A Cross-Cultural Study Testing the Universality of Basic Psychological Needs Theory across Different Academic Subjects

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Abstract

Basic Psychological Needs Theory (BPNT) suggests that autonomy supportive teachers can

promote the satisfaction of students' three basic psychological needs (i.e., the needs for

autonomy, competence, and relatedness) and this is essential for optimal functioning and

personal well-being. The role of need satisfaction as a determinant of well-being is

understood to be invariant across contexts and cultures. The aim of this study was to test the

invariance in the relationships between students' perceptions of their teachers' autonomy

support and their psychological need satisfaction, enjoyment, concentration, and boredom

across different school subjects (Maths, English and PE lessons) and across different cultures

(England and Turkey). Questionnaires tapping the targeted variables in the three different

lesson types were completed by students in schools in England and Turkey. Results from

multilevel modelling analyses showed some support for the tenets of BPNT, albeit there were

inconsistences between the strength of the hypothesised relationships on account of country

and/or lesson type.

Keywords: basic psychological needs, autonomy support, engagement

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Throughout their time at school, students study a diverse range of subjects that

contribute to their overall education. It is generally recognised that students will engage with

energy and derive enjoyment from some subjects, while in other subjects students put

forward minimal effort towards and disengage from classroom activities (Eccles et al., 1983;

Gottfried, 1982; Smith & Fouad, 1999; Wigfield, Eccles, MacIver, Reuman & Midgley,

1991). Research has consistently demonstrated that variation in human behaviour and optimal

functioning is a consequence of the social-psychological characteristics of the relevant

context in which individuals engage. Self-determination theory (SDT; Deci & Ryan, 1985;

2000) is a prominent theory of motivation that considers the social psychological conditions

or environments that determine effective functioning in different contexts. Specifically, SDT

centres on the premise that the extent to which one's innate psychological needs are satisfied

or thwarted by significant others subsequently determines whether or not optimal engagement

and functioning ensues. SDT has frequently been adopted as a framework in which to

examine determinants of students' positive and negative experiences in school (e.g.,

Vallerand, Fortier & Guay, 1997) as well as within specific subjects such as Physical

Education (PE; Standage, Duda, & Ntoumanis, 2005; Ntoumanis, 2012), Maths, Economics,

English, and Science (Reeve, Jang, Carrell, Jeon & Barch, 2004). Less is known, however,

regarding whether the role of basic psychological need satisfaction in promoting well-being is

equally important across the range of subjects experienced in school and also across different

countries.

In the current study, our over-arching aim was to examine whether the strength of the relationship between basic need satisfaction and students' quality of engagement and well-being was equal in three school subjects (namely, PE, Maths, English). We also examined whether these associations were consistent across countries. Moreover, we examined whether teacher's autonomy support was equally influential as a determinant of psychological need satisfaction in these three subjects and between students studying in England and Turkey.

Basic Psychological Need Theory (BPNT)

According to SDT, humans have an inherent striving to satisfy three psychological needs; autonomy, competence, and relatedness (Ryan & Deci, 2000). Autonomy connotes an inner endorsement of one's actions, the sense that they emanate from one self and are one's own (Ryan & Deci, 2000). Competence is the belief that one has the ability to influence important outcomes in relation to one's own development or experiences (White, 1959). Relatedness is experienced when one feels that he/she has satisfying and supportive social relationships (Baumeister & Leary, 1995).

With respect to the prominent social contextual factors deemed relevant to psychological need satisfaction, education research embedded within BPNT has predominantly centred on the extent to which the teacher-created environment is autonomy supportive (Deci & Ryan, 2000; Reeve, 2009). Autonomy support is evident when a teacher provides his/her students with meaningful choices, provides a rationale for requests, acknowledges students' feelings, encourages personal initiative toward the activity and conveys confidence in the students' abilities (Deci et al., 2001; Williams, Gagne, Ryan, & Deci, 2002). Studies in mainstream education (e.g., Jang, Kim & Reeve, 2012) have supported a BPNT model in which perceived autonomy support from one's teacher predicts the satisfaction of students' psychological needs. In turn, the satisfaction of students'

psychological needs promotes positive outcomes. For example, Vallerand, Fortier and Guay (1997) found that Canadian students' (M_{age} = 14.97 years) overall competence and autonomy need satisfaction experienced in high school explained the relationship between perceived teacher autonomy support and self-determined motivation for learning. More recently, Jang, Reeve, Ryan and Kim (2009) reported that teachers' autonomy support was positively correlated with the psychological needs of tenth grade South Korean students, which were subsequently positively correlated with their achievement, optimal engagement and intrinsic motivation towards education.

With regard to experiences of autonomy support in specific lessons in mainstream education, Reeve et al. (2004) found that the more autonomy supportive teachers were during instruction in Maths, Economics, English, and Science lessons, the more engaged (i.e., higher task involvement and influence attempts) their high school students were. Similarly, in Jang, Reeve and Deci's (2010) study, autonomy support predicted students' behavioural engagement (i.e., attention, effort, verbal participation, persistence, positive emotion, and voice) in English, Maths, Social Studies, and Science lessons at high school. However, neither of these studies measured basic need satisfaction experienced by the students.

