



## Research article

## Development and initial validation of a scale for the situational recognition of the basic psychological needs

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## ABSTRACT

Centered on the Basic Psychological Needs Theory, recent theoretical underpinnings were used and initial empirical processes were initiated to conceptualize, develop and validate a new questionnaire about how teachers shape instructional goals. In a first exploratory study, 188 university graduates and 211 in-service teachers from both the general and special education domains were recruited to recognize the basic psychological needs of an adolescent with physical and mild cognitive disability presented in a short video vignette. In the second confirmatory study, the sample consisted of 239 in-service teachers. According to the results, the new instrument demonstrated acceptable psychometric qualities. For instance, the goodness-of-fit indices CFI and NNFI were both good (1.00) in the confirmatory factor analysis. In both studies, the recognition of the basic psychological needs was involved in a series of statistically significant correlations with participants' intrinsic life goals ( $R \geq .34$ ), state empathy ( $R \geq .38$ ) and intrinsic instructional goals ( $R \geq .51$ ). This preliminary research suggested that participants integrated the new concept in their intrinsic motivational style. Overall, the results highlight the importance of recognizing the basic psychological needs by including this construct both in research and practice.

## 1. Introduction

Contemporary reports focus on the fact that many groups of people with disabilities or people from other minorities may not receive empathy and support in line with their needs (Burke et al., 2016; Levett-Jones et al., 2017; Sharma et al., 2021). Educational and health personnel may be challenged by stress, burnout, or long service, while trying to meet clients/students needs (Passalacqua and Segrin, 2012; Varsamis et al., 2011). At the same time, many teachers feel that they lack the training to effectively support the psychological and mental health needs of their students (Reinke et al., 2011). For these reasons, we focused on expanding theory and research concerning the person-centered and needs satisfying work carried out by authority figures (parents, teachers, caregivers, practitioners etc.) who support people with physical disabilities (Magill-Evans and Darra, 2011; Varsamis and Agalotis, 2011; Sharma et al., 2021). In this framework, preferring and recommending instructional goals is an important process in educational and health domains, which are intersected in the case of physical disability, such as in Cerebral Palsy (CP, cf. Agalotis and Varsamis, 2019; Freeman et al., 2018; Stadskleiv, 2020).

Recent research exhibits interest in unveiling predictors of motivating and needs supportive styles (e.g., Escrivá-Boulley, Haerens, Tessier and Sarrazin, 2021a). Albeit the benefits of setting instructional goals are well documented (e.g., Jang, 2019), research about their antecedents is still limited. Thus, the aim of the present work was to develop and examine a new correlate of how our studies' participants shape and set instructional goals. This correlate concerns the degree, in which authority figures recognize and accept the psychological needs of the persons they look after. We assume that this psychological construct will be linked to the prioritization of intrinsic instructional goals in a proximate way. Basic Psychological Needs Theory (BPNT, (Ryan and Deci, 2008)) was used to conceptualize a scale for recognizing innate psychological needs in a specific instructional situation. Purposely, we selected a short video presenting an adolescent with Cerebral Palsy (CP). The notion of recognizing innate psychological needs may shed light in the structure of empathic communication and motivational sets implemented by authority figures.

## 1.1. Basic psychological needs theory

BPNT has greatly stimulated research in the domain of Self-Determination Theory (SDT). This was due to the robust and unifying

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role that basic psychological needs (BPNs) perform within the psychological entities of SDT (Vansteenkiste et al., 2020). Until now three human innate needs are broadly accepted, namely, autonomy (peoples' need to feel as causal agents who act in congruence to their inner development forces and their integrated self), competence (peoples' need to feel competent and experience mastery in anything they undertake) and relatedness (peoples' need to bond with others in a mutual way and maintain caring relationships).

In particular, the satisfaction of these needs by social contexts is considered necessary for personal growth, integrity, well-being and autonomous motivation (Deci and Ryan, 2014; Laporte et al., 2021; Mano-Israëli and Gero, 2017). More specifically, in contexts such as general and special education, authority figures play a central role in fostering intrinsic motivation, facilitating agentic engagement, forging quality relationships and thus meeting the BPNs of the people they look after (Li et al., 2018; Niemiec et al., 2014; Koka et al., 2021). Hence, authority figures are able to employ a set of helpful and caring practices, which in terms of the SDT are labeled as autonomy supportive and/or needs supportive (Reeve et al., 2019; Varsamis et al., 2021, p. 2). The following basic theoretical positions and research findings substantiate that humans, especially authority figures, are in position to recognize the value of the BPNs of their fellow human beings.

### 1.2. Theoretical underpinnings

Fundamental to the notion of recognizing and thus sustaining BPNs to others are four theoretical and empirical pillars within the framework of SDT. Firstly, authority figures like teachers can form and express representations of their preferences for the course of their students' education in the form of intrinsic and extrinsic instructional goals (Cheon et al., 2019; Jang, 2019). In compliance with SDT's perspective on human psychological flourishing, intrinsic instructional goals are particularly needs supportive (Deci and Ryan, 2014; Niemiec et al., 2014). It has also been established that the adoption of intrinsic instructional goals permeates several aspects of daily teaching, as it affects the quality of the relationship with students, the positive attitude towards each student's growth rate, the autonomy-supportive motivational style, the satisfaction of the BPNs of the students, the disposition for empathy and the unconditional positive regard (Aelterman et al., 2019; Jang, 2019; Ryan et al., 2019). Further, interventional studies have shown that a) the promotion of autonomous motivation and needs satisfying conditions and b) the suggestion of intrinsic goals to students, are malleable in teachers (Cheon et al., 2019; Reeve et al., 2019). All of the aforementioned practices reveal that prioritizing needs supportive goals may imply a preceding recognition of the BPNs of those being looked after.

Secondly, empathy is a human psychological entity, which, combined with intrinsic motivational sets, leads authority figures to show their genuine interest in satisfying the BPNs of those being looked after (Chatzisarantis et al., 2019; Rogers, 1951, in Brodley, 1999). This happens by respecting the temperamental and organismic identity of those served as well as promoting methods/ways of providing a descriptive, non-judgmental and constructive feedback (Burt et al., 2013; Carpentier and Mageau, 2013; Orsini et al., 2015). On the part of the authority figures, empathy is consistent with intrinsic life goals, with more internalized levels of behavior regulation, with satisfied BPNs, with undivided interest in accurately and constructively understanding the whole internal frame of reference of others, with a willingness to care for others, and with the tendency to provide assistance (see also Ryan and Deci, 2017, pp. 160, 203, 209). Having such robust inner psychological foundations, authority figures are able to empathize with and support the BPNs of growing persons. Overall, recognizing and elevating other peoples' BPNs may represent a manifestation of a very well developed empathy (Rogers, 1951, in Brodley, 1999).

Thirdly, research has shown that relationships between teachers and students may rely on reciprocity to meet BPNs of both parties involved (e.g., Reeve, 2015). Authority figures and those served bring in the

relationship and cooperation with each other their personal goal contents and their motivational sets, whereas they seek mutual satisfaction of their BPNs and try to understand the experiences of the other party (Sheldon and Kasser, 1995; Williams, 2014; Vansteenkiste et al., 2004). Thus, these two sides influence each other reciprocally a) through the way they perceive the overall motivation of the other party on the self-determination continuum and b) as to the motivation they will then show on their part. Likewise, those served, e.g., students and athletes, are able to grasp the amount of their BPNs support from authority figures both given to themselves and to their peers (Carbonneau and Milyavskaya, 2017; Pulido et al., 2017). It becomes clear that, people are able to perceive many of the core elements of SDT in other people, such as, for example, obvious goal contents, behavioral regulations, perceived barriers, resistances, frustrations and BPNs satisfaction (see also Chatzisarantis et al., 2019; Escrivá-Boulley et al., 2021a; Orsini et al., 2015; Rodrigues et al., 2020; Ryan and Deci, 2017; Taylor and Ntoumanis, 2007).

