020; Trigueros, Mínguez et al., 2019; Vansteenkiste et al., 2020). Novelty has been used in several studies, but has not been shown to work well within the BPN scale itself, so it has been used mainly as a complementary measure (Bagheri & Milyavskaya, 2020;

Trigueros, Mínguez et al., 2019). However, following theoretical guidelines, the novelty is written in such a way that it could be considered the fourth BPN.

In the current literature there are few published studies in which novelty is analysed as a possible basic psychological need. On the one hand, in the research by González-Cutre et al. (2016), although the relationship between the need for novelty and life satisfaction in adults and the different types of motivation in PE students was analysed, novelty was treated in isolation and not as part of the BPN factor, as occurred in the study by González-Cutre and Sicilia (2019). On the other hand, the study by Espínola et al. (2020) although it went on to analyse the role of the need for novelty within the sequence proposed by self-determination theory (Deci & Ryan, 1987, 2000; Ryan & Deci, 2017) and the hierarchical model of Vallerand (1997, 2001), again treated novelty as a construct isolated from the rest of the BPNs, without testing its functioning as part of the BPNs.

To date, there are no studies with the inclusion of novelty as part of the overall BPN factor, except in the validation of the BPN frustration scale (Trigueros, Maldonado et al., 2020). However, the study by Trigueros, Maldonado et al., (2020) used either the four BPNs or the unitary factor, but failed to test its performance. Therefore, we propose the inclusion of novelty as a BPN dimension, and to analyse its functioning within a model, in which the interpersonal teaching style of autonomy support is related to BPN frustration, including novelty, experienced resilience and, finally, its relationship with adaptive consequences such as the intention to be physically active, to eat a balanced diet and the academic performance of PE students. In this study it will be tested the role of novelty using different models, in the hypothesized model the performance of the model will be analyzed by including the need for novelty as a fourth factor of the NPB, in the first alternative model novelty will be removed from the model; and, in the second alternative, novelty will appear at the same level of the NPB although as an independent variable.

BPN and Resilience

Resilience is the ability to overcome difficult situations that occur in life, recognise them, accept them and learn from them, emerging stronger from them (Rutter, 1993). In the academic environment, students who show resilience in their studies and in the face of tasks with different degrees of difficulty will also show resilience in the face of obstacles in everyday life; the capacity for resilience is extrapolated to the rest of the facets of a person's life, helping them to overcome both academically and personally (Reeve et al. 2020). The capacity for resilience implicitly shows the

development of new skills and abilities to better adapt to the environment and the new circumstances faced by the individual. These connotations of resilience seem to be related to what is postulated by SDT, which highlights and focuses on the overall development of the individual. The individual actively performs actions with a tendency towards psychological growth, integrating his or her experiences in a coherent way with his or her will (Deci & Ryan, 2000; 2002). In this line, resilience is shown as a construct that facilitates behavioural changes, adaptation to the environment, and in short, the holistic development of the person, so it seems interesting to incorporate this construct as an explanatory adjuvant of SDT.

One of the SDT mini-theories, specifically that of basic psychological needs, takes these as the fundamental and necessary pillars for the holistic fulfilment of the individual, being related to the quality of involvement (Deci & Ryan, 2000). In this sense, Cantú-Berrueto et al. (2016) in their research showed the relationship between feeling frustrated BPN and showing less interest and participation in the specific activity, in this case physical exercise. Following the postulates of SDT, we know that the satisfaction or frustration of BPN is determined to some extent not only by antecedents from the social environment surrounding the individual, but also by the person's own ability to manage their internal skills and abilities according to the changes demanded by the outside world (Ryan et al., 2012). In previous studies, the teaching role has been shown to be key as a stimulus from this social environment, where an autonomy-supportive style favours the satisfaction of BPN for proper development (Ryan & Deci, 2017; Trigueros, Aguilar et al., 2020). In the research by González et al. (2019), a significant relationship was found between BPN satisfaction, showing greater resilience and involvement in exercise, being to a lesser extent if BPNs were frustrated. In this study, it is hypothesised that the inclusion of novelty as a fourth dimension of BPN would help to explain its relationship with resilience, since, if we show PE students tasks with novel components, they should manage their own internal resources to give new responses to these, so that the development of resilience as an adaptive consequence would be favoured. Otherwise, the frustration of BPN would lead to a lower development of BPN.