Miserandino's (1996) longitudinal study involved third and fourth grade elementary students (M_{age} = 9.51 years) who were distributed across 14 different classes. Regression analyses found perceived competence to be negatively associated with students' negative emotional engagement and withdrawal behaviours in school. Moreover, perceived competence was a significant predictor of grades in maths and social studies when measured during the first and last ten weeks of the school year. Perceived competence did not predict reading, language, arts or spelling at either time point. Similarly, Tian, Chen and Huebners's (2014) study with high school students (M_{age} = 15.69 years) found significant positive

bidirectional longitudinal relationships between psychological need satisfaction and school satisfaction. The significant bidirectional relationships were also observed between competence need satisfaction and positive affect in school. In many studies conducted in the PE environment at high school, psychological need satisfaction has also been positively associated with well-being (Standage, Duda, & Ntoumanis, 2005; Standage, Duda, & Ntoumanis, 2006; Bagøien et al, 2010; Taylor & Lonsdale, 2010), general self-esteem (Standage & Gillison, 2007), and effort (Taylor, & Lonsdale, 2010) in students aged 11-17 years.

The aforementioned research has advanced our knowledge of how BPNT applies in education. However, previous research in which students are asked to consider the 'typical' social environment manifested in their school (e.g., Jang et al., 2009; Vallerand et al., 1997) or the typical environment within one subject or across a range of subjects (e.g., Miserandino, 1996; Standage, Duda, & Ntoumanis, 2005; Tessier, Sarrazin, & Ntoumanis, 2010) precludes the possibility of delineating similarities (or differences) between the motivational atmospheres created within each different school subject as well as the strength of the relationships with students' psychological need satisfaction in those subjects. In the context of vocational dance, Quested, Duda, Ntoumanis, and Maxwell (2013) found that autonomy support experienced in dance classes predicted positive affective states experienced by dancers (M_{age} = 20.58 years) in those classes. However, this association was not found in rehearsal or performance settings. This suggests the role of autonomy support as a determinant of basic need satisfaction may not be equivalent across different learning contexts experienced in school. Our study builds upon the Quested et al. (2013) study by examining the relationship between autonomy support and basic need satisfaction in different

subjects. This is an important focus of study that will inform understanding of the role of motivation theory in determining engagement in school regardless of subject studied.

The universal role of basic needs. An important feature of SDT is the hypothesis that the psychological needs are essential for optimal human functioning and well-being, regardless of culture or context (Deci & Ryan, 2000, Ryan & Deci, 2002). That is, feelings of autonomy, competence and relatedness are considered to be organism needs that are universal (Jang et al., 2009). Previous research has confirmed the universal role of psychological needs across different life domains as well as in different circumstances within those contexts. For example, Milyavskaya and Koestner (2011) demonstrated that adults' report of basic psychological need satisfaction was positively associated with autonomous motivation and well-being across six life contexts (i.e., family, friends, romantic relationship, work, school, and activities/leisure). This study found that there was no significant difference in the strength of the association between needs and motivation across all domains. However, with regard to the association between need satisfaction and well-being, invariance could not be supported. The role of the needs was similar in school, family, work and relationships, but the needs had a smaller effect in the friendship and activity domains.

Quested et al. (2013) found psychological need satisfaction experienced within three learning and performance-related situations in the dance school (i.e., class, rehearsal, performance) was relevant to the students' affective states experienced in those contexts. However, there were situational differences in the salience of each need as a determinant of affective states experienced in these three situations. Autonomy and relatedness were stronger predictors in classes and rehearsals, whereas competence emerged as the most relevant determinant of affective states in dance performances. Less is known however, regarding the

salience of basic psychological needs as predictors of healthful functioning in different contexts (i.e., school subjects) in mainstream secondary education.

BPNT also considers that autonomy, competence and relatedness are universally required for healthful functioning across different cultures (Ryan & Deci, 2002). This assumption is in contrast to cultural-relativist theories (e.g., Markus, Kitayama, & Heiman, 1996) which propose that needs are more or less important depending upon one's culture. Specifically, the concept of autonomy is thought to hold importance for individuals' well-being in Western civilization that emphasises individualism but have little value in Eastern, collectivist cultures that value a group's needs (Iyengar & Lepper, 1999; Markus & Kitayama, 2003). Moreover, teachers' autonomy supportive behaviours may be given less value in collectivist cultures that promote conformity, obedience and respect of superiors in the classroom environment (Chao & Tseng, 2002). The contrasting views of SDT and cultural-relativist theorists regarding autonomy may be the result of different approaches to the construct's definition. Autonomy is defined, according to cultural-relativist theorists, as an individual's interpersonal independence and individualism. With this definition, autonomy would be considered to be detrimental to well-being in collective cultures given such cultures require individuals to follow external influences and meet social norms (Markus & Kitayama, 2003). Conversely, autonomy is orthogonal to independence within SDT and represents an individual's intrapersonal propensity to be self-governed, to experience feelings of volition, and to endorse one's own behaviour (Chirkov & Ryan, 2001). SDT therefore permits the hypothesis that individuals within a collective culture will experience heightened well-being when they are autonomous in their decision to become dependent on other people and comply with social norms (Taylor & Lonsdale, 2010). Collectively, this implies that autonomy supportive behaviours would be less strongly associated with basic psychological need

satisfaction and well- and ill-being in Eastern than Western cultures. Similarly, relatedness may be more important in Eastern cultures given the collectivist outlook in these cultures (Taylor & Lonsdale, 2010).

Aligned with SDT's expectations regarding the role of basic psychological needs in different cultures, there has been support for the beneficial role of autonomy support and basic psychological need satisfaction for academic learning and well-being across students from Western and Eastern cultures (see Chirkov, 2009, 2012 for overviews). For example, in a study in the context of PE, Taylor and Lonsdale (2010) revealed that the hypothesised relationships between teachers' autonomy support, basic psychological need satisfaction and effort and vitality were generally consistent when tested in students aged 13-15 years from the UK and Hong Kong.