The fourth indication for the concept of the BPNs' recognition, which actually is a preliminary evidence for its existence, is that authority persons are capable of naming, i.e. recognizing, students' psychological needs. A couple of previous studies clearly illustrated via qualitative and quantitative research that teachers can form conceptions and beliefs about students' BPNs (Lynch & Salikhova, 2016, 2017; Lynch et al., 2020). Their results showed that teachers can conceive and prioritize students' psychological needs. In other words, teachers hold representations about the human innate needs, depending on their contribution to students' psychological well-being.

To summarize, people, especially teachers, who are particularly prone to proactivity, genuineness, integrity, empathy, social bonding, and unconditional positive regard (e.g., Rogers, 1958, in Brodley, 1999) are obviously able to recognize, understand and support the BPNs, as well as their numerous antecedents, of the people with whom they have a close relationship (Pulido et al., 2017; Swan and Riley, 2015). Sine qua non, autonomously-motivated support of other people's BPNs suggests a preceding recognition of those needs. Introducing and testing the construct of recognizing others' BPNs may contribute to a more efficient support of those being looked after and offer a new proximate link among teachers' motivational sets, empathy and instructional goals.

BPNT predicts that people are naturally inclined to meet their BPNs (Ryan and Deci, 2017). We use the term "recognition" to accentuate aspects like acknowledge, apprehend and value. Consequently, recognition of BPNs describes in what extent people believe and probably accept that others have innate psychological needs, which are to be satisfied for facilitating high states of well-being. At variance with the work of Lynch and Salikhova (2016), we consider BPNs recognition as an integral part of authority figures supportive styles and as an antecedent of intrinsic instructional goals. Lastly, it is important to state that whereas the concept of the BPNs per se is already established (Ryan and Deci, 2017) our research offers a new construct, namely the recognition of BPNs in other persons.

### 1.3. The present research

According to the formulated rationale, it is viable to examine how university graduates and in-service teachers approach students they look after. Both in general and special education, case studies are appropriate for exploring the dynamic relationships that are developed as part of a student-centered and dyad-based supportive work (Burt et al., 2013; Weinstein et al., 2010; Williams, 2014). Recently, research underlined the importance of situational approaches on how BPNs are being satisfied (Escrivá-Boulley et al., 2021b; Parrisius et al., 2021). Consequently, offering a relevant video vignette may have advantages like authenticity, realism and engagement for the participants (e.g., Nørskov et al., 2020; Rodríguez-Muñiz et al., 2018; Shen, 2010). Of course, the use of video vignettes may have drawbacks as well, such as a possible participants' detachment from the characters shown in the video (for more, see Erfanian et al., 2020). Still, a theoretically and socially relevant video is

expected to stimulate participants' empathy, needs recognition and goal formation.

## 2. Study 1

The first study (Study 1) served an exploratory purpose with reference to our core research question, which in fact addresses the existence of the proposed psychological entity. That is, the initial psychometric qualities of the new scale were to be tested in a large and diverse sample of university graduates and school teachers. Consequently, we suppose that after checking for face validity (semantic validation), study participants will perceive the items of the new measurement as being a) internally consistent, b) divided into theory-conform factors and c) interconnected with relevant scales, which represent proximate motivational supportive styles. In addition, we assume that the video vignette will be relevant to the participants, to ensure its connection to real world issues.

### 2.1. Materials and methods

#### 2.1.1. Scale development

Procedures of scale development begun with a literature review, since the theoretical underpinnings of the construct pursued are both solid and sufficient (Boateng et al., 2018; Hair et al., 2019). After reviewing the literature of the last decades, we preferred to start with the basic questionnaires of the BPNs in order to generate items (e.g., Chen et al., 2015; Lynch and Salikhova, 2016; Ryan and Deci, 2017; Varsamis et al., 2021). The endeavor was to prepare a small number of items in order to suit the state/situational nature of the scale under development and the video vignette used. This effort resulted in 20 proposed items. Three independent researchers (all Ph.D. holders, in sport psychology, family psychology and educational psychology respectively) have taken on the task of validating the content of the items. Eight of them were directly excluded, because they were considered as referring to aspects that are foreign to BPNT, such as frustration avoidance, self-efficacy and assertiveness. Finally, three more items had to be dropped, because there was a disagreement among the researchers. Although these items were initially thought to focus on the striving functions of the BPNs (e.g., 'To handle the isolation he may feel from those he works with'), a researcher argued that the items seemed to reflect issues of needs strength and/or needs management.

As to the semantic validation, 22 university graduates and 18 teachers participated in a meeting, held via a distanced learning platform. All respondents were introduced to the topic and they have watched the video vignette. Subsequently, they reviewed and they answered the nine items of the scale. Then, they were engaged in a discussion and recommended improvements. Their suggestions had to do with minor phrasing simplifications and slight conversions of some verbs.

#### 2.1.2. Participants

For this study, university graduates and school teachers were recruited in the context of a non-random convenience sampling method. In the Greek educational system (Eurydice, 2020) graduate students have completed a two-semester mandatory practicum in schools or other relevant institutions as a part of their studies. In this way, students presented some experience with students and mentors, which is pertinent to the present study. An electronic invitation was sent to the university departments, graduates of which are eligible to work in the school system, and to the administration offices of school districts. All institutions and schools were placed in Central Macedonia, Greece. To calculate the sample size needed, rules of thumbs were taken into account, as far the exploratory and the confirmatory factor analysis are concerned (Kyrizos, 2018). The initially obtained sample contained 441 persons. After screening the data for univariate and multivariate outliers (Leys et al., 2019), 42 persons were removed from this data set. The final sample involved 399 participants, described in the results section.

### 2.1.3. Measures

Except the new psychological measure, all other psychological constructs were previously validated both in our national context, as well as in many other countries (e.g., Chen et al., 2015; Grouzet et al., 2005; Nalipay et al., 2020; Ryan and Deci, 2017; Varsamis et al., 2021). Related questionnaires were chosen to comply with the setting of the present research, which requires the assessment of the participants' situational response to the video vignette. Though, not all instruments were available in a state mode. In these cases, the questionnaires' introductory text was adapted accordingly. To avoid any inconvenience or confusion in the participants, five-point, fully verbalized, Likert rating scale categories were applied in all questionnaires (extending from 1 = 'Not at all' up to 5 = 'Very much so').

**2.1.3.1. Demographic characteristics.** Sex and age group were recorded for each participant. University graduates declared, whether their bachelor's degree was a formal qualification for working in general or in special education. Correspondingly, teachers indicated if they were working at that time in general or in special education. Moreover, teachers determined the educational level of their school (primary or secondary). Lastly, all participants answered, if the discipline of their studies or work had a direct relationship to physical movement, or not (see results section).

**2.1.3.2. Video vignette.** For the purpose of the present research, a video vignette was used, more particularly, the rehabilitation scene from the movie "The Keys of the House" (Ferri et al., 2004). This film is about an emotional exploration of paternity and the nature of disability. A father and son, who until recently followed different paths, now find themselves in a position where they have to get to know each other. In the selected scene, we watch Paolo, teenager presenting CP and mild cognitive impairment with his doctor and her team at a special rehabilitation hospital in Berlin. The doctor relentlessly gives Paolo instructions, using a strong tone of voice. She urges him to continue despite the fact that the process seems to be agonizing for him. Meanwhile, the father is watching the process. At some point, he cannot stand it and tries to intervene in order to support his child. Then we see a woman, Nicole, the mother of a girl with physical disability, whom Paolo's father meets at the hospital, discussing the goals of rehabilitation and his relationship with his son. It is here that reference is made a) to the fact that the father and the doctor do not share the same goals as far as Paolo's rehabilitation is concerned and b) the consequences of chronic lack of contact between father and son.

