TRABAJO FIN DE GRADO:
A SYSTEMATIC REVIEW OF THE NEED FOR NOVELTY IN SELF-DETERMINATION THEORY

Titulación: Grado en Ciencias de la Actividad Física y del Deporte

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Contenido

1. Abstract

Recently, the need for novelty has been proposed as a basic psychological need within self-determination theory, and many studies have examined this need in different contexts and populations. For this reason, the aim of the present study was to review and synthesize the role of novelty as a basic psychological need from this theory. This systematic literature search of studies published between 2016 and March 2021 was undertaken on the electronic databases APA PsycArticles, APA PsycInfo, Proquest Central, Scopus, SPORTDiscus, and Web of Science. Initially 1178 documents were identified, and after the selection process, 27 articles were included in this review. The results support the idea of including novelty as a basic psychological need, since its satisfaction led to positive outcomes and its frustration is related with ill-being; novelty need satisfaction acts as a growth need because it works in accordance with the other existing needs; it is a precursor and not a consequence within the motivational process of self-determination theory; and it works universally for different ages and cultures.

2. Introduction

The construct of novelty has been present in self-determination theory (SDT) since the development of the primary studies and the establishment of the original postulates on this theory (Deci, 1975; Deci & Ryan, 1991, 2000; Ryan & Deci, 2000). The founders of SDT included the tendency to be curious, seek out novel activities, and encounter new challenges in their initial definitions of intrinsic motivation. However, the formal proposition of novelty as a candidate basic psychological need (BPN) within SDT has been done recently (González-Cutre et al., 2016, 2020). Novelty is defined as the innate need to experience something not previously experienced or that differs from the experiences that comprise a person's everyday routine (González-Cutre et al., 2016).

Recent research have suggested that novelty experiences could be important for a range of adaptive outcomes in different settings, such as improvements in the classroom teaching-learning process (Calderón et al., 2020; Stoa & Chu, 2020), well-being at work (Baghery & Milyavskaya, 2020), emotional tourism experiences (Skavronskaya et al., 2020), healthy nutritional behaviors (Sylvester et al., 2018), physical activity adherence (Hargreaves et al., 2021; Lakicevic et al., 2020), rest in athletes (Eccles & Kamier, 2019), and even for wellness in a general life domain (González-Cutre et al., 2016, 2020). Therefore, novelty seems an important variable that could be add to the existing BPN list within SDT (autonomy, competence, and relatedness), with the objective to promote positive affective, cognitive, and behavioral consequences and to prevent ill-being.

According to SDT (Ryan & Deci, 2017, 2020), autonomy refers to a sense of volition, self-organization of behavior, and initiative in our actions; competence concerns the feeling of efficacy, mastery, and success; and relatedness represents the desire to feel connected to others and belong to a group. The satisfaction of all these BPN is associated with autonomous motivation and optimal functioning while their frustration is related to controlled motivation, amotivation, and malfunctioning. Although novelty is linked to these three BPN, research has

shown that it could be a distinct construct, but with a similar role, which helps to better understand the human motivational processes and psychological growth (González-Cutre et al., 2016, 2020). Consequently, the addition of novelty to SDT-based motivational models could increase the explained variance of different outcomes, but also change the relations of the three BPN with these outcomes (e.g., González-Cutre & Sicilia, 2019). On this matter, the design of interventions in different contexts aim to satisfy not only the three BPN, but also the need for novelty, may lead to better psychological and behavioral development (González-Cutre et al., 2019).

Novelty has passed an initial test to be considered a BPN, fulfilling some criteria established by Ryan and Deci (2017) from SDT, but many criteria should be readdressed and extended (Vansteenkiste et al., 2020). We are facing a thought-provoking process, but a long journey is still necessary (Vansteenkiste et al., 2020). Several systematic reviews and meta-analyses have recently tested the main postulates of SDT regarding the three BPN (Ntoumanis et al., 2020; Reeve & Cheon, 2021; Van den Broeck et al., 2016; Vasconcellos et al., 2020; White et al., 2021). However, there are not studies that have reviewed the role of novelty as a BPN. Taking into account that research on this topic has grown in the last years, the objective of this study was to review and synthesize this evidence. Specifically, we are going to carry out a systematic review of the quantitative studies that have analyzed novelty as a candidate BPN from SDT in any domain of life, trying to provide evidence about the criteria (see Method section; González-Cutre et al, 2020; Ryan & Deci, 2017) that novelty has met until now to be considered a BPN.

3. Method

This review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (Page et al., 2021), and it was recorded in PROSPERO (International Prospective Register of Ongoing Systematic Reviews, http://www.crd.york.ac.uk/prospero).

3.1 Eligibility criteria

We aimed to include the studies meeting the following criteria: (1) Novelty was analyzed as a candidate BPN from SDT; (2) Novelty was measured in any life context or general life; (3) Articles were written in English or Spanish and published in peer-reviewed journals.

The following exclusion criteria were applied: (1) Qualitative studies; (2) Narrative and systematic reviews, conference proceedings, and theses/dissertations; (3) Novelty was not conceptualized as a BPN or it was analyzed from a different theory; (4) Studies measuring intensity (desire) of the need for novelty (novelty seeking) instead of novelty satisfaction, frustration or support; (5) Novelty was analyzed together with the three BPN (autonomy, competence, and relatedness) in a single variable and therefore its differentiate effect was missing; (6) Studies with the same sample as the main study which analyzed antecedents or outcomes of novelty.

3.2 Information sources and search strategy

A systematic literature search of studies published between 2016 (the year in which novelty was proposed as a BPN by González-Cutre et al.) and March 2021 was undertaken on the electronic databases APA PsycArticles, APA PsycInfo, Proquest Central, Scopus, SPORTDiscus, and Web of Science. The following search strategy was used: novelty AND ("basic psychological need*" OR "self-determination theory"). These terms were searched in all fields. We also scanned reference lists of included studies in order to identify possible relevant articles that had not been located in the initial search.

3.3 Selection process

First, the articles obtained after following the search strategy were collected in a bibliography management software (EndNote X9). Duplicate studies were removed and two researchers (MG and JS) independently examined potentially eligible studies by reading titles and abstracts and considering the inclusion criteria. In the second phase, these two researchers independently read the full text of the preselected studies, applying the exclusion criteria and creating a list of potentially eligible articles. A third researcher (DG) was included to discuss any discrepancies when consensus was not reached.

