Young adolescent psychological need profiles: Associations with classroom achievement and well-being

Stephen R. Earl, Ian M. Taylor, Carla Meijen, Louis Passfield

ABSTRACT

Drawing on self-determination theory, this study adopted a person-centred methodology to identify distinct pupil profiles based on their psychological need satisfaction. A sample of 586 pupils (387 male, 199 female; mean age = 12.6, range 11-15 years old) from three secondary schools (two co-educational and one all boys) completed questionnaires regarding their psychological need satisfaction, and well and ill-being, with teachers rating pupil achievement. Hierarchical cluster analysis revealed five distinct profiles. Four profiles indicated synergy existed between the three needs, showing similar in-group levels of satisfaction across the needs but in varying amounts. Univariate (ANCOVA) and multivariate (MANCOVA) analysis of covariance, controlling for school and subject differences, revealed the most satisfied group displayed the highest classroom performance ($F_{4, 540} = 7.03$, $p < .001$, $\eta_p^2 = .05$), well-being ($F_{8, 1136} = 45.63$, $p < .001$, Wilk's $\Lambda = 0.57$, $\eta_p^2 = .24$) and lowest ill-being ($F_{8, 1134} = 23.39$, $p < .001$; Wilk's $\Lambda = 0.74$, $\eta_p^2 = .14$), whereas the most dissatisfied group displayed the most averse outcomes. The findings give support to the claim that the three psychological needs operate interdependently and indicate that researchers should consider them in combination rather than in isolation. The research also offers practical insights into why different pupil groups may thrive or struggle in classrooms which could help inform targeted initiatives towards pupils with deficits in psychological need satisfaction.

INTRODUCTION

Young adolescent pupils' functioning and performance at school typically derives from a combination of simultaneous, rather than isolated, personal experiences (e.g. Fall & Roberts, 2012; Wang & Holcombe, 2010). These experiences are often not directly observable, and thus it can often be a challenging task for teachers to identify specific reasons why certain groups of pupils may be thriving or struggling in the classroom. For example, some pupils may feel competent at their classwork but unsupported or pressured by others in the classroom; whereas other pupils may develop close bonds with others but feel incapable of completing classwork. The academic and emotional outcomes associated with these contrasting psychological experiences may be distinctly different and warrant specific teaching support strategies. Adopting a holistic view of pupils' collective classroom experiences may offer educators a deeper understanding of why certain pupils may thrive more than others and help inform targeted ways to nurture positive experiences for different pupil groups in classrooms. Using self-determination theory (SDT; Ryan & Deci, 2017) as a theoretical foundation for the present research , a profiling analytical approach is sought to investigate commonalities and differences in pupils' simultaneous psychological classroom experiences, and how these may impact their academic achievement and psychological health.

Self-Determination Theory in Education

SDT is a motivational theory of human behaviour and has received extensive consideration for its application within schools (e.g. Guay, Ratelle, Roy, & Litalien, 2010). Specifically SDT conceptualises how individuals perceive themselves within a social context through the satisfaction of the basic psychological needs of autonomy, competence, and relatedness, which are posited to be fundamental for optimal psychological growth and

flourishing (Deci & Ryan, 2011; 2017). Autonomy is characterised as the experience of volition and psychological freedom so that behaviour is perceived to emanate from oneself (deCharms, 1968). Competence reflects the feeling of being effective in achieving one's desired pursuits and goals (White, 1959). Relatedness refers to the need to form close, interpersonal relationships and feel connected with significant others (Baumeister & Leary, 1995). Positive associations have been well-established between the satisfaction of pupils' psychological needs and indicators of academic, emotional, and social development in cross sectional (e.g. Marshik, Ashton, & Algina, 2017; Saeki & Quirk, 2015; Taylor & Lonsdale, 2010), semester long (e.g. Tian, Chen, & Huebner, 2014; Véronneau, Koestner, & Abela, 2005) and multiple year studies (e.g. Ratelle & Duchesne, 2014). These academic and socio-cognitive benefits have also been demonstrated across different taught school subjects (Erturan-İlker, Quested, Appleton, & Duda, 2018). On the contrary, a frustration of these psychological needs has been associated with pupil feelings of ill-being, classroom disengagement and lower academic attainment (e.g. Chen et al, 2015; Earl, Taylor, Meijen, & Passfield, 2017; Jang, Kim, & Reeve, 2016). Consequently, young adolescents' psychological need satisfaction seems a valuable resource for educators to consider and foster in their teaching practice (Niemiec & Ryan, 2009).