The independent researchers of the present study agreed on the following features of the video vignette. Firstly, the basic criteria are met according to Shen (2010), as to the prerequisites of state empathy, namely 1) the vignette portrays the main characters' distress, 2) perceived verisimilitude of the vignette is large for the age of participants, as well as for the Greek context, and 3) the video is affected laden. Secondly, although the vignette shows a physical rehabilitation setting for some time (2' and 25"), in the remaining time (1' and 15") Paolo's cognitive and psychosocial functioning issues are highlighted (Stadskleiv, 2020). Thus, in the whole of the vignette, several views are revealed, which are relevant to a multidisciplinary work. As a result, this particular story shows in a comprehensive way many of the difficulties that are often associated with movement disability (e.g., Agaliotis and Varsamis, 2019). In the third place, this story arouses concerns as to what extent the BPNs of the adolescent and his father are met. Many of the theory-driven suggestions for supporting BPNs do not seem to be implemented in this video excerpt (Niemiec et al., 2014; Williams, 2014). Finally, with regard to the adolescent, the independent researchers identified the following elements of SDT motivation: a) the adolescent's momentary engagement in physical action and exertion was delivered in a uniquely convincing manner (Symonds et al., 2019), b) a dilemma is implied between satisfaction of autonomy, e.g. through self-determined choices and participating in the movement test in order to develop gain

ability, c) the displayed action refers to goals and behavior regulations, which are other than purely intrinsic, and d) perspective-taking, respect on the adolescent's pace of progress and mutuality of the relationship are questionable.

**2.1.3.3. Social validity.** In a part of the study's sample ( $N = 112$ , up to 75% females, 30% aged between 18-25 and 72% teachers) the social validity of the video vignette was evaluated via a self-report questionnaire. Four items were adapted to the video vignette from [Shayne and Miltenberger \(2013\)](#). An example question was: 'Stories like this can vocationally train me really well'.

**2.1.3.4. Aspiration Index (AI) - short form.** The measurement of the participants' current life goal contents was based on the Aspiration Index ([Kasser and Ryan, 1996](#)). An effort was made to address the momentary goal contents. Thus, participants were informed that people's life goals may undergo slight variations on a day-to-day basis ([Zawadzka et al., 2019](#)). Hence, they were asked to indicate how important they consider each of the listed life goals at the day/time they completed the questionnaire ([Hope et al., 2016](#)). For the purpose of this study, a short form of the Aspiration Index is justifiable, as it should address the participants' instantaneous life goals. It was adopted from [Kasser \(2019, p. 21\)](#). This 11-item scale, which contains one item per goal domain, was translated and adapted to the Greek reality ([Fountoulakis et al., 2006](#)). Only minor expressive adaptations were needed. The intrinsic life goals subscale consisted of seven items. An example question was: 'I will deal effectively with problems occurring in my life'. The extrinsic subscale comprised four items. An example question for assessing intrinsic life goals was: 'I will have a job that pays well'.

**2.1.3.5. State Empathy Scale (SES).** State empathy during message processing was assessed with the State Empathy Scale ([Shen, 2010](#)). This scale covered three components: affective empathy (understanding another person's momentary experiences and emotional expressions); cognitive empathy (recognizing and adopting another person's circumstantial point of view); and associative empathy (identification with another person's situation and events, cf. [Shen, 2010](#)). These three components were to merge into a second-order single factor. The items were translated, adapted and pertained to the adolescent presented in the video vignette. Example questions were then: 'The young boy's emotions are genuine' (affective empathy), 'I can understand what the young boy was going through in the video' (cognitive empathy) and 'I can identify with the situation shown in the video' (associative empathy).

**2.1.3.6. Teachers Goal Questionnaire (TGQ).** The Teachers Goal Questionnaire ([Jang, 2019](#)) was utilized to assess participants' instantaneous instructional goals. Participants were asked to determine the importance of 16 instructional goals for the adolescent shown in the video, in the context of creating an Individualized Education Program (IEP), depending on the specialty they would have in a supposed multidisciplinary team. The questionnaire's items were equally divided into four factors. Two of them concerned intrinsic goals, namely Personal Growth (example item: 'Encourage the young boy pursue his own interests') and Relationship Growth (example item: 'Promote deeper, more essential relationships between the young boy and team members'). The other two factors emphasized extrinsic goals, which are High Scores (example item: 'Teach the young boy to attain high test scores') and Assured Success (example item: 'Project a professional image to our principal').

**2.1.3.7. Basic Psychological Needs Recognition Questionnaire - State (BPNRQ-S).** The development of this new instrument aimed at the participants' situational recognition of another person's BPNs. The procedures described in the scale development section resulted in nine items to be tested ([Table 1](#)). These items were equally distributed among the three BPNs. In this questionnaire, participants were asked to express

themselves regarding the needs of the adolescent of the vignette. It was pointed out that they are alleged to be operating within a supposed multidisciplinary team, depending on their specialty. The main goal of this team was to create an IEP.

**2.1.4. Procedure**

Participants were informed about the purpose, topic and content of the research. It was made clear to them that they would respond to how they would contribute with their specialty to a multidisciplinary team in terms of building an IEP for a case study. Then, they proceeded to the following tasks: 1) they listed their personal goal contents, 2) they read a brief description of the whole film, 3) they read an introduction to the specific scene, 4) they were shown photographs of the characters that appeared on the video and given their names, 5) they watched the scene with Greek subtitles, 6) they captured state empathy for the adolescent, 7) they expressed their opinion on the BPNs of the adolescent, 8) they expressed the instructional goals that they would propose and 9) they completed their demographic data. The entire procedure lasted approximately 20–30 min. The data collection took place via an electronic questionnaire.

**2.1.5. Ethics**

The study was conducted in agreement with the ethical standards of research with human subjects of the University of Macedonia. The Committee for Research Ethics of the University of Macedonia accepted the research protocol (Approval Number: 30/18.02.21).

**2.1.6. Statistical analyses**

Basic analyses, such as data screening, descriptive statistics, zero-order correlations, Wilcoxon Signed Ranks test, internal consistency

**Table 1.** Results from exploratory factor analysis of the basic psychological needs recognition questionnaire (BPNRQ-S).

BPNRQ-S Item	M	SD	Factor loading			Communality
			1	2	3	
<b>Factor 1: Autonomy</b>						
1. A sense of choice/freedom in the things he does	4.02	.84	.93			.63
4. To show with his actions what he really wants	4.21	.76	.71			.65
7. To express his opinion/ideas and to be heard	4.38	.71	.62			.57
<b>Factor 2: Relatedness</b>						
6. To feel mutual warmth with those he works with	4.32	.73		.94		.73
3. To feel very close to those he works with	4.14	.81		.83		.66
9. To be accepted by those he cooperates with	4.08	.68		.42		.58
<b>Factor 3: Competence</b>						
5. To process ways to overcome his weaknesses	4.39	.72			.95	.72
8. To feel really capable at whatever he engages in	4.32	.72			.59	.51
2. To feel that he can accomplish whatever he undertakes	4.21	.77			.52	.60
Scale descriptive statistics	4.23	.55				
Average of loadings			.75	.73	.67	
Eigenvalues			4.94	1.00	.77	
% of variance			50.68	7.40	4.61	
Cumulative %			50.68	58.08	62.69	

Note. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Rotation converged in five iterations. Factor loadings below .40 were omitted from this table.  $N = 399$ .