In sum, evidence supports the universal importance of satisfying basic psychological needs for effective functioning, as well as the important role of the social environment in determining the degree of psychological need satisfaction experienced. However, to date, research has been limited to comparing the proposed relationships within BPNT across situations or across cultures. A more thorough test is dependent upon examining the hypothesized relationships across situations and cultures simultaneously. Moreover, despite considerable SDT research in educational contexts little is known regarding the role of basic psychological need satisfaction in determining effective functioning in different lessons experienced in school.

Therefore, in the current study, we examined the hypothesized relationships proposed by BPNT across students' typical experiences in three subjects that are considered central to school education, namely, Maths, English and PE lessons. We chose the aforementioned subjects because they target the range of key skills that children are required to learn during

school education (i.e., numeracy, literacy, physical). Furthermore, we tested the hypothesized relationships using data provided by students studying in Western and Eastern European countries, namely, England and Turkey. Western European countries such as England tend to be characterized by a more individualistic culture where individuals describe themselves as autonomous and independent, whereas individuals from Eastern European countries such as Turkey tend to have more collectivist cultures who endorse interdependence (Oyserman, Coon, & Kemmelmeier, 2002). Thus, the inclusion of students from the English and Turkish school systems in our sample allowed us to test the universality hypothesis in two distinct cultural groups. Consistent with SDT, we hypothesized that students' perceptions of their teachers' autonomy support in a particular subject would predict their psychological need satisfaction, which in turn would predict students' heightened quality of engagement (i.e., enjoyment, concentration, boredom) experienced within that subject. Based on the universality hypothesis central to SDT, we also predicted that these relationships would be invariant (i.e., same direction and strength) across different school subjects and across the two cultures.

Method

Participants

The data from Turkey were collected in Denizli, a city with an approximate population of 978,700 (Turkish Statistical Institute, 2014), 36% of which are under 25 years old (Turkish Statistical Institute, 2013). In England, data were collected in Birmingham, a large city inhabited by approximately one million people, 15% of which are between 10-19 years old[1] (http://www.birmingham.gov.uk).

Participants from England were recruited from one school while participants from Turkey were recruited from two schools. School were selected with convenience sampling in

both countries. Participants were 629 students (299 boys, 324 girls, and 6 unspecified), including 312 from England (From fifth to 11th grades, age range = 11-16, age M = 13.98, SD = 1.33) and 317 from Turkey (From fifth to 12th grades, age range = 10-18, age M = 15.15, SD = 1.46). The entire sample (100%) from Turkey reported their ethnicity as Turkish. The ethnicity of the sample from the school in England was mixed parallel with the broad ethnic diversity of Birmingham: Pakistani ethnicity (69%), Bangladeshi (5.8%), Other Asian (5.4%), White and Asian (4.8%), Other Black (3.5%), Black Caribbean (0.3%), White and Black Caribbean (0.3%), White British (1.3%) or Other White (1.3%), Black African (2.2%), Other Mixed (1%), and Other (4.8%). Six percent of the sample from England did not report their ethnicity. While many in our sample reported non-Western ethnicity, our focus in this study was students attending school in Western (and in the case of the Turkish sample, Eastern) educational system and society. In this study, we targeted students in high/secondary education rather than younger students in elementary/infant schools as adolescents are more likely to be taught by different teachers in different subjects (and are thus potentially exposed to variations in teacher autonomy support from lesson to lesson).

Procedures

Data was collected in the spring semester in 2012 from the participants in England and in the fall semester in 2013 from the participants in Turkey. After obtaining ethical approval from the authors' University ethics boards, verbal permission from the head teachers of participating schools was secured for their students to be invited to participate in the study. Parents of the students were subsequently informed in writing of the details of what their child's participation would involve. An opt-out approach to parental informed consent was adopted, in which parents could decide to exclude their child from the project by signing and returning the consent form. The students were also invited to participate in the study, and

they received verbal and written information regarding the nature of their voluntary participation in the study. One week after the consent forms were distributed, the data collection procedures started. Following an explanation of the study at the beginning of a timetabled class, the students were asked to complete a multi-section questionnaire independently. No students or parents denied consent to participate. The researcher responsible for data collection asked students to answer honestly and emphasized that there was no right or wrong answers. Data collection was supervised by the researcher and lasted approximately 30 minutes.

Measures

The students completed three versions of the following questionnaires to measure the targeted variables in each lesson. Each version of the questionnaire was contextualized to capture students' experiences in Maths, English or PE. For each questionnaire, students were encouraged to respond to the statements thinking about their experiences over the past four weeks. Before the data collection in Turkey, the questionnaires were translated using guidelines suggested by Duda and Hayashi (1998). In brief, the items were translated into Turkish by a team of translators who reached a common consensus. This process was followed by translation back to English by a second, independent translation team. Minor discrepancies were resolved via discussion between the two translation teams.