Despite the acclaim for psychological need satisfaction being well-founded within young adolescent education, the emergence of this evidence has predominately been derived from variable-centred research. That is, these approaches assume that the three psychological needs function distinctly rather than interactively and simultaneously with one another (Bergman & Magnusson, 1997). For example, when assessed separately, the satisfaction of the each need was found to have differential relations with outcomes such as academic attainment, engagement, well-being, and social adjustment (e.g. Duchesne, Ratelle, & Feng, 2017; Jang, Reeve, Ryan, & Kim, 2009). Furthermore, averaging the three needs together

into composite variable has been positively correlated with better school grades, engagement, and quality motivation (e.g. Badri, Amani-Saribaglou, Ahrari, Jahadi, & Mahmoudi, 2014; Ntoumanis, 2005; Saeki & Quirk, 2015). Although each psychological need may have distinct correlates, such variable-centred approaches fail to account for the practical interplay between the three needs when pupils actually experience them in the classroom (Ryan & Deci, 2017). It is unlikely that pupils will experience satisfaction of one need in complete isolation from another. Examining satisfaction of the three needs collectively may unearth new knowledge about how the three needs function in unison and how teachers can better support pupils' satisfaction of all three needs in an applied classroom.

Much debate has arisen regarding the connectivity between the three psychological needs. Implicit motivation theorists portray the three needs as distinct from one another as the experience and benefit of each need will be dependent on a person valuing the need in a specific context (e.g., Hofer & Busch, 2011; Hofer, Busch & Kiessling, 2008). Conversely, cultural relativist perspectives espouse a view of autonomy and relatedness as conflicting, rather than being experienced in harmony (e.g., Iyengar & DeVoe, 2003; Markus & Kitayama. 1991)[1]. SDT theorists, however, infer the three needs may operate interdependently as the satisfaction of one psychological need will potentially facilitate the satisfaction of the other two (Ryan & Deci, 2017). Indeed, strong and positive correlations have been consistently demonstrated between the three pairs of psychological needs (e.g., Tian et al., 2014), and the benefits of psychological need satisfaction have been evidenced

[1] It should be noted that these cultural relativist standpoints define autonomy as reflecting individualism and independence from others as opposed to the experience of personal agency and volition posited by SDT (Ryan & Powelson, 1991). As such, cultural relativist and SDT perspectives may be tapping into conceptually different notions when referring to autonomy. In accord with SDT propositions, the experience of autonomy and relatedness are posited to be mutually complementary and ill effects will occur when they are turned against each other, in instances such as conditional regard (see relationships motivation theory; Ryan & Deci, 2017).

irrespective of an individual's culture or desired value for a psychological need (Chen et al., 2015; Erturan-İlker et al., 2018). Previous findings have also illustrated that the equal and balanced satisfaction of all three needs may have greater positive connotations for university students' well-being compared to having greater amounts of satisfaction in specific needs (Sheldon & Niemiec, 2006). Even though these studies boost SDT's proposition that the three needs may operate in unison, they did not explicitly assess the interplay between the three needs. Thus, it is still unclear how the satisfaction of each need may interact with the satisfaction of the other two.