(reliability) and exploratory factor analysis were performed through the statistical program SPSS (IBM Corp., 2011). More specifically, the Cronbach's Alpha ( $\alpha$ ) was employed to assess internal consistency of the scales. Cut-off categories for internal consistency were: poor ( $\alpha < .67$ ), fair ( $\alpha < .80$ ), good ( $\alpha < .90$ ), very good ( $\alpha < .94$ ) and excellent ( $\alpha > .94$ , cf. Mohamad et al., 2015). The correlation matrix of the main variables was studied to pinpoint criterion validity of the new scale. Spearman's correlation coefficient ( $R$ ) was calculated to estimate the strength of the linear relationships, since tests examining univariate data normality (Kolmogorov-Smirnov with Lilliefors Significance Correction) suggested non-normal distribution for all variables. Besides statistical significance, a rule of thumb was consulted to classify correlations in rough categories (in absolute values, negligible:  $R < .30$ , low:  $.30 < R < .50$ , moderate:  $.50 < R < .70$ , high:  $.70 < R < .90$ , very high:  $.90 < R < 1.00$ , cf. Mukaka, 2012).

Contemporary approaches to Exploratory Factor Analysis (EFA) were applied to detect any factors in the scale under development (Moretti et al., 2019). The visual inspection of the point of inflection on the scree plot curve was employed to determine the number of the factors to be extracted (Osborne et al., 2008). Principal Axis Factoring (PAF) with an oblique (i.e., promax with Kaiser normalization) rotation was the extraction method, because factors were expected to correlate. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) was obtained, in which measures over .60 are considered to be adequate. Equally important, MSA for each item was estimated (values greater than 0.5 are preferable). Furthermore, assessing the data suitability regarding response bias was essential; the  $p$ -value of the Bartlett's Test of Sphericity should be statistically significant. Another central criterion constituted item communalities (their values had to be above .50). Similarly, item loadings on each factor needed to present minimum values of .30, but preferably over .40 (Osborne et al., 2008). Finally, the total variance explained by the model was expected to be greater than .60 (see also Hair et al., 2019). In the present study, a three-factor solution was preselected, because of the already established theoretical reasoning around the BPNs (e.g., Yong and Pearce, 2013).

### 2.1.7. Results

The final sample involved 399 participants, 156 men and 243 women. About half of them (49%) belonged to the age group of 18–25 years. The other age groups, namely those aged 26–35, 36–45, 46–55 and over 56, are represented by the percentages of 13%, 12%, 21% and 5% respectively. The sample consisted of 188 university graduates who have finished their studies in general (63%) and special (37%) education and who had however no official professional experience yet. The rest of the sample included 211 teachers, working in general (66%) and special (34%) education. Approximately half of the teachers (47%) were employed at the primary educational level, while the rest of them at the secondary education.

As to the quality of instruments used, the scale for social validity had a good internal consistency ( $\alpha = .84$ ). Participants rated positively the whole vignette (introductory text and video); the average of the scale was 3.96 ( $SD = .79$ ). The Wilcoxon Signed Ranks test showed a statistically significant deviation between the mean and the number three, which was the middle point of the Likert scale ( $Z = -8.13, p < .001$ ).

Both subscales of goal contents presented fair internal consistencies ( $\alpha$  values were .71 for the intrinsic and .70 for the extrinsic one). The structural validity of the two subscales was verified in a model, where the two confirmed factors were allowed to covariate. The data fit indices were good (chi-square value based on degrees of freedom,  $\chi^2 (31.56) = 48.94$ , chi-square value's statistical significance level,  $p = .03$ , chi-square value to degrees of freedom ratio,  $\chi^2/df = 1.55$ , normed fit index,  $NFI = .92$ , non-normed fit index,  $NNFI = .95$ , comparative fit index,  $CFI = .97$ , adjusted goodness of fit index,  $AGFI = .96$ , standardized root mean square residual,  $SRMR = .04$ , root mean square error of approximation,  $RMSEA = .04$ ,  $RMSEA$ 's 90% confidence interval,  $90\% CI = [.02, .06]$ ). Item loadings varied from .39 to .65 in the intrinsic factor and from .26 to

.63 in the extrinsic one. Correlations of the items across the two subscales were mostly negligible; only one of them was low. In consonance with the suggestions delivered by the statistical program LISREL, seven measurement errors among items should be allowed to covariate. Although their coefficients were statistically significant at the .01 level, they were small (their absolute values were lower than .23 in the completely standardized solution).

As to state empathy, the internal consistencies of the three subscales, namely, affective, cognitive, and associative empathy were fair ( $\alpha$  values were .75, .74, and .72 respectively). The confirmed second-order factor exhibited good reliability ( $\alpha = .86$ ). The structural validity of the questionnaire was good ( $\chi^2 (26.56) = 51.98, p < .01, \chi^2/df = 1.96, NFI = .97, NNFI = .97, CFI = .98, AGFI = .93, SRMR = .05, RMSEA = .06, 90\% CI = [.04, .07]$ ). Item loadings varied from .36 to .72 in all three factors. Correlations of the items across factors were negligible to low. According to LISREL's suggestions, two out of 14 measurement error covariations were greater than .25 as far as their absolute values are concerned. The three factors composed the state empathy at the second level of the statistical analysis.

The internal consistencies of the scales regarding teachers' instructional goals were good ( $\alpha$  values ranged from .81 to .87). We avoided creating second-level factors, because we reckon that the Assured Success factor is not referring directly to the adolescent, but to the team's goals. Indices of the structural validity of this questionnaire were acceptable to good ( $\chi^2 (52.84) = 70.56, p = .15, \chi^2/df = 1.34, NFI = .97, NNFI = .99, CFI = .99, AGFI = .96, SRMR = .05, RMSEA = .04, 90\% CI = [.02, .05]$ ). Item loadings varied from .57 to .87 in all four factors. Most of the correlations of the items across factors, especially among intrinsic vs. extrinsic ones, were negligible to low. Absolute values of the 12 measurement error covariations were low (in any case lower than .23).

On the subject of the situational BPNs' recognition, the form of the scree plot curve implied a three factor solution for the BPNRQ-S. Each factor contained three items (Table 1). Consistent with the theory, the items were aligned to the three BPNs. The percentage of total variance explained by the factors was 62.69%. Measures for sample adequacy and data suitability for structure detection were proper; the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was adequate for the whole model ( $MSA = .90$ ) and for each item (MSAs varied from .85 to .93). The Bartlett's Test of Sphericity was statistically significant ( $\chi^2 (36) = 1786.38, p < .001$ ). Communalities and factor loadings were considered as too (Table 1). Six out of 27 item correlations across factors were moderate, while the rest of them were low. Additional internal validity indices stemming from the CFA were good ( $\chi^2 (16.20) = 14.74, p = .56, \chi^2/df = .91, NFI = .99, NNFI = 1.00, CFI = 1.00, AGFI = .97, SRMR = .02, RMSEA = .02, 90\% CI = [.00, .05]$ ). In this model, the three factors were unified in a second-order factor. Moreover, the internal consistencies of the three factors extracted were good ( $\alpha$  values for factors 1, 2 and 3 were .81, .81, and .82 respectively). The overall internal consistency was good too ( $\alpha = .90$ ).

Criterion validity of the BPNRQ-S was derived from the correlations shown in Table 2. BPNs' recognition exhibited many statistically significant correlations with the rest variables. In fact, BPNs' recognition presented low correlations with intrinsic life goals and moderate ones with intrinsic instructional goals, whereas its correlations with extrinsic life goals and extrinsic instructional goals were negligible. Only in Study 1, the correlation between BPNs' recognition and goals underscoring high scores was low. What is more, in Study 1 the correlation between BPNs' recognition and extrinsic life goals was statistically significant, albeit negligible.