Intention to be physically active, maintain a healthy diet and academic achievement

The importance of physical education classes for the acquisition of healthy habits and the correct psychosocial growth and development of the individual has been highlighted in countless research studies (Chen et al., 2020; Di Battista,

2018; Liu et al., 2017). Studying the antecedents that reinforce these adaptive behaviours is of great interest. The influence of interpersonal teaching style has been shown to impact on BPN and how BPN satisfaction or frustration has been related to intention to be physically active, maintain a balanced diet and academic performance (Gonzalez-Cutre & Sicilia, 2019). However, to date, no research has been conducted that takes into account the inclusion of novelty as a fourth BPN in which its performance as a global measure has been tested. Furthermore, this study proposes to treat resilience as an explanatory construct that reinforces the postulates described in SDT.

Aim and hypothesis

In this sense, the main aim of this study was to perform an explanatory model based on SDT where the predictive capacity of the autonomy-supportive teaching style as a trigger on BPN frustration (including novelty) is analyzed, it is on resilience, and, finally, its relationship with adaptive outcomes such as intention to be physically active, maintain a healthy diet and academic performance. The second aim was analysed resilience as an adjuvant factor of explanatory models of SDT. The following are the hypotheses made in this study: (1) Controlling teaching styles will positively and significantly predict the frustration of BPN; (2) the inclusion of novelty in the tested model will help to increase the level of explanation of BPN; (3) resilience will be negatively predicted by the frustration of BPN and will positively and significantly predict adaptive outcomes such as level of physical activity, intention to maintain a healthy diet and academic performance.

Method

Participants and procedure

The study involved students in secondary school in various educational centres in southern Andalusia (Spain), their participation was voluntary and their confidentiality was safeguarded, making up a total of 2856 subjects (1514 boys and 1342 girls), with a mean age of 14.31 (Standard Deviation 1.91). To participate in the study, students had to submit an informed consent form signed by their parents or legal guardians and fill in each of the questionnaires in full.

The Bioethics Committee belonging to the University of Almeria approved the conduct of the present study (Ref. 03/2021 UALBIO). In addition, the protocol established by the American Psychology Associations was carefully followed and the precepts of the Declaration of Helsinki were respected.

Measurements

Teachers' need-supportive behaviours The Basic Psychological Needs Support in Physical Education Questionnaire by Sánchez-Oliva et al. (2013), was used to assess students' perceptions of support for competence, autonomy and relatedness as perceived by physical education teachers. The assertion "In PE classes, my teacher…" was followed by 12 items that preceded: competence support (e.g. "Encourages us to trust our ability to correctly do the tasks"), autonomy support (e.g. "Takes into account our opinion in the development of the lessons"), and relatedness support (e.g. "Encourages positive interactions among all class students"). The scale is a Likert-type scale of up to five points. From 1 (strongly disagree) to 5 (strongly agree).

Frustration of basic psychological needs Use was made of the Spanish scale of Trigueros et al. (2020a) which analyses the frustration of basic psychological needs in the context of PE. The scale was preceded by the heading "In my PE classes…" and consists of 17 items, distributed as follows among each of the factors that make up the scale: competence (four items; e.g. "There are activities that make me feel incapable"), relatedness (four items; e.g. "I don't get on well with my classmates"), autonomy (four items; e.g. "I feel pressured to do the activities planned by the teacher"), and novelty (five items; e.g. "Sometimes I feel that the exercises are the same in class after class"). The scale ranges from 1 (not at all true) to 7 (totally true) and is Likert-type.

Resilience in PE In order to analyse the students' ability to excel in Physical Education classes, the Resilience Scale in PE classes (Trigueros et al., 2020b) was used. This scale have 25 items divided between two factors that measure acceptance of oneself (e.g. "I am disciplined") and the context and personal competence (e.g. "For me it is important to maintain interest in class"). The scale ranges from 1 (total disagreement) to 7 (total agreement) and is Likert-type.

Intention to eat healthy We used the subscale belonging to the TPB, which has been successfully used in several studies (Huang et al., 2020; Lirola et al., 2021). This subscale consists of three items (e.g. "I intend to eat healthy food"). The scale ranges from 1 (strongly disagree) to 7 (strongly agree) and is Likert-type.

Intention to be physically active We used the subscale belonging to the TPB (Hagger et al., 2009). This scale

consist of three items (e.g. "I intend to do active sports and/ or physical activities during my leisure-time in the next 5 weeks… "). The scale is a Likert-type scale of up to seven points. From 1 (strongly disagree) to 7 (strongly agree).

Academic Performance in PE Use was made of the marks obtained in PE by the students. This information was provided by the teacher. The value of the grades ranged from: 1 (Fail) to 5 (Outstanding).