Autonomy support. Students' perceptions of teacher autonomy support were assessed using five items (e.g., "I felt the teacher provided me with choices and options") adapted to the school context from the Health Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). Previous research has supported the reliability of the one factor ($\alpha = 95$; Williams, Grow, Freedman, Ryan, & Deci, 1996). Students responded to the statements using a 7-point scale, anchored from 1 (*strongly disagree*) to 7 (*strongly agree).*

Basic psychological need satisfaction. Nine items were used in the current study to measure students' basic psychological need satisfaction in each subject. Feelings of autonomy were measured using three items (e.g., "I had some choice in what I wanted to do") employed by Standage, Duda, and Ntoumanis (2003). Students' scores on autonomy need satisfaction items have demonstrated acceptable internal reliability in previous education based studies (e.g., $\alpha = 0.81$ in Standage et al., 2003). Feelings of competence were measured using three items (e.g., I was pretty skilled) from the Intrinsic Motivation Inventory (McAuley, Duncan & Tammen, 1989). The internal reliability of the scale has previously been supported ($\alpha = 0.80$; McAuley, Duncan & Tammen, 1989). Feelings of relatedness were measured using three items (e.g., "I felt supported") from the acceptance subscale of the Need for Relatedness Scale (Richer & Vallerand, 1998). Students' scores on these items demonstrated acceptable internal reliability (0.91) in previous studies in the education context (e.g., Standage et al., 2003). Students responded to the statements using a 7-point scale, anchored by 1 (*strongly disagree*) and 7 (*strongly agree*). Means were calculated for each need scale and then a mean was created to produce a composite need satisfaction score.

Concentration. Three items (e.g., "I paid attention") from the scale developed by Standage, Duda and Ntoumanis (2005) were employed in this study to measure students' concentration in each subject. Students responded to the statements on a 5-point Likert scale (1 = never, 5 = always). Students' scores on the concentration scale have previously demonstrated sound internal reliability ($\alpha = 0.84$; Standage et al., 2005).

Enjoyment and boredom. Students' enjoyment (e.g., "I usually had fun") and boredom (e.g., "I was usually bored") in each subject was captured using six items from Duda and Nicholls's (1992) Satisfaction Interest Scale (SIS). Responses were indicated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Previous research has showed

0. 94 and 0.83 of Cronbach's alpha for enjoyment and boredom items respectively

Exploratory factor analysis revealed 0.82 and 0.71 alpha coefficients for enjoyment and

boredom subscales respectively in samples of students (Duda & Nicholls, 1992).

Data Analysis

All scales used for the data collection were Likert-type scales which provide ordinal

data in nature. To obtain interval data, means were calculated for each subscale and mean

scores were used in data analysis for each variable. Multilevel modelling analyses were

employed to test the study hypotheses. This approach was appropriate as the data were

hierarchically structured (i.e., students' responses to experiences within each of the three

lessons were nested within each individual student) and so this method accounts for the point

that students' responses in relation to experiences in each subject were not independent

(Snijders & Bosker, 1999). Data were analyzed using maximum likelihood estimations in

MLwiN version 2.27 (Rasbash, Charlton, Browne, Healy, & Cameron, 2009). The data

structure included two levels, with student at level two and their responses regarding their

experiences in each subject nested at level one. Prior to analysis, the predictor variables were

group mean centered. This implies that the data now captures the amount that each students'

(for example) enjoyment in (for example) Maths class deviates from that students' mean for

enjoyment across the three contexts. The three types of lesson (Maths, English, PE) as well as

country (England, Turkey) were dummy coded and two-way interaction terms were

calculated between the predictor variables and each lesson context and country. In the main

analyses, PE and England were used as the reference categories (respectively). To enable a

comparison between Maths and English, follow-up analyses repeated this step with Maths as

the reference category. A three-way interaction between lesson context, country and needs

was also calculated and entered in the final step of the analyses. In all models, these three-

way interactions did not significantly predict enjoyment, concentration or boredom. Therefore, these terms were not included in the final models reported. Pseudo R^2 statistics were calculated to evaluate the proportion of variance explained by the predictors in the final models over and above the models prior to the addition of the predictor, and as an indicator of effect size (Singer & Willet, 2003), i.e., small $\leq$ .10, medium $\leq$ .30, large $\leq$ .50.

Results

Preliminary Analyses

Data were screened and cleaned according to standard procedures. No multivariate or univariate outliers were identified in the data representing the study variables. Table 1 presents the mean scores for the study variables in each domain, by each country. Students reported the highest autonomy supportive teaching in English. The students' overall psychological need satisfaction, enjoyment and concentration, and boredom were highest in PE lessons.

Insert Table 1 about here

Multilevel Analysis

For each dependent variable of study we were interested to determine the proportion of variance between students (level 2) and between their lessons of study (level 1). To do this, we calculated the intra-class correlation for basic need satisfaction (.31), enjoyment (.17), concentration (.29) and boredom (.21). The intra-class correlation results imply that 69%, 83%, 71% and 79% of the variation in basic need satisfaction, enjoyment, concentration and boredom (respectively) was between lesson types (i.e., Maths, English, PE), and thus, not accounted for by between-person differences. Gender and school grade were controlled in all analyses via their inclusion as fixed predictors in all models and thus, the baseline model

referred to throughout the results included these predictors. Additional variables were added as fixed predictors in a step-by-step fashion.