3.4 Data collection process and data items

The included studies were coded on an Excel database by MG and reviewed by DG. Doubts were resolved through discussion among all the authors. Extracted data included publication year, country, sample size, gender distribution, age, context (e.g., work, physical education, general life), study design (i.e., cross-sectional, quasi-experimental, experimental, and systematic observation), intervention duration, instruments to measure novelty (i.e., satisfaction, frustration, and support), significant results, and criteria for identifying a new BPN (Ryan & Deci, 2017). For coding the inclusion criteria for a new BPN, we checked if the following aspects were fulfilled in the studies included in this systematic review: (1) Novelty satisfaction was positively associated with well-being, health, and psychological integrity, or negatively related to ill-being. Novelty frustration showed the opposite pattern; (2) The article clearly specified the novelty experiences and behaviors that lead to well-being through a theoretical description, intervention actions, or discussion of ideas; (3) Novelty was essential to interpret empirical phenomena because it was associated with a social factor or intervention effect, being able to mediate the relations between these factors, motivation (autonomous, controlled, or amotivation), and psychological functioning; (4) Novelty acted as a growth need rather than a deficit need that only functions when the three BPN are frustrated. Therefore measures of novelty and the three BPN were positively associated; (5) Novelty was a precursor of well-being and not an outcome of satisfaction of the three BPN; and (6) Novelty operated universally and therefore its relations with the three BPN were invariant across gender and age; its relations with other variables were not moderated by money, age, novelty importance, novelty seeking, or openness to experience; and the association pattern of novelty was the same for countries other than Spain (country in which novelty was first tested as a BPN).

3.5 Methodological quality assessment

The methodological quality of the selected articles was independently assessed by two researchers (JS and MR) using the Quality of Survey Studies in Psychology (Q-SSP, Protogerou & Hagger, 2020) checklist. A third researcher (DG) was included to discuss any discrepancies when consensus was not reached. This checklist was recently developed considering the opinion of an international panel of experts in psychology research and quality assessment. It comprised 20 items designed to evaluate the quality of the studies in four domains: introduction (rationale and variables; four items), participants (sampling and recruitment; three items), data (collection, analyses, results, and discussion; 10 items), and ethics (consent, debrief, and funding/conflicts of interest; three items).

3.6 Synthesis methods

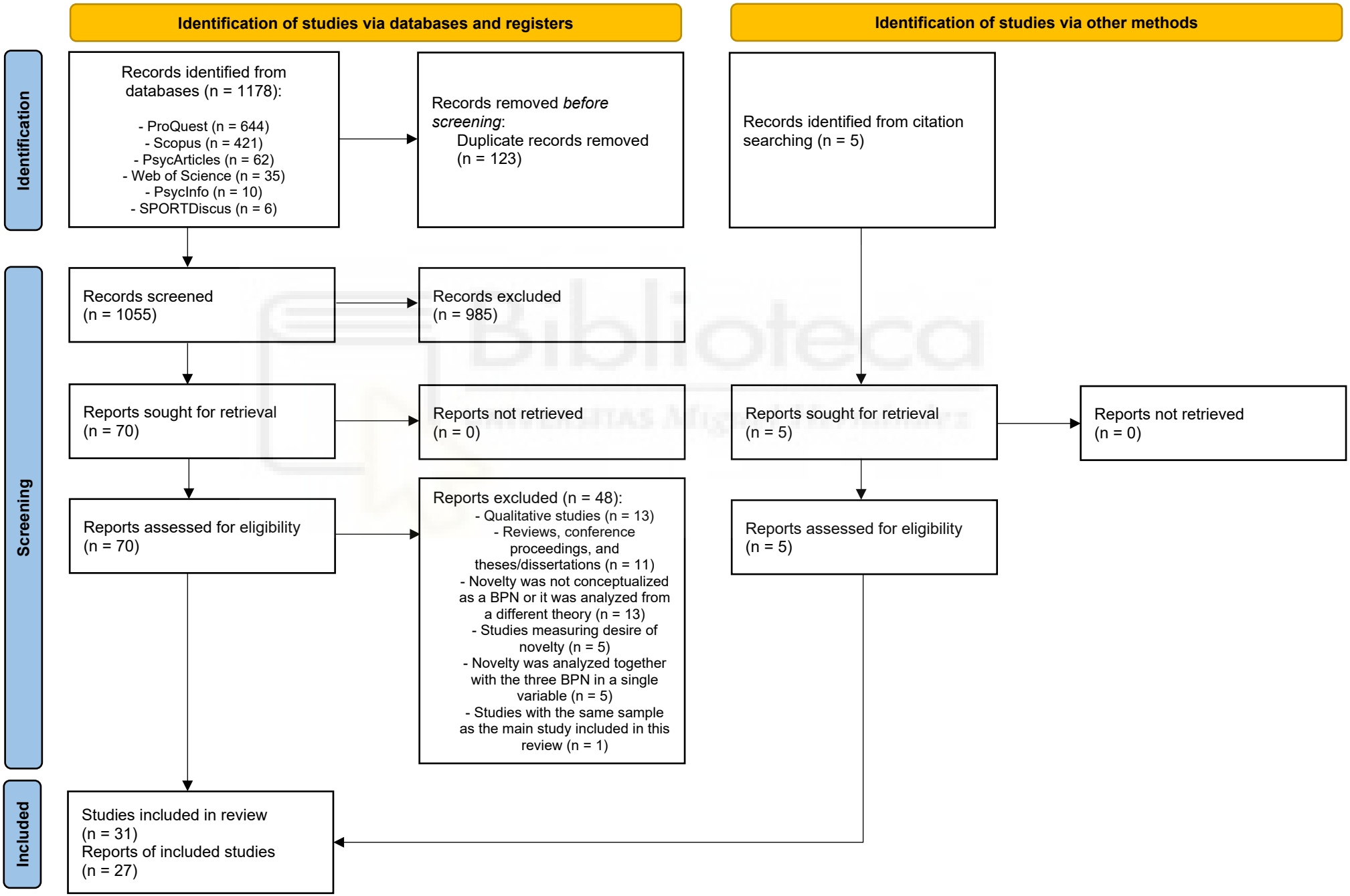
A narrative synthesis of the results was carried out in order to summarize the study and sample characteristics, novelty measures, and criteria fulfilled to be a BPN, using descriptive statistics and percentages. The main results of the selected studies were presented attending to different themes: (1) Associations between novelty and the three BPN; (2) Antecedents of novelty satisfaction and frustration; (3) Outcomes of novelty satisfaction and frustration; (4) Universality of the need for novelty; (5) Novelty experiences and behaviors that lead to well-being.