These questionnaires were completed by the students in a quiet classroom, free of distractions and individually. The students completed the questionnaires on paper and pencil, with a member of the research group present to answer any questions they might have.

Data Analysis

The statistical analyses of the present study were carried out using SPSS v20, AMOS v20 statistical software and Mplus v7.4.

Initially, descriptive statistics were calculated (standard deviation, mean and Pearson correlations). Subsequently, the reliability of each of the scales was calculated. For this, three parameters were calculated: (I) McDonald's omega coefficient was used to calculate composite reliability. This index takes into account the measurement errors of the items and the associations of the items with respect to the constructs (Dunn et al., 2014); (II) Secondly, the average extracted variance index (AVE; Fornell & Larcker, 1981) was calculated. This index separates the factor variance measured without error (true variance) and with error (measurement error variance). The convergent validity of the factor is not supported with values below 0.50; (III) Thirdly, the Cornbach's alpha coefficient was used to assess the internal consistency of each of the constructs, with suitable values < 0.70 (Cicchetti, 2006); (IV) Finally, the heterotrait-monotrait ratio of correlations (HTMT) of the latent factors was estimated, assuming their discriminant nature in the presence of values below 0.90. This procedure has shown its suitability in terms of specificity and sensitivity with respect to other methods, especially in large sample sizes (Henseler et al., 2014).

Structural equation modelling (SEM) is the statistical method used to calculate the relationships between the variables in the study. For the SEM, the maximum likelihood estimation method was used, since it is the most appropriate when using Likert-type questionnaires and also considers non-normality distribution of the data (Beauducel & Herzberg, 2006). In addition, 95% biascorrected bootstrap CIs (95% CIBC) were calculated for each of the proposed pathways with 6000 bootstrap samples (Hayes & Scharkow,

2013) in the SEM. The following fit indices were used to accept or reject the model according to the parameters established by Hair et al. (2006): The SRMR and RMSEA will show a good fit when the score is equal to or below 0.06; the incremental indices (TLI, IFI and CFI) will show a good fit when the score is above 0.95; $\chi 2/df$ will show a good fit when the score is between 2 and 3.

Despite proposing a hypothesized model (Fig. 1) it is important to test alternative models. The first model examined without the items pertaining to novelty frustration to consider the possibility of including this factor in the proposed model. Next, a second additional model was examined in which factors of BPN frustration correlate with novelty frustration, as models proposed in different studies from BPN have failed to integrate novelty within a unitary construct of BPN. Two values will be used to compare the models: (I) Akaike information criterion (AIC), is an estimator of the prediction error and, therefore, of the relative quality of the statistical models for a given data set; (II) Bayesian information criterion (BIC), is a model selection criterion from a finite set of models.

Results

Preliminary and reliability analyses

Table 1 shows the descriptive statistics, latent correlations and reliability estimates of the scale scores (AVE, Omega coefficient, HTMT and Cronbach's alpha). The latent correlations between the study variables were significant ($p < .01$), ranging from -0.28 to 0.78.

Predictive findings across the SEM

The results through SEM have shown that the hypothesis-driven model of the present study obtained a good fit in the different statistics (see Table 2). Furthermore, as stated in Fig. 1, pupils' perceptions of PE teachers' autonomy, competence and relationship support were negatively and significantly related to BPN frustration ($\beta = -0.19$ to -0.44). In addition, BPN frustration was negatively and significantly related to resilience ($\beta = -0.46$). Finally, resilience was positively and significantly related to academic performance ($\beta = 0.21$); to intention to be physically active ($\beta = 0.55$) and to intention to eat a healthy diet ($\beta = 0.49$). As for the independent variables in the hypothesised model they correlated with each other positively (i.e. autonomy-competence support $r = .73$, $p < .001$; competence-related support $r = .075$, $p < .0001$; autonomy-related support $r = .69$, $p < .001$).