Autonomy support in lessons predicting basic need satisfaction in lessons

Perceptions of autonomy support were added to the baseline model in step one. This variable was a significant predictor of basic need satisfaction experienced in lessons ($\beta = .576$, $p < .001$). In step two, dummy variables representing Maths and English (with PE as the reference category) as well as interactions between those dummy variables and autonomy support, were added to the model. The interaction term was a significant predictor of basic need satisfaction in the case of Maths ($\beta = .129$, $p = 0.02$) and was nearing significance in the case of English ($\beta = .109$, $p = .051$). The significant Maths interaction term was probed (Aiken & West, 1991) and the significance of the simple slopes was investigated following the recommendations of Preacher, Curran and Bauer (2006). The simple slopes for PE ($b = .512$, $t = 16.19$, $p = 0.003$) and for Maths ($b = 0.641$, $t = \text{infinity}$, $p < .001$) were significant. Inspection of the interaction plot revealed that the slope for Maths was steeper than the slope for PE, implying a stronger relationship between perceived autonomy support and basic need satisfaction in Maths lessons than in PE lessons. To enable a comparison between English and Maths, step two was repeated with Maths as the reference category. In this equation, the interaction between English and autonomy support was not significant ($\beta = -.065$, $p = .202$), indicating there to be no significant difference between Maths and English lessons in the strength of the relationship between autonomy support and basic need satisfaction experienced in those lessons.

In step three, we added the variables representing Turkey (with England as reference) and the interaction term between Turkey and autonomy support. Neither variable significantly predicted basic need satisfaction in lessons. This implies that there was no

significant difference between students in England or Turkey, with regard to the strength of the association between autonomy support and basic need satisfaction experienced in lessons. Forty seven percent of the variance in basic need satisfaction experienced in lessons was explained by the predictors in the final model, based on calculation of the Pseudo R^2 statistic.

Basic need satisfaction in lessons predicting student experiences in lessons

Enjoyment. When added to the baseline model, and controlling for grade and gender, basic need satisfaction experienced in classes significantly predicted the students' reported enjoyment in classes ($b = .498$, $p < .001$). In step two, English and Maths, as well as the interactions between English and Maths with basic need satisfaction, were added to the model. The interaction between Maths and needs was not significant ($b = 0.08$, $p = 0.18$), however interaction between English and needs was significant ($b = 0.127$, $p = 0.037$). This suggests there was no significant difference in the strength of the relationship between basic needs satisfaction and enjoyment experienced in Maths when compared with PE lessons (reference category), but that there were differences in PE and English settings. Probing the Needs x English interaction revealed the simple slope for PE ($\beta = 0.42$, $p = 0.01$) and English ($\beta = 0.547$, $p = 0.007$) to be significant. Interpretation of the plot revealed enjoyment to be lower at low levels of need satisfaction, but higher at higher levels of need satisfaction in English classes than PE classes. To facilitate a comparison between Maths and English lessons, step two was repeated with Maths as the reference category. However, the English x basic need satisfaction interaction term was not a significant predictor ($\beta = .047$, $p = 0.425$).

In step three, we added country and the country x basic needs interaction term to this model. The needs x Turkey variable significantly predicted lesson enjoyment ($b = 0.21$, $p < .001$). Probing the interaction revealed the simple slopes for England ($b = 0.284$, p = 0.02)

and Turkey ($b = 0.494$, $p = 0.0447$) to be significant. The interaction plot can be interpreted to imply that in Turkey, students' experience of enjoyment in lessons is more sensitive to the degree of basic need satisfaction experienced. The Pseudo R^2 statistic indicated that 35% of the total variance in the students' lesson enjoyment was accounted for by the predictors in this final model.

   Concentration. Basic need satisfaction experienced in lessons significantly predicted students' concentration ($\beta = .39$, $p < .001$). When added to the model, with PE as the reference category the interaction between basic need satisfaction and English ($\beta = .13$, $p < .01$) significantly predicted students' reported concentration in that lesson, whereas the basic needs x Maths interaction did not ($\beta = .002$, $p = .97$). Probing the significant interaction revealed the simple slopes for both English ($b = .497$, $t = 15.72$, $p = .004$) and PE ($b = .336$, $t = 10.62$, $p < .009$) to be significant. The slope for English lessons was steeper than that for PE lessons, suggesting that in English lessons (compared to PE) lower levels of need satisfaction resulted in lower levels of concentration, and correspondingly, higher levels of need satisfaction resulted in higher reported concentration in English lessons. When step two was repeated with Maths as the reference category, the English x basic needs interaction term significantly predicted concentration ($\beta = .154$, $p = .001$). Probing this interaction revealed that the simple slopes for Maths ($b = 0.343$, $t = 10.85$, $p = 0.008$) and English ($b = .497$, $t = 9.07$, $p = 0.0119$) were significant. Inspection of the plot revealed a steeper slope for English than for Maths. This implies that when levels of basic need satisfaction are low in English lessons, students experience lower concentration than when basic need satisfaction in Maths lessons is low. However when need satisfaction is high in English lessons, students experience higher levels of concentration than when need satisfaction is high in Maths lessons.

In the final step, country and the country x basic needs interaction term was added to the model. These predictors significantly predicted the students' reported concentration in lessons. With England as the reference category, the Turkey x basic needs interaction significantly predicted students' reported concentration (β = .12, $p <$ .001). Probing the interaction revealed the simple slopes representing students in England (b = .273, t = 6.105, p =.03) and Turkey (b = 0.39, t = 12.33, p = 0.007) to be significant. At low levels of basic need satisfaction, students in Turkey were lower than those in England in reported concentration. At high levels of basic need satisfaction students in both countries experienced similar levels of concentration in lessons. The Pseudo R^2 statistic calculation indicated that 34% of the variance in concentration was explained by the predictors in this final model.

Boredom. Basic need satisfaction in lessons significantly predicted the students' reported boredom experienced in those learning contexts (b = -.371, $p <$ .001). In step two, the interactions between basic need satisfaction and English (b = -0.037, p = 0.0896), and Maths (b = -0.107, p = 0.563), did not significantly predict boredom. When this step was repeated with Maths as the reference category, the English x needs interaction term was not a significant predictor (b = 0.07, p = 0.2303). Collectively these findings suggest that there is no difference in the strength of the association between basic need satisfaction and boredom on account of lesson type.