4. Results

As shown in Figure 1, the electronic search initially located 1178 publications, of which 123 were removed because of duplicate records. After the title and abstract reading, 985 records were removed considering the inclusion criteria. In the second phase, after full-text reading and applying the exclusion criteria, 48 reports were excluded as follow: qualitative studies (n = 13), narrative and systematic reviews, conference proceedings, and theses/dissertations (n = 11), novelty was not conceptualized as a BPN or it was analyzed from a different theory (n = 13), studies measuring desire of novelty instead of novelty satisfaction, frustration, or support (n = 5), novelty was analyzed together with the three BPN in a single variable (n = 5), and a study with the same sample as the main study included in this review (n = 1). Finally, five reports were identified through other sources and added to the 22 final reports included in the review, meaning a total of 27 articles. The 27 located articles comprised a total of 31 studies (see Table 1 in Annexes). The number of studies was higher than the total number of articles because some articles analyzed data from more than one sample: three samples (Bagheri & Milyavskaya, 2020) and two samples (González-Cutre et al., 2016; González-Cutre et al., 2020).

Figure 1

PRISMA 2020 Flow Diagram for New Systematic Reviews



The 27 articles included in this review were published between 2016 and 2021. Only three articles were published before 2019 (11.1%), four articles were published in 2019 (14.8%), most of the articles were published in 2020 (17; 63%), and three articles were published in 2021 (until March) (11.1%). Among all studies, 24 were carried out in Spain (77.4%), covering almost the entire national territory, and there were seven studies from other countries: two from Estonia; two with participants from Canada, United States, United Kingdom, and Australia; one from Canada; one from Malaysia; and one from Japan. Regarding the context, there were nine different settings: 20 studies were carried out in physical education (64.5%), three in a general life domain (9.7%), two in physical exercise (6.5%), one study asked about three important domains of life chosen by the participants, and one study was carried out in each of the following contexts: work, secondary education, university education, language learning, and sport. The most used study design was cross-sectional with 23 studies (74.2%), followed by four quasi experimental studies (12.9%), two experimental studies (6.5%), one quasi experimental study without control group (3.2%), and one systematic observation study (3.2%). Duration of the studies ranged from a single manipulation in an experimental study to a five-year intervention.

The study sample presented the following characteristics: the total number of participants was 20263: 9541 males (47.1%), 10710 females (52.8%), and 12 other or missing (0.1%). The minimum and maximum sample sizes were 50 and 2372, respectively, with the exception of one systematic observation study with a sample size of 3 participants. The age range of the sample in the 25 studies which reported this information was between 9 and 18 years for children and adolescents, and between 18 and 80 for studies carried out with adults. The mean age for the total sample was 19.20.

There were 13 different instruments to measure novelty: six self-report questionnaires to measure novelty satisfaction (46.1%), five self-report questionnaires to measure novelty frustration (38.5%), and one self-report questionnaire to measure novelty support (7.7%). In addition, one observational instrument was developed including items for novelty support and novelty thwarting (7.7%). With the objective of measuring novelty satisfaction, 12 studies used the five-item version of the Novelty Need Satisfaction Scale (NNSS; González-Cutre & Sicilia, 2019), nine studies used the six-item version of the NNSS (González-Cutre et al., 2016), one study adapted the NNSS to measure novelty satisfaction related to the adoption of a healthy lifestyle through three items (Ferriz et al., 2020), and one study (Birdsell, 2018) used three items from the 19-item initial pool of the NNSS. To measure novelty-variety satisfaction, Bagheri and Milyavskaya (2020) developed three items which were used in two studies, and they added a new item in a third study. With the aim of measuring novelty frustration, five studies used the five items developed by Trigueros, Maldonado et al. (2020) while other studies developed and used other instruments (six items, Koka et al., 2020; five items, González-Cutre et al., 2020; and three items, Birdsell, 2018). Bagheri and Milyavskaya (2020) also developed four items to measure novelty-variety frustration which were used in one study. Finally, to measure novelty support, Fierro-Suero, Almagro, Sáenz-López, and Carmona-Márquez (2020) developed a four-item self-report questionnaire, and Fierro-Suero, Almagro, Castillo, and Sáenz-López (2020) developed an Observational Instrument for Interpersonal Motivational Climate with five items to measure novelty support and five items to measure novelty thwarting.

Concerning the criteria that a new candidate BPN should meet, novelty fulfilled the fourth criterion in 24 studies (77.4%), the first criterion in 23 studies (74.2%), the second criterion in 22 studies (71%), the third criterion in 21 studies (67.7%), the fifth criterion in 20 studies (65%), and the sixth criterion in 14 studies (45.2%). Novelty fulfilled the six criteria in five studies, five criteria in nine studies, four criteria in eight studies, two criteria in eight studies, and one criterion in one study.

The main results of the reviewed studies (see Table 1 in Annexes) are shown in the following sections:

4.1 Associations between novelty and the three BPN

A new candidate need should be positively and moderately to highly related with the three BPN. This means that the new BPN must act in accordance with the three existing needs when these are satisfied, and not only when they become threatened or frustrated (Criterion 4). In line with this idea, 20 studies showed that novelty satisfaction was positively associated with satisfaction of the three existing needs, ten studies showed that novelty frustration was positively related to frustration of the three BPN, and one study (Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020) found that novelty support was positively associated with autonomy, competence, and relatedness support. Finally, we should highlight an important research showing that novelty did not act as a deficit need, because when novelty-variety satisfaction was thwarted in an experimental condition (in a work setting and in a general life domain), there was a significant decrease in wellbeing, even when the three BPN were satisfied (Bagheri & Milyavskaya, 2020, Studies 2 and 3).