## 3. Study 2

While the first study was dedicated to an initial theory check, the second study was conducted with the intention of confirming the findings in a new sample of experienced teachers and thus to finally verify the core research question. In essence, reproducing previously found factor

**Table 2.** Spearman's zero-order correlations among the variables of the studies.

	1	2	3	4	5	6	7
1 GCi							
2 GCe	.30**/.28**						
3 SE	.25**/.35**	.13**/.11					
4 NR	.42**/.34**	.21**/.04	.38**/.43**				
5 IG-1	.39**/.32**	.23**/.13*	.35**/.34**	.65**/.52**			
6 IG-2	.29**/.34**	.15**/.08	.26**/.35**	.61**/.51**	.63**/.62**		
7 IG-3	.12*/.25**	.30**/.15*	.18**/.24**	.37**/.23**	.31**/.14*	.43**/.31**	
8 IG-4	.03/.21**	.21**/.34**	.09/.07	.25**/.13*	.20**/.10	.33**/.26**	.59**/.53**

Note. Values before the slash denote findings of Study 1, whereas values after the slash refer to Study 2. GCi: Intrinsic Goal Contents, GCe: Extrinsic Goal Contents, SE: State Empathy, NR: Basic Psychological Needs Recognition, IG: Instructional Goals, IG-1: Personal Growth, IG-2: Relationship Growth, IG-3: High Scores, IG-4: Assured Success.

structures and relationships among variables across samples is an integral part of a scale validation. Hence, we expect that the construct validity (factors) and the criterion validity (correlations) of the questionnaire under development will be confirmed in the new sample. In Study 2, the same measures as in Study 1 were used, except assessing the vignette's social validity. All other materials and methods were the same with those of Study 1. Moreover, the Confirmatory Factor Analysis (CFA) was incorporated for two reasons. Firstly, to deliver indices about the new scale's internal validity that actually extends on the information given by the EFA (Ponsignon et al., 2021). Secondly, to verify the structure of all the implemented questionnaires, especially the construct validity of the new scale in the second sample (Boateng et al., 2018).

The statistical program LISREL (Jöreskog and Sörbom, 2017) was used to perform the CFA. All variables were normalized. The Robust Maximum Likelihood (RML) method was used, which represents an attempt to handle multivariate non-normality (Jöreskog et al., 2016). In all analyses, the completely standardized solutions were used. Additionally, Satorra-Bentler's adjusted chi-square and adjusted degrees of freedom were taken into account, because data were not normally distributed. The criteria for evaluating goodness-of-fit indices were derived from Schermelleh-Engel et al. (2003).

### 3.1. Results

The sample of study 2 was composed of 239 teachers (41 men, 197 women, 1 unspecified), working in general (48%) and special (52%) education. About half of the teachers (54%) served at primary schools. The frequencies of the participants' ages were recorded as follows: 18–25 years (1%), 26–35 years (22%), 36–45 years (22%), 46–55 years (40%) and over 56 years (15%).

Pertaining to the quality of the measures, Table 3 gives the summary of the goodness-of-fit indices for the instruments used in this study. All questionnaires were characterized by acceptable fit indices. The BPNRQ-S demonstrated good fit indices. Information about scale items (Table 4) revealed that item 9 may need improvement.

As in Study 1, correlations between BPNRQ-S and the other questionnaires delivered evidence for its criterion validity. BPNs' recognition showed statistically significant correlations to the other variables, except

to extrinsic life goals. Correlations between BPNRQ-S and extrinsic instructional goals were negligible. BPNs' recognition presented low correlations with intrinsic life goals and moderate ones with intrinsic instructional goals.

### 4. General discussion

This research paper introduced and tested the concept of the situational recognition of a student's BPNs' through university graduates and teachers. In two studies, participants expressed their psychological states in the context of their alleged participation in the development of an IEP for an adolescent with Cerebral Palsy. The theoretically and socially validated vignette used, succinctly showed many of the difficulties which usually occur in children and adolescents with movement disabilities. The large samples used and the social valid vignette founded the studies' external validity.

Study 1 and Study 2 were based in two complementary methodological strategies (exploratory and confirmatory). Both of them delivered empirical evidence supporting the core research question (showcasing the existence and providing initial psychometric properties of the proposed psychological construct). Overall, the outcomes were encouraging for the questionnaire developed (BPNRQ-S). An exception constitutes its ninth item, which needs to be improved. In all other cases, measures of internal consistency, factor structure and internal validity were acceptable. The theory-conform relationships of the scale with the other tested variables demonstrated the criterion validity of the new psychological construct. Specifically, recognizing the BPNs of the adolescent in the vignette by graduate students and school teachers was substantially correlated to their own intrinsic life goals, state empathy and intrinsic instructional goals. In some cases, the correlation profile revealed in Study 2 was more congruent to theory than in Study 1. University graduates and young teachers, as being part of the diverse sample in Study 1, may have not fully developed –nor definitely formed– their instructional beliefs and practices (Graham et al., 2020; Saeed and Meisam, 2018; Stahnke and Blömeke, 2021). On the whole, correlations showed that BPNs recognition may represent a proximate correlate of teachers' willingness to set intrinsic instructional goals as compared to intrinsic life goals and state empathy.

**Table 3.** Goodness-of-fit indices for the measures used in Study 2.

	$\chi^2$	df	p	$\chi^2/df$	NFI	NNFI	CFI	AGFI	SRMR	RMSEA	90% CI
GC	18.12	17.18	.39	1.06	.93	.99	1.00	.98	.04	.02	.00–.06
SE	36.21	26.46	.10	1.37	.96	.98	.99	.92	.04	.05	.02–.07
IG	64.78	50.10	.08	1.29	.94	.98	.99	.91	.06	.04	.02–.06
NR	20.07	18.16	.34	1.11	.97	1.00	1.00	.95	.04	.03	.00–.07

Note. GC: Goal Contents (Aspiration Index - Short Form), SE: State Empathy (State Empathy Scale), NR: Needs Recognition (Basic Psychological Needs Recognition Questionnaire - State), IG: Instructional Goals (Teachers Goal Questionnaire).

**Table 4.** Results from confirmatory factor analysis of the basic psychological needs recognition questionnaire (BPNRQ-S).

BPNRQ-S Item	M	SD	Factor loading			E	R <sup>2</sup>
			1	2	3		
<b>Factor 1: Autonomy</b>							
7. To express his opinion/ideas and to be heard	4.22	.74	<b>.86</b>			.26	.74
4. To show with his actions what he really wants	4.05	.70	<b>.78</b>			.39	.62
1. A sense of choice/freedom in the things he does	3.71	.70	<b>.76</b>			.42	.58
<b>Factor 2: Relatedness</b>							
3. To feel very close to those he works with	4.30	.69		<b>.75</b>		.45	.56
6. To feel mutual warmth with those he works with	4.41	.67		<b>.71</b>		.49	.51
9. To be accepted by those he cooperates with	3.78	.86		<b>.52</b>		.73	.27
<b>Factor 3: Competence</b>							
2. To feel that he can accomplish whatever he undertakes	4.21	.70			<b>.83</b>	.32	.68
8. To feel really capable at whatever he engages in	4.00	.76			<b>.79</b>	.38	.63
5. To process ways to overcome his weaknesses	4.10	.75			<b>.75</b>	.44	.56
Scale descriptive statistics	4.09	.49					

Note. E: Error residual, R<sup>2</sup>: Squared multiple correlation. *N* = 239.