Two alternative models were tested in order to ensure the adequacy of the proposed hypothesised model. The first

Table 1 Means (M), standard deviations (SD), reliability coefficients, HTMT, and latent correlations among study variables

Variables	M (SD)	α	ω	AVE	1	2	3	4	5	6	7	8
1. Autonomy Support	3.15 (1.12)	0.84	0.80	0.52	-	0.77	0.62	-0.55	0.42	0.44	0.50	0.49
2. Competence Support	3.49 (0.87)	0.85	0.81	0.53	0.84	-	0.78	-0.47	0.58	0.40	0.50	0.38
3. Relatedness Support	3.32 (1.01)	0.82	0.81	0.53	0.71	0.85	-	-0.33	0.34	0.38	0.42	0.47
4. BPNF	2.87 (1.19)	0.88	0.83	0.56	-0.60	-0.52	-0.38	-	-0.31	-0.56	-0.44	-0.28
5. Resilience	4.98 (0.99)	0.91	0.90	0.74	0.48	0.64	0.39	-0.36	-	0.59	0.47	0.49
6. Intention to be physically active	5.11 (1.22)	0.87	0.88	0.68	0.49	0.45	0.44	-0.63	0.66	-	0.32	0.35
7. Intention to eat healthy	4.54 (0.79)	0.89	0.86	0.64	0.54	0.56	0.48	-0.49	0.52	0.39	-	0.21
8. Academic Performance	2.99 (0.33)	-	-	-	0.52	0.42	0.53	-0.39	0.55	0.42	0.28	-

Note: BNPF = Basic Psychological Needs Frustration. The values below the diagonal correspond to the heterotrait to monotrait (HTMT) ratio between factors

alternative model (see Supplementary Material 1), which did not include novelty frustration within BPNF, but was correlated with the higher order factor (Frustration) grouping competence, relatedness and autonomy, showed a good fit to the data (see Table 2), and explained 54% of the variance in resilience. However, the proposed model grouping the four BPNF sub-factors (i.e., Fig. 1) showed more variance (i.e., > 8%) than the alternative model one. However, this increase in variance could be due to the grouping of the four sub-factors into one in the proposed model (Fig. 1). As for the AIC and BIC estimators, it is not possible to use them. This is because the number of items in the two models are different. Nevertheless, the remaining statistical parameters showed support for the proposed model (i.e. Figure 1). More specifically, as shown in Table 2, the hypothesised model showed lower values for the χ2/df and RMSEA statistics and higher values for the incremental indices, compared to the alternative model one. Similarly, the alternative model two (see supplementary material 2), which comprised a common latent variable (BPNF without novelty) also showed a good fit to the data (see Table 2). In this model, the variance explained was lower than in the original model (i.e., 52%). In addition, the original model (i.e. Figure 1) showed slightly better AIC and BIC values, as well as lower values of χ2/df, RMSEA, and higher values of CFI, IFI and TLI. These analyses reinforce the relevance of the proposed model, which allows us to analyse the effect of novelty frustration within BPNF.

Discussion

The main aim of this study was to develop an explanatory model based on the SDT where the predictive capacity of the interpersonal teaching style of autonomy support as a trigger for BPN frustration (including novelty) was analysed, as well as its relationship with adaptive consequences such as the intention to be physically active, maintain a healthy diet and academic performance. The results obtained showed support for considering as the best explanatory model the one in which novelty was included as part of the factor structure of the BPNs, helping to explain the proposed model. Novelty (0.80) contributes to a similar extent as competence (0.86), autonomy (0.82) and relatedness (0.79) to the BPN construct. Thus, as in previous literature where the predictive power of novelty as an isolated measure had been tested (Espínola et al., 2020; González-Cutre et al., 2016; González-Cutre & Sicilia, 2019), this research supports the inclusion of novelty as a factor that increases the predictive power of the BPN, so it is appropriate to consider novelty as the fourth BPN.
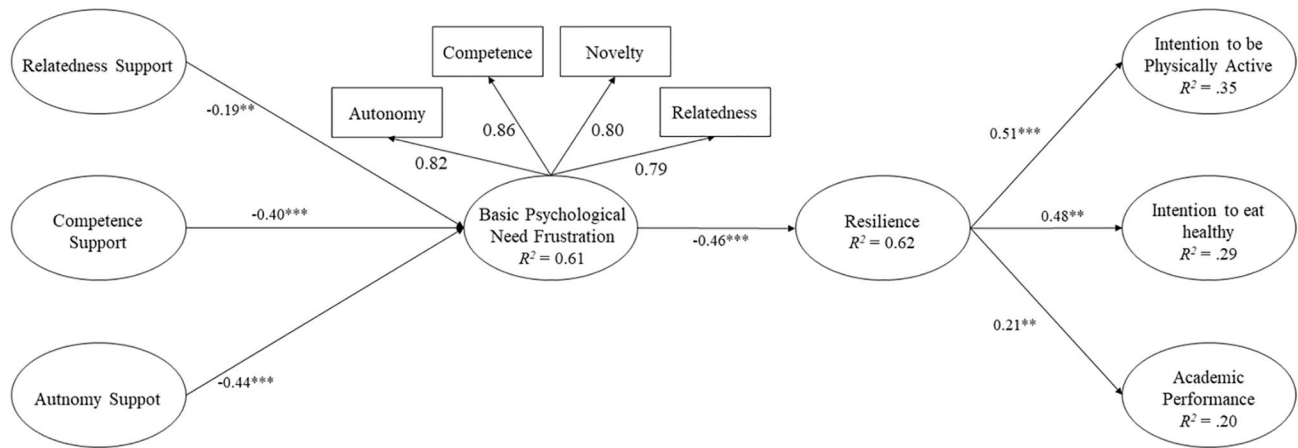
Fig. 1 Results of the hypothesised model analysed by means of SEM. ***p < .001; ** p < .01