4.2 Antecedents of novelty satisfaction and frustration

Novelty should act as a significant mediator of the relations between social factors and outcomes (Criterion 3). In this review, we found some evidence about the factors that explain or predict novelty satisfaction or frustration. In this regard, novelty satisfaction was positively predicted by student's perception of novelty (Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020), autonomy, competence, and relatedness support from physical education teachers (Aibar et al., 2021). Perceived autonomy support to adopt a healthy lifestyle from peers and school tutor also positively predicted students' satisfaction of novelty related to the adoption of a healthy lifestyle (Ferriz et al., 2020). Moreover, Birdsell (2018) found that students who went to self-access English learning centers (autonomy-supportive context) showed higher scores in novelty satisfaction and lower scores in novelty frustration than students who did not go to this type of centres. In sport (aesthetic group gymnasts), autonomy support was also positively related to novelty satisfaction and negatively related to novelty frustration, while negative conditional regard and intimidation (perceived controlling behaviour) was negatively related to novelty satisfaction (Koka et al., 2020). One study (Koka et al., in press) even specified the type of autonomy support (procedural: guide students to find their own solutions) that predicted students' novelty satisfaction in physical education and not the satisfaction of the three BPN. On the other hand, psychologically controlling teaching positively predicted novelty frustration in physical education (Trigueros, Aguilar-Parra et al., 2019, 2020; Trigueros, Mínguez et al., 2020). Likewise, other studies in physical education showed that novelty satisfaction was positively associated with task-involving

climate and negatively associated with ego-involving climate (Buzón & Conde, 2017; Fernández-Espínola, Almagro, & Tamayo-Fajardo, 2020).

In addition, different quasi-experimental studies (Gil-Arias et al., 2021; Manso-Lorenzo et al., 2020; Martínez de Ojeda et al., 2021) developed in physical education, showed that pedagogical models such as teaching games for understanding or sport education had a positive effect on students' novelty satisfaction. Novel contents as Colpbol (Hernández-Martínez et al., 2019) or Goubak (Manso-Lorenzo et al., 2020) also seemed to have a positive influence on novelty satisfaction. Furthermore, a one-year multicomponent school-based intervention for the promotion of physical activity, including the application of autonomy-supportive strategies by the physical education teacher, other teachers, tutor, and parents, increased students' novelty satisfaction and perceived variety (Sevil-Serrano et al., 2020).

4.3 Outcomes of novelty satisfaction and frustration

To complete the mediation process, it is necessary to understand the effect of novelty on different outcomes. We expected that novelty satisfaction would be a positive predictor of adaptive outcomes and a negative predictor of maladaptive outcomes, while novelty frustration would show the opposite pattern (Criterion 1 and 5). On this matter, studies in different settings revealed that novelty satisfaction led to several positive consequences such as intrinsic motivation (Fernández-Espínola, Almagro, & Tamayo-Fajardo, 2020; Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020; González-Cutre & Sicilia, 2019; González-Cutre et al., 2016; Koka et al., in press; Koka et al., 2020; Trigueros, Mínguez et al., 2019), autonomous motivation (Fernandez-Espínola, Almagro, Tamayo-Fajardo, & Sáenz-López, 2020; Ferriz et al., 2020; González-Cutre et al., 2020; González-Cutre et al., 2016), positive affect (Bagheri & Milyavskaya, 2020), vitality (Bagheri & Milyavskaya, 2020; González-Cutre et al., 2020; González-Cutre & Sicilia, 2019), meaning in life (González-Cutre et al., 2020), life satisfaction (González-Cutre et al., 2020; González-Cutre et al., 2016), class satisfaction (Birdsell, 2018; González-Cutre & Sicilia, 2019), engagement (Benlahcene et al., 2020; Birdsell, 2018), dispositional flow (González-Cutre & Sicilia, 2019), enjoyment (Fierro-Suero, Almagro, & Sáenz-López, 2020), pride (Fierro-Suero, Almagro, & Sáenz-López, 2020), and intention to be physically active (Aibar et al. 2021). However, novelty satisfaction was also positively associated with introjected regulation (González-Cutre et al., 2016; Koka et al., 2020) and anxiety (Fierro-Suero, Almagro, & Sáenz-López, 2020), and was not associated with sport performance (Koka et al., 2020).

On the other hand, novelty satisfaction was negatively related to negative affect (Bagheri & Milyavskaya, 2020), boredom, anger and hopelessness (Fierro-Suero, Almagro, & Sáenz-López, 2020), and amotivation (González-Cutre et al., 2016; Koka et al., 2020).

Finally, novelty frustration positively predicted amotivation (Trigueros, Maldonado et al., 2020), and was negatively associated with intrinsic motivation and identified regulation (Koka et al., 2020), vitality (Bagheri & Milyavskaya, 2020; González-Cutre et al., 2020), life satisfaction and meaning in life (González-Cutre et al., 2020), emotional intelligence (Trigueros, Aguilar-Parra et al., 2019), resilience (Trigueros, Mínguez et al., 2020), actively engagement, class satisfaction, positive attitudes and experiences (Birdsell, 2018).

4.4 Universality of the need for novelty

To consider novelty as a BPN, it should operate universally, for all people at all ages in all cultures (Criterion 6). In this regard, the reviewed studies showed that money, age, novelty seeking, and importance assigned to novelty did not moderate the relations between novelty satisfaction/frustration, motivation, and well-being (Bagheri & Milyavskaya, 2020; González-Cutre et al., 2020). Nevertheless, the personality trait of openness to experience strengthened the relations between satisfaction/frustration of the three BPN and novelty and well-being (González-Cutre et al., 2020). The relations between novelty satisfaction/frustration and satisfaction/frustration of the three BPN were invariant across gender and age (González-Cutre et al., 2016; Trigueros, Álvarez et al., 2020; Trigueros, Maldonado et al., 2020; Trigueros, Mínguez et al., 2019). Fierro-Suero, Almagro, Sáenz-López, and Carmona-Márquez (2020) also found that the relations between novelty support and support for the three BPN were invariant across gender.

Concerning the country and culture, we can see that novelty has been tested as a BPN in almost all regions of Spain and in other countries whose culture differs greatly from the Spanish one, such as Canada, United States, United Kingdom and Australia (Bagheri & Milyavskaya, 2020), Malaysia (Benlahcene et al., 2020), Japan (Birdsell, 2018), and Estonia (Koka et al., in press; Koka et al., 2020).