Even being negligible or low, correlations between BPNs' recognition and extrinsic instructional goals were statistically significant in both samples. The reason for this phenomenon may be twofold. Firstly, the content of the video, especially the part which shows the adolescent struggling to carry out the movement test in line with the doctor's standards, may have brought to the surface previous experiences of participants and so they identified to a large extent with the difficulties of the situation. Therefore, although participants relied on their own intrinsic life goals, associative elements of empathy and recognition of BPNs the vignette may stimulated them to go for high-performance goals in response to the adolescent's apparent struggling for achievement. In this way, maybe the effort of the participants to promote structure (Aelterman et al., 2019) in the whole situation is shown, namely the effort to closely guide this adolescent's progress. Even in Jang's (2019) research, correlations of individual content goals with extrinsic instructional goals, especially with Assured Success, were statistically significant. Secondly, the questionnaire assessing teachers' instructional goals does not include a subscale, which calls intrinsically oriented competence goals for the adolescent's innate need for competence, e.g. enabling the kid to feel capable (Cheon et al., 2019). This fact may have influenced the participants in diverting instructional goals in favor of high scores (Assured Success).

#### 4.1. Implications

The present findings have some implications for both theory and practice. The correlations among the tested constructs highlighted the importance of the new psychological concept in explaining the prioritization of intrinsic instructional goals. Particularly, BPNs' recognition seemed to play a proximate causation role as far as teachers' intrinsic goals are concerned. That being said, the concept of BPNs' recognition appeared to reveal a key aspect on how teachers build goal representations. In this way, BPNs' recognition complements teachers' supportive styles, which are admittedly linked to the quality of teachers' instruction (Mano-Israëli and Gero, 2017). Taken altogether, the construct of BPNs recognition may lend clarity to teachers' tendency to support the psychological growth of their students. To put it in another way, identifying innate needs to be satisfied is crucial for shaping appropriate and quite specific instructional plans (Ryan and Deci, 2017). Similarly, BPNs recognition may add value to practice in domains, such as student tertiary education, teacher support and/or trainings, student teacher mentoring/supervisions and related needs assessments. For instance, this construct may be integrated in programs promoting supportive teaching styles, particularly by connecting empathy to needs satisfying instructional goals. Several stakeholders may also profit from the construct of

BPNs recognition and improve recommendations provided for people with physical disabilities.

#### 4.2. Limitations

The two presented studies were cross-sectional and preliminary in nature. As a result, neither the precise placement of the new construct in teachers' supportive styles nor its exact causal role could be determined. Also, the purpose of our study was not to generalize the results across situations, but only to focus on the response of the participants to that particular vignette. Therefore, the ecological validity of the scale has not been fully examined. Nevertheless, the social validity of this vignette was acceptable. Regardless of the above, states of empathy and recognition of BPNs cannot cover the wide range of daily interactions. Furthermore, participants' responses may have been influenced by the characteristics of the vignette, such as the script of the film, the specific disability, the adolescent's gender and the gender of the other heroes. Finally, the present research was based solely on self-report questionnaires, which are not free from biases. Proposed solutions for these limitations are addressed in the following section.

#### 4.3. Future research

In addition to the above, enlarging the new scale and strengthening its psychometric qualities would be useful. Moreover, a set of socially validated videos will be needed to overcome any possible bias caused by the video vignette used and to assure higher validity of the scales used (Shen, 2010). This would also give the between-person variance needed for establishing a more solid construct. After these improvements, the dimensionality of the enlarged scale should be tested anew. Also, future research could strengthen the causal and mediating role of basic psychological needs recognition via path analysis and by manipulating it in longitudinal studies (e.g., Levett-Jones et al., 2017). In addition, providing recognition of BPNs could be examined as a trait, not only as a state characteristic. As a consequence, participants will be asked about the needs of children and adolescents regardless of a particular situation. In this case, criterion validity could be checked by examining correlations between the BPNs' recognition with the motivational practices of teachers (Aelterman et al., 2019) and personality factors like narcissism (Sedikides et al., 2018). Of course, it should be also examined, how this new construct is linked to teachers' real behaviors. Lastly, the inclusion of matters concerning personal vs. shared responsibility (Daniels et al., 2020; Daniels et al., 2017) may clarify the puzzling correlations found between BPNs' recognition and extrinsic instructional goals.

## Declarations

### Author contribution statement

Panagiotis Varsamis: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Georgios Katsanis: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

Eleni Iosifidou: Performed the experiments; Contributed reagents, materials, analysis tools or data.

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### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