When added to the equation in step three (with England as the reference category) the Turkey x basic needs interaction did not significantly predicted student boredom in lessons (β = - .024, p = 0.5939). Twenty two percent of variance experienced in lessons was accounted for by the predictors in this final model.

Discussion

School education is universally valued as an important part of the development of numeracy, literacy and physical competencies, as well as personal and social well-being among young people. However, despite the importance of being effectively educated, many young people disengage with school and/or find experiences in certain lessons to detract from rather than support their well-being. BPNT (Ryan & Deci, 2002) has been utilized as a framework within which to examine the social-psychological dynamics that may determine the quality of engagement and well-being students derived from lessons (e.g., Vallerand et al., 1997; Jang et al., 2009). In the present study, this universal theory was tested to determine whether there was invariance in the role of satisfaction of the basic psychological needs of autonomy, competence and relatedness as predictors of indicators of well-being and engagement, as a function of lesson type (Maths, English, PE), or country of study (England, Turkey). Moreover, it was examined whether perceived autonomy support in those lessons predicted basic need satisfaction during those lessons. Overall, the study provided broad support for BPNT's universality hypothesis with regard to the role of the basic psychological needs. However, there remained some inconsistencies in findings across lesson types and country.

Autonomy Support in Lessons Predicting Basic Need Satisfaction in Lessons

The importance of considering motivation-related factors at the sub-contextual level (i.e., between lesson type) has previously been highlighted (Guay et al., 2010) but this area is under explored. Particularly, only a few studies (e.g., Jang et al., 2012; Jang et al., 2009) have investigated whether the association between overall autonomy support and psychological need satisfaction was consistent across different school subjects. Thus, this study provides initial support for the SDT-based proposition that students' experiences of autonomy-

supportive teaching in specific subjects are positively associated with psychological need satisfaction, and that these associations are found across different subjects.

While autonomy support and basic psychological need satisfaction were positively correlated in all three subjects, the findings also revealed this relationship to differ in strength, depending on the subject of focus in the lesson. Specifically, it is noteworthy that there was a stronger relationship between perceived autonomy support and basic psychological need satisfaction in Maths lessons than there was in PE lessons. However, although there were no significant differences in the strength of the relationship between autonomy support and need satisfaction in English when compared to PE and Maths, results comparing English to PE were almost significant ($p = .051$), implying these subjects to be more different than they are the same. Why there would be differences between some subjects but not others is curious. It is noteworthy that the psychological needs mean score was higher in PE than in the other two learning contexts, whereas autonomy support was perceived as lowest in PE. It is possible that PE is a setting that more easily lends itself to students' experiencing psychological need satisfaction than Maths via sources other than autonomy support. For example, in PE classes, there is naturally more opportunity for team work which may organically contribute towards relatedness even if the teacher is not autonomy supportive. Compared to Maths, demonstration of competence could be considered to be more overt given the physical nature of PE. Perhaps without the frequent grading and marking often applied in Maths, students may be more inclined to feel competent and 'OK' at the subject regardless of whether the teacher is autonomy supportive. Therefore, it is plausible that students' experience of basic psychological need satisfaction is less sensitive to the degree of autonomy support provided by the teacher than in Maths due to these other contextual cues.

Another possibility is that the peer climate (Vazou et al., 2005) is more salient in PE than Maths and so this could be a more prominent predictor of basic psychological need satisfaction. Whereas Maths is more likely to be structured predominantly around individual work, PE traditionally relies more upon group activities and interactions with peers. As such, the students may be more aware of the peer created motivational climate in PE than Maths. As such, in PE, the students' degree of psychological need satisfaction may derive more strongly from this source. On the contrary, these study findings suggest that in Maths, students' basic psychological need satisfaction could be more reliant on the autonomy support provided by the teacher. This explanation is speculative and could be further explored via simultaneous measurement of the teacher- and peer- created climate which would enable analysis of the independent contribution of each type of climate to psychological need satisfaction in each type of lesson.

Basic Need Satisfaction in Lessons Predicting Student Experiences in Lessons

As expected, basic psychological need satisfaction experienced in classes significantly predicted the students' reported enjoyment, concentration and boredom. In the case of students' experience of enjoyment, there were no significant differences in the strength of the relationship between basic psychological need satisfaction and enjoyment when Maths was compared to either English or PE. However the relationship between basic psychological need satisfaction and enjoyment was stronger in English than in PE. This brings into question the universality hypothesis that psychological need satisfaction is equally important for engagement-related outcomes regardless of context. One possible explanation is that some students' experience of sport and physical activity outside of school, or in sport during school led by another teacher or coach, means that they would still derive enjoyment from engaging in PE, even if it is a low psychological need supportive environment. However overtime,

there may be a detrimental impact on young people's enjoyment of PE and being active, if the PE environment continues to be low in psychological need support. Longitudinal research is needed to explore whether this would be the case.