4.5 Novelty experiences and behaviors that lead to well-being

A BPN must specify content and, therefore, it is necessary to know the specific experiences that lead to well-being through this need (Criterion 2). The need for novelty would be satisfied if it is the first time that a person finds a novel stimulus or if there is a change in the person's routine (González-Cutre et al., 2016). In this sense, the reviewed studies describe the content of novelty (González-Cutre et al., 2016, 2020) and provide different ideas which could promote novelty experiences (Fierro-Suero, Almagro, Castillo, & Sáenz-López, 2020) related to positive outcomes. These suggestions have been done mainly in education (physical education) but they could be extrapolated to other contexts: (1) Carry out novel activities (or with different rules), contents, teaching units, or projects (Aibar et al., 2021; González-Cutre & Sicilia, 2019; Sevil-Serrano et al., 2020), such as field-based learning (Benlahcene et al., 2020), escape-rooms (Fernández-Espínola, Almagro, & Tamayo-Fajardo, 2020), trendy physical-expressive activities (e.g., Zumba, Bodycombat) (Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020), and alternative sports (e.g., Kin-ball, Parkour, Colpbol, Goubak) (Aibar et al., 2021; González-Cutre & Sicilia, 2019; Hernández-Martínez et al., 2019; Manso-Lorenzo et al., 2020); (2) Use different motivation and behavior change techniques (e.g., encouraging the experimentation of new behaviors) (Aibar et al., 2021); (3) Acquire new resources and knowledge to be involved in a behavior (e.g., healthy lifestyle; Ferriz et al., 2020); (4) Combine diverse teaching styles (e.g., reciprocal, guided discovery, divergent discovery, self-check) and pedagogical models (e.g., teaching games for understanding, sport education, personal and social responsibility, gamification) (Aibar et al., 2021; Benlahcene et al., 2020; Gil-Arias et al., 2021; Martínez de Ojeda et al., 2021; Koka et al., in press); (5) Use innovative materials (e.g., Fitball, BOSU, TRX, recycled and self-made materials) (Aibar et al., 2021; Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020; González-Cutre & Sicilia, 2019); (6) Use online applications (e.g., Runtastic, Padlet, Quizlet, Socrative, TikTok,

Munzee) (Benlahcene et al., 2020; Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020; González-Cutre & Sicilia, 2019); (7) Carry out activities in surprising natural spaces (e.g., hiking, climbing, canyoning) (Fernández-Espínola, Almagro, Tamayo-Fajardo, & Sáenz-López, 2020; González-Cutre & Sicilia, 2019); (8) Implement novel assessment systems (e.g., peer assessment and self-assessment) (Aibar et al., 2021; Benlahcene et al., 2020; González-Cutre & Sicilia, 2019); (9) Invite new people to present information (Benlahcene et al., 2020); and (10) Integrate play and creativity using metaphor and humor (Birdsell, 2018).

5. Discussion

The aim of this study was to review and synthesize the role of novelty as a BPN from SDT. Specifically, we carried out a systematic review of the quantitative studies that have analyzed novelty as a candidate BPN from SDT in any domain of life. With the objective of provide evidence about considering novelty as a new BPN candidate, 31 quantitative studies were included in this systematic review that were carried out in different contexts (e.g., physical education, general life domain, physical activity).

Trying to provide evidence about the criteria that novelty should met to be considered a BPN (Ryan & Deci, 2017), each study has been analyzed in this review based on the six established criteria. Regarding the first criterion, the satisfaction of the new candidate need should be associated with positive consequences and negatively associated with negative consequences, and frustration must be positively associated with negative consequences and negatively with well-being. Related to this criterion, we can find the fifth criterion, which states that a new candidate need should be a precursor of well-being and not a consequence of the satisfaction of the three BPN. Therefore these two criteria are fulfilled when the need predicts positive variables, and this review showed different studies in which novelty satisfaction was positively associated with several positive consequences (e.g., intrinsic and autonomous motivation, enjoyment, life satisfaction, meaning life, intention to be physically active), and was negatively related to negative outcomes (e.g., boredom, anger, amotivation). Moreover, novelty frustration led to negative outcomes (e.g., amotivation), and were negatively related with positive outcomes (e.g., intrinsic motivation, identified regulation, emotional intelligence).

Concerning the second criterion: the new candidate must specify content and, therefore, it is necessary to know the specific experiences that lead to well-being through this need, the reviewed studies shown a wide evidence of novel content and different ideas that can promote novel experiences resulting in positive consequences related to well-being. For example, in education or training context, teachers and instructors can use online applications (e.g., TikTok, Munzee, Runtastic) or introduce alternatives sports and games (Goubak, Kinball, Colpbol) on their classes, and this can be extrapolated to other situations such as work or leisure time.

In relation to the third criterion, that deals about the mediation role of a basic need between social factors and consequences, this review shows different antecedents of novelty satisfaction and frustration. Support for the three BPN (mainly autonomy support), novelty

support, task-involving climate, some pedagogical models and new contents, were positively associated with novelty satisfaction. Moreover, controlling behavior and ego-involving climate were negatively associated with novelty satisfaction.

The fourth criterion establishes that there is a positive and moderate-high relationship between the needs, which means that novelty does not act only when the other needs are low. Therefore, it is a growth need rather than a deficit need. In this sense, the evidence found throughout this study shows that novelty satisfaction was positively associated with satisfaction of the three existing needs and novelty frustration was positively related to frustration of the three BPN. Concerning novelty support, it was associated with autonomy, competence, and relatedness support.

Finally, the sixth criterion considers that a candidate need must be universal, this is, it should be invariant across gender, age, cultures and personality. We found that novelty behaves the same regardless of culture, as there is evidence about novelty need in Spain, Japan, Malaysia, Estonia, Canada, United States, United Kingdom, and Australia. Moreover, it has been demonstrated that money, age, and novelty seeking, did not moderate the relations between novelty satisfaction/frustration and positive outcomes.

As has been shown throughout this review, much evidence supports the idea that novelty may be considered a new candidate need within SDT. However, more evidence is needed, especially following the limitations of this study, that are introduced below.

The most used study design was cross-sectional, and there were no longitudinal studies, as the same time that there were few experimental and quasi-experimental studies. Therefore, it would be interesting to study the need for novelty through studies with different designs to increase the quality of the results.

Another limitation of the reviewed studies, which future investigation should take in account in order to expand the evidence, is that novelty satisfaction has been measured more than novelty frustration, and there were few research about novelty support (Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez, 2020). Moreover, the direct relation between novelty frustration and negative outcomes (e.g., malfunctioning, amotivation, negative affect, boredom, ill-being) has not been studied, but it has only been inversely related to positive consequences (e.g., wellbeing, intrinsic motivation, satisfaction, positive affect).