## References

- Aelterman, N., Vansteenkiste, M., Haerens, L., Soenens, B., Fontaine, J.R., Reeve, J., 2019. Toward an integrative and fine-grained insight in motivating and demotivating teaching styles: the merits of a circumplex approach. *J. Educ. Psychol.* 111 (3), 497–521.
- Agaliotis, I., Varsamis, P., 2019. Using MIMIC modeling to identify dimensions of self-regulation in cerebral palsy. *Psychology* 10 (6), 799–818.
- Boateng, G.O., Neilands, T.B., Frongillo, E.A., Melgar-Quinonez, H.R., Young, S.L., 2018. Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Front. Public Health* 6.
- Brodley, B., 1999. The actualizing tendency concept in client-centred therapy. *Person-Cent. J.* 6 (2), 108–120. Retrieved from: [https://adpca.org/wp-content/uploads/2020/11/6\\_2\\_4.pdf](https://adpca.org/wp-content/uploads/2020/11/6_2_4.pdf).
- Burke, D.A., Koot, H.M., De Wilde, A., Begeer, S., 2016. Influence of child factors on health-care professionals' recognition of common childhood mental-health problems. *J. Child Fam. Stud.* 25 (10), 3083–3096.
- Burt, T.D., Young-Jones, A.D., Yadon, C.A., Carr, M.T., 2013. The advisor and instructor as a Dynamic Duo: academic motivation and basic psychological needs. *NACADA J.* 33 (2), 44–54.
- Carboneau, N., Milyavskaya, M., 2017. Your goals or mine? Women's personal and vicarious eating regulation goals and their partners' perceptions of support, well-being, and relationship quality. *Motiv. Emot.* 41 (4), 465–477.
- Carpentier, J., Mageau, G.A., 2013. When change-oriented feedback enhances motivation, well-being and performance: a look at autonomy-supportive feedback in sport. *Psychol. Sport Exerc.* 14 (3), 423–435.
- Chatzisarantis, N.L., Ada, E.N., Ahmadi, M., Caltabiano, N., Wang, D., Thøgersen-Ntoumani, C., Hagger, M.S., 2019. Differential effects of perceptions of equal, favourable and unfavourable autonomy support on educational and well-being outcomes. *Contemp. Educ. Psychol.* 58, 33–43.
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E.L., Van der Kaap-Deeder, J., Verstuyf, J., 2015. Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motiv. Emot.* 39 (2), 216–236.
- Cheon, S.H., Reeve, J., Song, Y., 2019. Recommending goals and supporting needs: an intervention to help physical education teachers communicate their expectations while supporting students' psychological needs. *Psychol. Sport Exerc.* 41, 107–118.
- Daniels, L.M., Dueck, B.S., Goegan, L.D., 2020. Pre-service teachers' reflections on personal responsibility for student motivation: a video vignette study. *J. Teacher Educ. Educator* 9 (2), 221–239.
- Daniels, L.M., Radil, A.I., Goegan, L.D., 2017. Combinations of personal responsibility: differences on pre-service and practicing teachers' efficacy, engagement, classroom goal structures and wellbeing. *Front. Psychol.* 8.
- Deci, E.L., Ryan, R.M., 2014. Autonomy and need satisfaction in close relationships: relationships motivation theory. In: Weinstein, N. (Ed.), *Human Motivation and Interpersonal Relationships: Theory, Research, and Applications*. Springer Science + Business Media, pp. 53–73.
- Erfanian, F., Roudsari, R., Heydari, A., Bahmani, M., 2020. A narrative on using vignettes: its advantages and drawbacks. *J. Midwif. Reproduct. Health* 8, 2134–2145.
- Escriva-Bouley, G., Guillet-Descas, E., Aelterman, N., Vansteenkiste, M., Van Doren, N., Lentillon-Kaestner, V., Haerens, L., 2021a. Adopting the situation in school questionnaire to examine physical education teachers' motivating and demotivating styles using a Circumplex approach. *Int. J. Environ. Res. Publ. Health* 18 (14), 7342.
- Escriva-Bouley, G., Haerens, L., Tessier, D., Sarrazin, P., 2021b. Antecedents of primary school teachers' need-supportive and need-thwarting styles in physical education. *Eur. Phys. Educ. Rev.* 27 (4), 961–980.
- Eurydice, 2020. National Education Systems. Greece. European Commission. Retrieved from: [https://eacea.ec.europa.eu/national-policies/eurydice/content/primary-education-20\\_en](https://eacea.ec.europa.eu/national-policies/eurydice/content/primary-education-20_en).
- Ferri, E., Porcelli, E., Amelio, G., 2004. The Keys to the House. Lions Gate Entertainment, Italy.
- Fountoulakis, K., Papadopoulou, M., Kleanthous, S., Papadopoulou, A., Bizeli, V., Nimatoudis, I., Iacovides, A., Kaprinis, G., 2006. Reliability and psychometric properties of the Greek translation of the state-trait anxiety inventory form Y: preliminary data. *Ann. Gen. Psychiatr.* 5 (2).
- Freeman, M., Stewart, D., Cunningham, C.E., Gorter, J.W., 2018. Information needs of young people with cerebral palsy and their families during the transition to adulthood: a scoping review. *J. Trans. Med.* 1 (1).
- Graham, L.J., White, S.L., Cologon, K., Pianta, R.C., 2020. Do teachers' years of experience make a difference in the quality of teaching? *Teach. Teach. Educ.* 96, 103190.
- Grouzet, F.M., Kasser, T., Ahuvia, A., Dols, J.M., Kim, Y., Lau, S., Sheldon, K.M., 2005. The structure of goal contents across 15 cultures. *J. Pers. Soc. Psychol.* 89 (5), 800–816.
- Hair, J.F., Gabriel, L.D.S., Da Silva, D.M., Braga Junior, S., 2019. Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Manag. J.* 54 (4), 490–507.
- Hope, N.H., Milyavskaya, M., Holding, A.C., Koestner, R., 2016. The humble path to progress: goal-specific aspirational content predicts goal progress and goal vitality. *Pers. Individ. Differ.* 90, 99–107.
- IBM Corp., 2011. IBM SPSS Statistics for Windows. IBM Corp (Version 20.0) [Computer software]. <https://www.ibm.com/analytics/spss-statistics-software>.
- Jang, H., 2019. Teachers' intrinsic vs. extrinsic instructional goals predict their classroom motivating styles. *Learn. InStruct.* 60, 286–300.
- Jöreskog, K.G., Sörbom, D., 2017. LISREL 9.30: User's Reference Guide. Scientific Software International [Computer software]. <https://ssccentral.com/index.php/products/lisrel/>.
- Jöreskog, K.G., Olsson, U.H., Wallentin, Y.F., 2016. *Multivariate Analysis with LISREL*. Springer International Publishing.
- Kasser, T., 2019. An Overview of the Aspiration Index. Unpublished manuscript, Knox College, Galesburg, Illinois, USA.
- Kasser, T., Ryan, R.M., 1996. Further examining the American dream: differential correlates of intrinsic and extrinsic goals. *Pers. Soc. Psychol. Bull.* 22 (3), 280–287.
- Koka, A., Tilga, H., Hein, V., Kalajas-Tilga, H., Raudsepp, L., 2021. A multidimensional approach to perceived teachers' autonomy support and its relationship with intrinsic motivation of students in physical education. *Int. J. Sport Psychol.* 52 (3), 266–286.
- Kyriazos, T.A., 2018. Applied psychometrics: sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology* 9 (8), 2207–2230.
- Laporte, N., Soenens, B., Flamant, N., Vansteenkiste, M., Mabbe, E., Brenning, K., 2021. The role of daily need crafting in daily fluctuations in adolescents' need-based and affective experiences. *Motiv. Emot.*
- Levett-Jones, T., Lapkin, S., Govind, N., Pich, J., Hoffman, K., Jeong, S.Y., Everson, N., 2017. Measuring the impact of a 'point of view' disability simulation on nursing students' empathy using the comprehensive state empathy scale. *Nurse Educ. Today* 59, 75–81.
- Leys, C., Delacre, M., Mora, Y.L., Lakens, D., Ley, C., 2019. How to classify, detect, and manage univariate and multivariate outliers, with emphasis on pre-registration. *Int. Rev. Soc. Psychol.* 32 (1).
- Li, J., Deng, M., Wang, X., Tang, Y., 2018. Teachers' and parents' autonomy support and psychological control perceived in junior-high school: extending the dual-process model of self-determination theory. *Learn. Individ. Differ.* 68, 20–29.
- Lynch, M.F., Salikhova, N.R., 2016. Teachers' conceptions about the child's developmental needs: a structural analysis. *Int. Electron. J. Math. Educ.* 11 (5), 1471–1479.
- Lynch, M., Salikhova, N., 2017. Teachers' beliefs about the needs of students: teachers as local experts (A qualitative analysis). *Educ. Self Develop.* 12 (3), 33–43.
- Lynch, M., Salikhova, N., Eryemeeva, A., 2020. Basic needs in other cultures: using qualitative methods to study key issues in self-determination theory research. *J. Higher School Econ.* 17 (1), 134–144.
- Magill-Evans, J., Darra, J., 2011. Disabilities, physical. In: Brown, B.B., Prinstein, M.J. (Eds.), *Encyclopedia of Adolescence*, 1. Elsevier, London, pp. 125–133.
- Mano-Israëli, S., Gero, A., 2017. What drives teachers to teach electronics at a two-year technical college? A self-determination theory perspective. *Int. J. Eng. Educ.* 33 (6), 1892–1899.
- Mohamad, M.M., Sulaiman, N.L., Sern, L.C., Salleh, K.M., 2015. Measuring the validity and reliability of research instruments. *Proc. Soc. Behav. Sci.* 204, 164–171.
- Moretti, E.D., Anholon, R., Rampasso, L.S., Silva, D., Santa-Eulalia, L.A., Ignácio, P.S., 2019. Main difficulties during RFID implementation: an exploratory factor analysis approach. *Technol. Anal. Strat. Manag.* 31 (8), 943–956.
- Mukaka, M.M., 2012. Statistics corner: a guide to appropriate use of correlation coefficient in medical research. *Malawi Med. J.: J. Med. Assoc. Malawi* 24 (3), 69–71. PMID: PMC3576830.
- Nalipay, M.J., King, R.B., Cai, Y., 2020. Autonomy is equally important across east and west: testing the cross-cultural universality of self-determination theory. *J. Adolesc.* 78, 67–72.