Conversely, it was found that if students experience lower levels of basic psychological need satisfaction in PE this is less costly to their concentration in this lesson, than when basic psychological need satisfaction is low in English (but not Maths) lessons. In English lessons (compared to PE), lower levels of psychological need satisfaction resulted in lower levels of concentration, and correspondingly, higher levels of need satisfaction resulted in higher reported concentration in English than in PE lessons. When comparing English with Maths, it was also found that when levels of basic psychological need satisfaction are low in English lessons, students concentrate less than when basic psychological need satisfaction in Maths lessons is low. Conversely, when psychological need satisfaction was high in English lessons, students experience higher levels of concentration than when psychological need satisfaction was high in Maths lessons. Collectively, these results suggest that students' concentration in the current study may have been especially sensitive to the degree of psychological need satisfaction in English classes. These findings are interesting and raise the question as to whether there could be inherent differences between the subjects of Maths and English that might explain these findings. In future research it could be useful to conduct interviews with students to explore their experiences in lessons and to try to identify factors in the subject matter or in how it is taught that could lead to these differences.

Interestingly, this study found there to be no difference in the strength of the association between basic psychological need satisfaction and boredom on account of lesson type. Thus, regardless of the lesson type, the same degree of psychological need support is needed to off-set boredom. In sum, the universality hypothesis is not well supported in this

study, due to the variability in findings concerning the role of basic psychological needs in predicting enjoyment and concentration. Consistency in findings across lessons in relation to boredom however, lends some support to the universality hypothesis. Further investigation is required to better understand why the psychological need support proposed by SDT needs would play a consistent role across lessons in relation to some outcomes (i.e., boredom) but not others.

Between Country Differences

With regards to cultural differences, these findings offered support for the overall premise of SDT in that there were no significant difference between students in England or Turkey in the strength of the association between autonomy support and basic psychological need satisfaction experienced in lessons. In contrast, the findings regarding cross-country differences in the relationship between basic psychological need satisfaction and enjoyment showed that, in the case of students in Turkey, there was a stronger positive relationship between need satisfaction experienced in lessons and enjoyment within those lessons. Thus, in Turkey, students' experience of enjoyment in lessons appeared to be more sensitive to the degree of psychological need satisfaction experienced in those lessons. One possible explanation for this finding could be the role of experiences in related contexts outside of PE, such as recreational sport, which may heighten sensitivity to the experience of need satisfaction in PE lessons. It is possible that if the environment in sport is more need thwarting or low in need supportive features, then coming into PE lessons in which needs are satisfied, could enhance enjoyment further. It was also found that at low levels of basic need satisfaction, students in Turkey were lower in concentration than those in UK. Again, in support of the universality hypothesis, at high levels of basic need satisfaction students in both countries experienced similar levels of concentration in lessons. Likewise, there were no

differences between the two countries in the relationship between need satisfaction and boredom.

In summary, this study examined the hypothesised relationships put forward by BPNT across students' typical experiences in Maths, English and PE lessons. The hypothesised relationships were also compared between students studying in Western and Eastern European countries, namely, England and Turkey. Consistent with SDT, it was found that students' perceptions of their teachers' autonomy support in a particular subject would predict their psychological need satisfaction, which in turn would predict students' heightened quality of engagement (i.e., enjoyment, concentration, boredom) experienced within that subject. However, overall, findings only partially supported the universality hypothesis put forward by BPNT (Ryan & Deci, 2002). However, although statistical equivalence was not consistently supported, it was universally the case that the basic psychological needs played a role in determining the quality of experience students in England and Turkey had in school.

Implications for Practice

From an applied perspective, it is perhaps now necessary to better understand how teachers can most effectively support basic psychological needs in different contexts, via those types of behaviors classically described as autonomy supportive (and captured by the measure used). General teaching strategies that have been found to support students' basic psychological needs include taking the students' perspective, allowing time for each student to lean, nurturing students' inner motivational resources, providing explanatory rationales for requests, avoiding the use of controlling language and rewards, and recognizing and accepting students' expressions of disappointment, frustration and other negative affect (Reeves, 2006, 2009a, 2009b). Moreover, teachers are able to receive training to create

autonomy-supportive environments via educational workshops that have been developed and evaluated by researchers across a range of academic subjects (e.g., Aelterman, Vansteenkiste, Van Keer, De Meyer, Van den Berghe, Haerens, 2013; De Naeghel, Van Keer, Vansteenkiste, Haerens, & Aelterman, 2016; Lonsdale et al., 2017; Naeghel, Van Keer, Vansteenkiste, Haerens & Aelterman, 2016).

Future Research Directions

A number of future directions can be inferred from the contribution this work makes to the literature. For example, the present study highlights that psychological need satisfaction may be facilitated more easily in some subjects than others. Guay and colleagues (2010) have speculated that interventions targeting students' motivation in schools could be more effective if they were subject specific. This study suggests that future interventions may be enhanced if they provide specific examples of how to use need supportive strategies (including but not limited to autonomy support) that are specific to different subjects. Future intervention research of this kind could explore whether subject specific interventions are more effective than general teacher interventions as a means to standardise the contribution of autonomy support to need satisfaction and in turn, engagement related outcomes.

Previous research has highlighted that there is intra-individual variation in lesson interest within a particular subject over a series of weeks. While this study asked students to think about their experiences over the past few weeks, it was recognised that their responses would not capture the day-to-day fluctuations in perceived autonomy support, need satisfaction and indices of engagement, as well as the inter-relationships between these variables over time. Cross-context diary style research (e.g., Quested et al., 2013) would be a useful method to explore determinants of within- as well as between-subject fluctuations in the targeted variables, as well as the stability of the associations identified in this study.

This study could be extended to simultaneously assess other motivationally relevant features of the social environment that may determine whether students' psychological needs are supported (e.g., empowering and disempowering climates; Appleton et al., 2016). Observational coding of the motivational dynamics within each subject (e.g., Smith et al., 2015) would also help to delineate whether the universality hypothesis can or cannot be supported across different subjects in an educational context.