Regarding the instruments to measure novelty, it would be interesting unifying the measure. Among the studies included in this review, there were used 13 different instruments: six self-report questionnaires to measure novelty satisfaction, five self-report questionnaires to measure novelty frustration, one self-report questionnaire to measure novelty support, and one observational instrument was developed including items for novelty support and novelty thwarting. So, it would be worth unifying measurements with the aim of standardizing the results. On the other hand, the fact that different instruments were used, and the results provided were similar, showed that the concept of novelty is associated with the characteristics that it should be. Moreover, the instrument developed by Trigueros, Maldonado et al. (2020) with the objective of measure novelty frustration, has items that are more related to competence frustration (i.e., I do not feel capable of doing new things, I am

not capable of experimenting new sensations), and one item that are more related to relatedness frustration (i.e., sometimes I feel rejected when I am trying to innovate). The study where novelty-variety construct is analyzed, developed an instrument to measure (Bagheri & Milyavskaya, 2020) novelty-variety satisfaction and frustration, but items related to novelty-variety satisfaction are more associated with novelty satisfaction (e.g., I feel that I do something new; I feel that I do things that add something new to my day, week, or month; I often try new things).

Concerning the universality criterion, as mentioned above, future investigations must study the effect of novelty need in other cultures and countries. As mentioned before, novelty has been tested as a BPN in almost all regions of Spain, Canada, United States, United Kingdom, Australia, Malaysia, Japan, and Estonia, but it would be interesting to reach evidence in more countries.

Despite the limitations, this review also presents some strengths. The review process was validated by two authors who carried out the selection and extraction of the included studies. In addition, a third author took part in the decision in case of disagreement. To analyze the methodological quality of the included studies, we used the QSSP, which is a very recent instrument specifically developed for studies that synthesize evidence in the field of psychology. Another strong point of our study is the sample of this review. The total number of participants was 20263, 9541 males, 10710 females, and the age range in the studies was between 9 and 80 years old. Finally, the present study is the first that review the existing literature with the objective to provide evidence about considering novelty as a new basic psychological need.

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7. Annexes

Table 1

Studies Included in the Systematic Review

Reference	Country	Sample size	Age (range and mean)	Context	Design	Duration	Instruments to measure novelty	Results	Criteria for BPN
Aibar et al. (2021)	Spain (northeast)	*N* = 1118 students M = 549 F = 569	12-18 (14.11)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- Students' perception of autonomy, competence, and relatedness support from physical education teachers positively predicted satisfaction of the three BPN and novelty. - Satisfaction of the three BPN and novelty positively predicted intention to be physically active outside school.	1, 2, 3, 4, 5
Bagheri & Milyavskaya (2020) Study 1	Canada, United States, United Kingdom, and Australia	*N* = 202 adults M = 86 F = 116	19-73 (37.71)	Three important domains of life chosen by the participants	Cross-sectional	-	Development of 3 items to measure novelty-variety satisfaction	- Novelty-variety satisfaction was positively correlated with satisfaction of the three BPN. - Autonomy and novelty-variety satisfaction positively predicted positive affect and vitality, and negatively predicted negative affect. Relatedness satisfaction also positively predicted positive affect and vitality, whereas competence satisfaction only positively predicted vitality. - The effects of novelty-variety were unchanged when controlling for age.	1, 2, 4, 5, 6
Bagheri & Milyavskaya (2020) Study 2	Canada	*N* = 414 undergraduates M = 106 F = 308	17-50 (20.44)	Work	Experimental	Participants read an information about a work scenario in which BPN and novelty/variety are satisfied or one of them is thwarted	3 items to measure novelty-variety satisfaction (Study 1)	- Thwarting novelty-variety satisfaction did not influence participants' ratings of autonomy and relatedness satisfaction. - When novelty-variety satisfaction was thwarted, there was a significant decrease in wellbeing, even when the three BPN were satisfied. - Autonomy, relatedness and novelty-variety satisfaction positively predicted positive affect and vitality. Autonomy and relatedness satisfaction negatively predicted negative affect.	1, 2, 3, 4, 5, 6
Bagheri & Milyavskaya (2020) Study 3	Canada, United States, United Kingdom, and Australia	*N* = 599 adults M = 204 F = 383 Other or missing = 12	(38.40)	General life	Experimental	Participants read an information about a general life scenario in which BPN, novelty-variety, and money are satisfied or one of them is thwarted	- 4 items to measure novelty-variety satisfaction (Study 1 plus an additional item) - Development of 4 items to measure novelty-variety frustration	- Thwarting one of the BPN satisfaction influenced satisfaction of other BPN and novelty-variety and vice versa. Thwarting money did not influence any of the three BPN satisfaction nor novelty-variety satisfaction and vice versa. - When novelty-variety satisfaction was thwarted, there was a significant decrease in well-being, even when the three BPN were satisfied. - Satisfaction of the three BPN and novelty-variety positively predicted positive affect and vitality. Satisfaction of the three BPN negatively predicted negative affect. - Age and novelty seeking did not moderate the relations between novelty-variety satisfaction and well-being. - Frustration of the three BPN and novelty-variety negatively predicted well-being.	1, 2, 3, 4, 5, 6