- Niemiec, C.P., Soenens, B., Vansteenkiste, M., 2014. Is relatedness enough? On the importance of need support in different types of social experiences. In: Weinstein, N. (Ed.), *Human Motivation and Interpersonal Relationships: Theory, Research and Applications*. Springer Science + Business Media, pp. 77–96.
- Nørskov, S., Damholdt, M.F., Ulhøi, J.P., Jensen, M.B., Ess, C., Seibt, J., 2020. Applicant fairness perceptions of a robot-mediated job interview: a video vignette-based experimental survey. *Front. Robot. AI* 7.
- Orsini, C., Evans, P., Binnie, V., Ledezma, P., Fuentes, F., 2015. Encouraging intrinsic motivation in the clinical setting: teachers' perspectives from the self-determination theory. *Eur. J. Dent. Educ.* 20 (2), 102–111.
- Osborne, J., Costello, A., Kellow, J., 2008. Best practices in exploratory factor analysis. In: Osborne, J. (Ed.), *Best Practices in Quantitative Methods*. SAGE Publications, Inc., pp. 86–99.
- Parrisius, C., Gaspard, H., Zitzmann, S., Trautwein, U., Nagengast, B., 2021. The "situative nature" of competence and value beliefs and the predictive power of autonomy support: a multilevel investigation of repeated observations. *J. Educ. Psychol.*
- Passalacqua, S.A., Segrin, C., 2012. The effect of resident physician stress, burnout, and empathy on patient-centered communication during the long-call shift. *Health Commun.* 27 (5), 449–456.
- Ponsignon, F., Smith, J.S., Smart, A., 2021. Development and validation of a measurement scale for the experience capability construct. *J. Serv. Manag.* 32 (3), 315–345.
- Pulido, J.J., Sánchez-Oliva, D., Leo, F.M., Sánchez-Cano, J., García-Calvo, T., 2017. Development and validation of coaches' interpersonal style questionnaire. *Meas. Phys. Educ. Exerc. Sci.* 22 (1), 25–37.
- Reeve, J., 2015. Giving and summoning autonomy support in hierarchical relationships. *Soc. Personal. Psychol. Comp.* 9 (8), 406–418.
- Reeve, J., Cheon, S.H., Jang, H.R., 2019. A teacher-focused intervention to enhance students' classroom engagement. In: Fredricks, J., Christenson, S., Reschly, A.L. (Eds.), *Handbook of Student Engagement Interventions*. Elsevier, pp. 87–102.
- Reinke, W.M., Stormont, M., Herman, K.C., Puri, R., Goel, N., 2011. Supporting children's mental health in schools: teacher perceptions of needs, roles, and barriers. *Sch. Psychol. Q.* 26 (1), 1–13.
- Rodrigues, F., Pelletier, L.G., Rocchi, M., Neiva, H.P., Teixeira, D.S., Cid, L., Monteiro, D., 2020. Trainer-exerciser relationship: the congruency effect on exerciser psychological needs using response surface analysis. *Scand. J. Med. Sci. Sports* 31 (1), 226–241.
- Rodríguez-Muñiz, L.J., Muñoz-Rodríguez, L., Alonso, P., De Coninck, K., Vanderlinde, R., Valcke, M., 2018. Exploring the effectiveness of video-vignettes to develop mathematics student teachers' feedback competence. *Eurasia J. Math. Sci. Technol. Educ.* 14 (11).
- Ryan, R.M., Deci, E.L., 2008. Self-determination theory and the role of basic psychological needs in personality and the organization of behavior. In: John, O.P., Robins, R.W., Pervin, L.A. (Eds.), *Handbook of Personality: Theory and Research*. Guilford Press, pp. 654–678.
- Ryan, R.M., Deci, E.L., 2017. *Self-determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Press.
- Ryan, R.M., Soenens, B., Vansteenkiste, M., 2019. Reflections on self-determination theory as an organizing framework for personality psychology: interfaces, integrations, issues, and unfinished business. *J. Pers.* 87 (1), 115–145.
- Saeed, M., Meisam, M., 2018. Exploring the effect of self-reflection through awareness raising on novice and experienced Iranian EFL teachers' pedagogical beliefs enactment. *J. Asia TEFL* 15 (3), 630–648.
- Schermelleh-Engel, K., Moosbrugger, H., Müller, H., 2003. Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *Methods Psychol. Res.* 8, 23–74.
- Sedikides, C., Ntoumanis, N., Sheldon, K.M., 2018. I am the chosen one: narcissism in the backdrop of self-determination theory. *J. Pers.* 87 (1), 70–81.
- Sharma, N., Pratap Yadav, V., Sharma, A., 2021. Attitudes and empathy of youth towards physically disabled persons. *Heliyon* 7 (8), e07852.
- Shayne, R., Miltenberger, R.G., 2012. Evaluation of behavioral skills training for teaching functional assessment and treatment selection skills to parents. *Behav. Interv.* 28 (1), 4–21.
- Sheldon, K.M., Kasser, T., 1995. Coherence and congruence: two aspects of personality integration. *J. Pers. Soc. Psychol.* 68 (3), 531–543.
- Shen, L., 2010. On a scale of state empathy during message processing. *West. J. Commun.* 74 (5), 504–524.
- Stadskleiv, K., 2020. Cognitive functioning in children with cerebral palsy. *Dev. Med. Child Neurol.* 62 (3), 283–289.
- Stahnke, R., Blömeke, S., 2021. Novice and expert teachers' noticing of classroom management in whole-group and partner work activities: evidence from teachers' gaze and identification of events. *Learn. InStruct.* 74, 101464.
- Swan, P., Riley, P., 2015. Social connection: empathy and mentalization for teachers. *Pastor. Care Educ.* 33 (4), 220–233.
- Symonds, J., Schoon, I., Eccles, J., Salmela-Aro, K., 2019. The development of motivation and Amotivation to study and work across age-graded transitions in adolescence and young adulthood. *J. Youth Adolesc.* 48 (6), 1131–1145.
- Taylor, I.M., Ntoumanis, N., 2007. Teacher motivational strategies and student self-determination in physical education. *J. Educ. Psychol.* 99 (4), 747–760.
- Vansteenkiste, M., Ryan, R.M., Soenens, B., 2020. Basic psychological need theory: advancements, critical themes, and future directions. *Motiv. Emot.* 44 (1), 1–31.
- Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K.M., Deci, E.L., 2004. Motivating learning, performance, and persistence: the synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *J. Pers. Soc. Psychol.* 87 (2), 246–260.
- Varsamis, P., Agaliotis, I., 2011. Profiles of self-concept, goal orientation, and self-regulation in students with physical, intellectual, and multiple disabilities: implications for instructional support. *Res. Dev. Disabil.* 32 (5), 1548–1555.
- Varsamis, P., Halios, H., Katsanis, G., Papadopoulos, A., 2021. The role of basic psychological needs in bullying victimisation in the family and at school. *J. Psychol. Counsell. Schools* 1–13.
- Varsamis, P., Staikopoulos, K., Sachpatzidou, E., Staikopoulou, M., 2011. Teachers' empathy, attributional beliefs and frame of reference when including students with Cerebral Palsy. *Learn. Teacher J.* 5, 3–11.
- Weinstein, N., Hodgins, H.S., Ryan, R.M., 2010. Autonomy and control in dyads: effects on interaction quality and joint creative performance. *Pers. Soc. Psychol. Bull.* 36 (12), 1603–1617.
- Williams, G.C., 2014. Self-determination and the patient-health practitioner relationship. In: Weinstein, N. (Ed.), *Human Motivation and Interpersonal Relationships: Theory, Research and Applications*. Springer Science + Business Media, pp. 335–360.
- Yong, A.G., Pearce, S., 2013. A beginner's guide to factor analysis: focusing on exploratory factor analysis. *Tutor. Quant. Meth. Psychol.* 9 (2), 79–94.
- Zawadzka, A.M., Kasser, T., Borchet, J., Iwanowska, M., Lewandowska-Walter, A., 2019. The effect of materialistic social models on teenagers' materialistic aspirations: results from priming experiments. *Curr. Psychol.*