Limitations

As with most studies, the present research is not without some limitations. Firstly, the data are cross-sectional which does not permit the testing of reciprocal links which may appear over time. Although the reciprocal relationships among variables were assessed within three different contexts, namely, Maths, English and PE lessons, representing numeracy, literacy and physical competencies, each school lesson has its own learning characteristics and creating different types of opportunity for learning. Thus, including a broader range of learning contexts such as computing, music, and art may further understanding of how teachers' provision of autonomy support relates to basic need satisfaction and students' quality of engagement and well-being. The use of observational methods to objectively rate the degree of autonomy support provided by teachers would also strengthen this field of research and address the limitation of common method variance. The cross-country comparison in this study focused on Turkey and England. These settings were chosen so that data could be collected in the eastern and western part of Europe respectively. However, it is notable that the ethnicity of the sample from the school in England was dominantly Pakistani. While this is not uncommon in many parts of the UK, it is notable that findings may not generalize to samples representing other ethnic groups also prominent in Western Europe.

The investigation was also limited to high school students, and thus future research may wish to replicate this study with younger (e.g., elementary/infant) and older (e.g., future/higher education) students. Future research may also wish to adopt a design to determine whether the hypothesized relationships between the targeted variables are consistent (or differ) as the student moves from the early to the latter school years and progresses through different stages of development. Although the universality assumption within SDT would suggest the relationships should be consistent regardless of age, the strength of the associations may vary as the student progresses through the academic system. For example, teacher autonomy-support may be less impactful on students' basic psychological needs at high school compared to elementary school as other environments and social influences (e.g., peer-created) may become more important in the student's live.

In sum, the results of this study revealed some inconsistencies between strength of the hypothesized relationships on account of country and lesson type, suggesting partial support for the universality hypothesis put forward by BPNT. Considering the overall support for the effect of autonomy support on basic psychological need satisfaction in all three lessons and both cultures however, educating pre- and in-service teachers in how to create an autonomy supportive atmosphere in class is important for the overall welfare and educational development of pupils in school.

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Table 1. *Descriptive statistics for study variables in each context by each country*

	Turkey (N = 475)														
	PE					Maths					English				
	Min	Max	Mean	Sd	α	Min	Max	Mean	Sd	α	Min	Max	Mean	Sd	α
Autonomy Support	1.00	7.00	5.06	1.53	0.88	1.00	7.00	5.08	1.83	0.92	1.00	7.00	5.18	1.81	0.94
Autonomy	1.00	7.00	5.38	1.57	0.83	1.00	7.00	4.85	1.83	0.84	1.00	7.00	4.85	1.82	0.86
Competence	1.00	7.00	5.21	1.66	0.88	1.00	7.00	5.00	1.75	0.89	1.00	7.00	4.56	1.97	0.92
Relatedness	1.00	7.00	5.22	1.55	0.84	1.00	7.00	5.01	1.90	0.92	1.00	7.00	4.92	1.91	0.90
Needs mean	1.00	7.00	5.27	1.37	0.92	1.00	7.00	4.95	1.61	0.92	1.00	7.00	4.78	1.72	0.94
Enjoyment	1.00	5.00	3.72	1.08	0.78	1.00	5.00	3.41	1.21	0.80	1.00	5.00	3.37	1.25	0.84
Concentration	1.00	5.00	3.89	1.01	0.88	1.00	5.00	3.72	1.04	0.90	1.00	5.00	3.45	1.22	0.93
Boredom	1.00	5.00	2.24	1.08	0.67	1.00	5.00	2.74	1.22	0.75	1.00	5.00	2.75	1.18	0.71
	England (N = 318)														
	PE					Maths					English				
	Min	Max	Mean	Sd	α	Min	Max	Mean	Sd	α	Min	Max	Mean	Sd	α
Autonomy Support	1.00	7.00	5.06	1.53	0.82	1.00	7.00	4.80	1.55	0.88	1.00	7.00	5.19	1.42	0.90
Autonomy	1.00	7.00	4.13	1.68	0.81	1.00	7.00	3.87	1.56	0.82	1.00	7.00	4.27	1.55	0.87
Competence	1.00	7.00	5.16	1.42	0.81	1.00	7.00	5.00	1.43	0.83	1.00	7.00	5.19	1.35	0.85
Relatedness	1.00	7.00	4.99	1.40	0.82	1.00	7.00	4.99	1.50	0.88	1.00	7.00	5.22	1.39	0.86
Needs mean	1.00	7.00	4.76	1.28	0.91	1.22	7.00	4.62	1.03	0.90	1.00	7.00	4.90	1.24	0.91
Enjoyment	1.00	5.00	2.48	1.34	0.90	1.00	5.00	2.84	1.13	0.85	1.00	5.00	2.59	1.14	0.87
Concentration	1.00	5.00	3.93	0.99	0.90	1.00	5.00	3.92	0.93	0.89	1.00	5.00	4.08	0.85	0.88
Boredom	1.00	5.00	3.49	1.34	0.83	1.00	5.00	3.09	1.13	0.72	1.67	5.00	3.30	1.13	0.77

Footnotes

[1] The ethnicity distribution of the population in Birmingham is white British 53.1%, Pakistani 13.5%, Indian 6.0%, white other 4.8%, Caribbean and mixed 4.4% each, Bangladeshi 3.0%, African 2.8%, Chinese 1.2% and other ethnicity 6.7%. The ethnicity distribution of the population in Denizli is predominantly Turkish.