Benlahcene et al. (2020)	Malaysia	*N* = 743 undergraduates M = 214 F = 529	(21.91)	University education	Cross-sectional	-	Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN. - Competence and relatedness satisfaction positively predicted the four dimensions of student engagement (behavioral, emotional, cognitive and agentic). Novelty satisfaction positively predicted behavioral, emotional and cognitive engagement, while autonomy satisfaction only positively predicted agentic engagement.	1, 2, 4, 5, 6
Birdsell (2018)	Japan	*N* = 271 undergraduates M = 159 F = 112	(19.15)	Language (English) learning	Cross-sectional	-	- 3 items to measure novelty satisfaction from the 19-item initial pool of the Novelty Need Satisfaction Scale (González-Cutre et al., 2016) - Development of 3 items to measure novelty frustration	- Novelty satisfaction was positively correlated with satisfaction of the three BPN and negatively correlated with frustration of the three BPN. The opposite pattern was found for novelty frustration. - Satisfaction of the three BPN and novelty was positively correlated with actively engagement, satisfaction, positive attitudes and experiences in English learning. Inversely, frustration of the three BPN and novelty was negatively correlated with these variables. - Students who went to self-access learning centers showed higher scores in satisfaction of the three BPN and novelty, actively engagement, and satisfaction, and lower scores in frustration of the three BPN and novelty than students who did not go to this type of centers.	1, 2, 3, 4, 6
Buzón & Conde (2017)	Spain (southwest)	*N* = 50 students M = 16 F = 34	11-12	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN. - Task-involving climate was positively correlated with satisfaction of the three BPN and novelty, while ego-involving climate was only negatively correlated with novelty satisfaction.	3, 4
Fernández-Espínola, Almagro, & Tamayo-Fajardo (2020)	Spain (southwest)	*N* = 732 students M = 364 F = 368	11-18 (13.92)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- Task-involving climate positively predicted novelty satisfaction. - Novelty satisfaction positively predicted intrinsic motivation, which in turn positively predicted intention to be physically active.	1, 2, 3, 5
Fernández-Espínola, Almagro, Tamayo-Fajardo, & Sáenz-López (2020)	Spain (southwest)	*N* = 1665 students M = 835 F = 830	10-18 (12.43)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- Satisfaction of the three BPN and novelty positively predicted autonomous motivation. - Autonomous motivation and competence satisfaction positively predicted intention to be physically active.	1, 2, 3, 4, 5
Ferriz et al. (2020)	Spain (east and southeast)	*N* = 215 students M = 107 F = 108	11-13 (11.35)	Secondary education	Cross-sectional	-	3-item adaptation of the Novelty Need Satisfaction Scale to measure novelty satisfaction related to the adoption of a healthy lifestyle	- Perceived autonomy support to adopt a healthy lifestyle from peers positively predicted satisfaction of the three BPN and novelty related to the adoption of a healthy lifestyle, while perceived autonomy support from tutor only positively predicted novelty satisfaction. - Satisfaction of the three BPN and novelty related to the adoption of a healthy lifestyle positively predicted autonomous motivation to a healthy lifestyle.	1, 2, 3, 4, 5

Fierro-Suero, Almagro, Castillo, & Sáenz-López (2020)	Spain (southwest)	*N* = 3 secondary school teachers M = 3	(37.30)	Physical education	Systematic observation	Three sessions per teacher	Development of the Observational instrument for Interpersonal Motivational Climate, including 5 items for novelty support and 5 items for novelty thwarting	- The instrument showed intra-and inter-tester reliability and content and discriminant validity. - Teachers showed more support for the three BPN than for novelty, which was more thwarted.	2
Fierro-Suero, Almagro, & Sáenz-López (2020)	Spain (southwest)	*N* = 902 students M = 427 F = 475	11-17 (13.15)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	Satisfaction of the three BPN and novelty positively predicted enjoyment and negatively predicted boredom. Competence, relatedness and novelty satisfaction negatively predicted anger and hopelessness. Competence and novelty satisfaction positively predicted pride. Competence and relatedness satisfaction negatively predicted anxiety while novelty satisfaction positively predicted it.	1, 5
Fierro-Suero, Almagro, Sáenz-López, & Carmona-Márquez (2020)	Spain (southwest)	*N* = 723 students M = 349 F = 374	11-16 (13.30)	Physical education	Cross-sectional	-	- Development of 4 items to measure novelty support - Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- Novelty support was positively correlated with support for the three BPN. These relations were invariant across gender. - Novelty support positively predicted autonomy, competence and novelty satisfaction which, in turn, positively predicted intrinsic motivation. - Novelty support also showed a direct positive effect on intrinsic motivation.	1, 2, 3, 4, 5, 6
Gil-Arias et al. (2021)	Spain (northeast)	*N* = 53 students M = 27 F = 26	(15.50)	Physical education	Quasi-experimental Pre-post without control group	A teaching unit of 10 sessions (five weeks)	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	A hybrid volleyball teaching unit, combining the teaching games for understanding and sport education models, showed a significant increase in students' perceptions of support for the three BPN from the physical education teacher, satisfaction of the three BPN and novelty, perceived variety, and intrinsic motivation. Boys reported a significant decrease in intention to participate in volleyball after the intervention.	2, 3
González-Cutre et al. (2020) Study 1	Spain (souteast)	*N* = 303 adults M = 126 F = 177	18-80 (33.50)	Physical exercise	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al, 2019)	- Competence, relatedness and novelty satisfaction positively predicted autonomous motivation. Competence satisfaction and autonomous motivation positively predicted enjoyment and vitality, while novelty satisfaction positively predicted vitality. - Autonomous motivation mediated the relations between competence, relatedness and novelty satisfaction and enjoyment and vitality. - The relations between satisfaction of the three BPN and novelty, motivation, and well-being were not moderated by the importance assigned to each need.	1, 2, 3, 4, 5, 6

González-Cutre et al. (2020) Study 2	Spain (35 provinces)	*N* = 598 adults M = 274 F = 324	18-75 (35.47)	General life	Cross-sectional	-	- Novelty Need Satisfaction Scale (5 items, González-Cutre et al, 2019) - Development of 5 items to measure novelty frustration	- Novelty satisfaction was positively correlated with satisfaction of the three BPN and negatively correlated with frustration of the three BPN. The opposite pattern was found for novelty frustration. - Satisfaction of the three BPN and novelty positively predicted vitality (except relatedness), life satisfaction, and meaning in life, while competence and novelty frustration negatively predicted these well-being outcomes. Life satisfaction was also negatively predicted by relatedness frustration and meaning by autonomy frustration. - The relations between satisfaction/frustration of the three BPN and novelty and well-being were not moderated by the importance assigned to each need, but openness to experience strengthened these relations.	1, 2, 4, 5, 6
González-Cutre & Sicilia (2019)	Spain (southeast)	*N* = 764 students M = 383 F = 381	12-20 (14.26)	Physical education	Cross-sectional	-	Elimination of 1 item from the Novelty Need Satisfaction Scale (González-Cutre et al., 2016)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN. - Competence and novelty satisfaction positively predicted intrinsic motivation to know, to accomplish, and to experience simulation. Autonomy satisfaction positively predicted intrinsic motivation to know and to experience stimulation, whereas relatedness satisfaction positively predicted intrinsic motivation to accomplish. - Autonomy, competence and novelty satisfaction positively predicted vitality, dispositional flow, and satisfaction. Relatedness satisfaction only positively predicted satisfaction. - Different types of intrinsic motivation mediated the relations between satisfaction of the three BPN and novelty and outcomes.	1, 2, 3, 4, 5
González-Cutre et al. (2016) Study 1	Spain (southeast)	*N* = 399 adults M = 202 F = 197	18-65 (31.30)	General life	Cross-sectional	-	Development of the Novelty Need Satisfaction Scale (6 items)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN. These relations were invariant across gender and age. - Autonomy, competence and novelty satisfaction positively predicted life satisfaction.	1, 2, 4, 5, 6
González-Cutre et al. (2016) Study 2	Spain (southeast)	*N* = 1035 students M = 496 F = 539	15-24 (16.20)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (6 items, Study 1)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN, the most autonomous forms of motivation, and introjected regulation, and negatively correlated with amotivation. - Competence and novelty satisfaction positively predicted intrinsic motivation.	1, 2, 4, 5
Hernández-Martínez et al. (2019)	Spain (center)	*N* = 58 students (29 experimental, 29 control) M = 38 F = 20	9-10 (9.38)	Physical education	Quasi-experimental	A teaching unit of 6 sessions (two weeks)	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- An intervention consisting of a teaching unit of a new content (Colpbol) with the teaching games for understanding model only had a significant positive effect on novelty satisfaction but not on satisfaction of the three BPN.	2, 3