As secondary aim, the inclusion of resilience as an explanatory construct of the model tested has been shown to significantly predict the adaptive consequences studied in this research. These results are in line with previous research where resilience has shown a contributory role by showing its significant relationship with BPN and physical exercise performance (González-Cutre & Sicilia, 2019; González et al., 2019), thus it would be expected both by its meaning wording and previous relationships studied, that within the proposed model resilience would present a similar behaviour and would be negatively predicted by BPN frustration, as in the study by Balaguer et al. (2020) where it highlights that sport contexts that show an autonomy-supportive style would lead to BPN satisfaction and therefore to favour constructs related to well-being as in the case of resilience. On the other hand, research by Canosa and Gutiérrez-Rodríguez (2020) conducted during the confinement caused by the pandemic found that resilient behaviours were related to healthy habits such as physical exercise, maintaining a healthy diet and a healthy sleep schedule. The relationship between resilience and academic performance has been studied in numerous research studies (Soldevilla et al., 2018; Villalta, 2010), all of these findings being in line with the results obtained in the present research. In this line, resilience is shown to be a construct that yields greater knowledge about the motivational relationships studied (including its relationship with BPN) and their possible adaptive consequences for the educational and health context.

As practical implications of this study, in light of the findings obtained, the importance of the teaching role in its relationship with the students is highlighted, since controlling teaching styles lead to the frustration of the students' basic psychological needs. The relevance of working on resilience in the educational context is highlighted in order to promote adaptive consequences such as those studied in this research, higher levels of physical activity, intention to eat a healthy diet and better academic performance. Therefore, pedagogical and didactic proposals by teachers that forget controlling models and opt for dynamics that favour resilience in their students and therefore the satisfaction of their NPB, will lead to better psychological development, personal growth and the achievement and maintenance of healthy habits in students. These findings can be applied in other educational or health contexts where the variables studied here have a place.

The possible limitations of this study include that the participants studied do not correspond to a representative sample of the population, being a convenience sample. Furthermore, in this research there are no variables that could have been controlled or manipulated. In addition, the implementation of correlational analyses, which prevents the establishment of cause-effect relationships. Therefore, the replication of the study at a longitudinal level is proposed as a prospective research project in order to provide more information and thus avoid the bias of the common method (Podsakoff et al., 2003). Furthermore, it should be borne in mind that despite having tested various structural equation

Table 2 Fit indices of the three structural equation models

	χ^2	df	χ^2/ df	RMSEA (90% CI)	CFI	IFI	TLI	AIC	BIC
Hypothesis model	461.23*	185	2.49	0.050	0.97	0.97	0.97	101312.41	102416.80
First alternative model	520.31*	166	3.13	0.062	0.94	0.94	0.94	90450.21	90454.19
s alternative model	562.49*	186	3.02	0.059	0.94	0.94	0.94	101697.30	102604.62

*p < .01

models and selecting the one with the best fit indices, there is the possibility of the problem of equivalent models inherent in the use of the structural equation technique itself, assuming that the ideal model presented could be one among other possible models (Hershberger, 2006).

By way of conclusion, the inclusion of novelty as the fourth BPN and resilience as predictor constructs of adaptive consequences in the same model can be extracted as a novel contribution of this research. Consequently, the results represent a contribution to the literature on SDT. Interpersonal teaching style favours BPN satisfaction or frustration (Frielink et al., 2018), therefore, it is up to teachers to foster climates of educational well-being that favour resilient behaviours that are positively and significantly related to healthy and adaptive behaviours for students (Lim et al., 2016). Therefore, it is relevant to investigate forms or strategies of autonomy support that help students to cope with situations or experiences within the physical education classroom.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12144-022-03496-y.

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