Koka et al. (in press)	Estonia	*N* = 660 students M = 298 F = 362	11-16 (13.63)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	- Cognitive autonomy support positively predicted autonomy and competence satisfaction. Organizational autonomy support positively predicted autonomy and relatedness satisfaction. Procedural autonomy support positively predicted novelty satisfaction. - Autonomy, competence, and novelty satisfaction positively predicted intrinsic motivation.	1, 2, 3, 4, 5, 6
Koka et al. (2020)	Estonia	*N* = 128 aesthetic group gymnasts F = 128	11-20 (13.25)	Sport	Cross-sectional	-	- Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016) - Development of 6 items to measure novelty frustration	- Novelty satisfaction was negatively correlated with negative conditional regard and intimidation (perceived controlling behavior) and amotivation, and positively correlated with autonomy support, satisfaction of the three BPN, intrinsic motivation, identified and introjected regulation. An opposite pattern was found for novelty frustration. - Novelty satisfaction and frustration were not correlated with performance.	1, 3, 4, 6
Manso-Lorenzo et al. (2020)	Spain (center)	*N* = 110 students (46 sport education, 64 direct instruction) M = 57 F = 53	10-12 (10.70)	Physical education	Quasi-experimental	18 sessions in the sport education group and 12 sessions in the direct instruction group	Novelty Need Satisfaction Scale (5 items, González-Cutre et al., 2019)	The direct instruction model showed a reduction in students' autonomy and competence satisfaction. Relatedness and novelty satisfaction were not negatively affected by the direct instruction model because the groups were mixed, and the content was novel (Goubak). The sport education model applied to teaching Goubak revealed higher positive effects on autonomy and novelty satisfaction than direct instruction.	2, 3
Martínez de Ojeda et al. (2021)	Spain (southeast)	*N* = 250 students (73 experimental, 177 control) M = 134 F = 116	(10.80)	Physical education	Quasi-experimental	5 academic years	Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016)	An intervention with the sport education model showed higher positive effects on students' intrinsic motivation, identified regulation, competence, relatedness and novelty satisfaction, and intercultural sensitivity, than traditional teaching.	2, 3
Sevil-Serrano et al. (2020)	Spain (northeast)	*N* = 210 students (105 experimental, 105 control) M = 99 F = 111	12-14 (13.04)	Physical education and leisure-time physical activity	Quasi-experimental	1 academic year	Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016)	A multicomponent school-based intervention for the promotion of physical activity, including the application of autonomy-supportive strategies by the physical education teacher, other teachers, tutor, and parents, increased students' perceived autonomy support, satisfaction of the three BPN and novelty, perceived variety, autonomous motivation, attitude, subjective norms, control, and physical activity intention.	1, 2, 3, 4
Trigueros, Aguilar-Parra et al. (2020) Study 2	Spain (south)	*N* = 428 students M = 211 F = 217	13-19 (15.56)	Physical education	Cross-sectional	-	5 items to measure novelty frustration (Trigueros, Maldonado et al., 2020)	- Novelty frustration was positively correlated with frustration of the three BPN. - Psychologically controlling teaching positively predicted frustration of the three BPN and novelty.	3, 4

Trigueros, Aguilar-Parra et al. (2019)	Spain (southeast)	*N* = 1602 students M = 820 F = 782	13-19 (15.73)	Physical education	Cross-sectional	-	5 items to measure novelty frustration (Trigueros, Maldonado et al., 2020)	- Novelty frustration was positively correlated with frustration of the three BPN. - Teachers' psychological control positively predicted frustration of the three BPN and novelty. - Frustration of the three BPN and novelty negatively predicted emotional intelligence.	1, 3, 4, 5
Trigueros, Álvarez et al. (2020)	Spain (south)	*N* = 2372 exercisers M = 1055 F = 1317	16-48 (28.39)	Physical exercise	Cross-sectional	-	- Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016) - 5 items to measure novelty frustration (Trigueros, Maldonado et al., 2020)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN and negatively correlated with frustration of the three BPN. The opposite pattern was found for novelty frustration. - These relations were invariant across gender and age.	4, 6
Trigueros, Maldonado et al. (2020)	Spain (southeast)	*N* = 271 students M = 143 F = 128	13-19 (15.22)	Physical education	Cross-sectional	-	Development of 5 items to measure novelty frustration	- Novelty frustration was positively correlated with frustration of the three BPN. These relations were invariant across gender. - Competence, autonomy, and novelty frustration positively predicted amotivation.	1, 4, 5, 6
Trigueros, Mínguez et al. (2019)	Spain (southeast)	*N* = 1444 students M = 728 F = 716	13-19 (15.34)	Physical education	Cross-sectional	-	Novelty Need Satisfaction Scale (6 items, González-Cutre et al., 2016)	- Novelty satisfaction was positively correlated with satisfaction of the three BPN. These relations were invariant across gender and age. - Competence, autonomy, and novelty satisfaction positively predicted intrinsic motivation.	1, 4, 5, 6
Trigueros, Mínguez et al. (2020)	Spain (southeast and north)	*N* = 1941 students M = 1031 F = 910	13-18 (15.34)	Physical education	Cross-sectional	-	5 items to measure novelty frustration (Trigueros, Maldonado et al., 2020)	- Novelty frustration was positively correlated with frustration of the three BPN. - Psychologically controlling teaching positively predicted frustration of the three BPN and novelty, while autonomy support negatively predicted them. - Frustration of the three BPN and novelty negatively predicted resilience.	1, 3, 4, 5