There are two distinct benefits to adopting a person-centred approach to examine pupils as individuals, rather than in relation to each psychological need as an isolated variable. Firstly, such an analysis would be well-suited to advance SDT's theoretical framework as it would allow the proposed synergy, or lack of, between the three needs to be empirically scrutinised (Ryan & Deci, 2017). These complex interactions would be hard to trace using a variable-centred approach. Exploring the dynamics between the psychological needs may highlight the extent it is possible for pupils to thrive in the classroom through the satisfaction of one need alone or if the needs operate in a reciprocal manner. It would seem unlikely that pupils will experience a sense of volition towards classwork (i.e. autonomy satisfaction) if they, at the same time, feel they are unable to complete the classwork (i.e. lack of competence satisfaction). Likewise, pupils may struggle to develop close connections with others in class (i.e. relatedness satisfaction) if they feel self-endorsed behaviour is repressed (i.e. lack of autonomy satisfaction). This knowledge would facilitate the second strength of a person-centred approach as it may offer valuable applied knowledge that could benefit educators in their classroom teaching. Specifically, this approach will allow sub-groups of pupils to be identified that show diverse patterns in psychological need satisfaction, as well as enabling how these groups function academically and psychologically in classrooms to be

explored (Bergman, & Andersson, 2010; Scholte, van Lieshout, & van Aken, 2001). From an ideal perspective, pupils' academic and emotional development should not come at the expense of one another. Understanding how the satisfaction, or potential frustration, of each psychological need may influence the experience of the other two needs may equip teachers with new knowledge in how to maximise pupils' psychological need satisfaction. This may have particular relevance within school classrooms given the influence that the learning context can have on the satisfaction of all three needs simultaneously (e.g. Cheon, Reeve, Moon, 2012; Curran & Standage, 2017).

The use of person-centred research has grown within education as a valuable method, with pupils being previously profiled based on learning styles (Liu, Wang, Kee, Koh, Lim, & Chua, 2014), perceptions of fitting in and standing out at school (Gray, 2017), and distinctions of motivational regulations (e.g. SDT or achievement goals; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). These findings show that self-determined pupil groups demonstrate more favourable academic and well-being outcomes. Clustering pupils based on their perceptions of the learning context has illustrated that pupil groups high in autonomy and relatedness support reported more enjoyment in class (Jaakkola, Wang, Soini, & Liukkonen, 2015), whereas pupils high in perceptions of autonomy and competence support displayed more effective time management and (Vansteenkiste et al., 2012). Furthermore, two studies have profiled pupils based on inter-individual differences in the source of their psychological need satisfaction (Raufelder, Regner, Drury, & Eid, 2015), or relatedness satisfaction specifically (León & Liew, 2017). These studies indicated that when pupil groups relied on psychological need support from their peers and teachers concurrently, rather than solely peers or teachers, they reported higher behavioural and emotional engagement. Yet despite the central role that the three psychological needs are hypothesised to play in pupils' scholastic and psychological

functioning, no study to date has examined profiles of adolescent pupils based on their subjective experience of all three needs (Niemiec & Ryan, 2009).

THE PRESENT RESEARCH

As a consequence of the aforementioned evidence, the present work employs a cluster-analytical approach to identify distinct pupil psychological need satisfaction profiles. Developing a greater understanding of the degree of synergy that may exist between the psychological needs may provide further understanding of how the three needs function in unison (Ryan & Deci, 2017). This may be particularly important during young adolescence when the experience of psychological need satisfaction has been posited to be integral for the development of pupils' emotional and psychosocial capacities (Hansen & Jessop, 2017). Complete synergy will be demonstrated if sub-groups of pupils simply report high, medium, and low satisfaction of all the three needs. Specifically, we hypothesise that the highest satisfaction for each psychological need will occur in one specific group of pupils whereas the lowest satisfaction of each need will be reported within a different group. Subsequently we expect a third group will emerge that displays moderate levels of satisfaction across the three psychological needs. In contrast, less synergy will be observed if the profiles are more complex with pupils reporting different levels of satisfaction of each psychological need. No evidence exists to inform hypotheses relating to what these groups might be characterised by but emergence of such groups may lead to new theoretical and practical discussion.

The second aim of the study was to investigate if the students in the identified profiles differed in teacher ratings of pupil achievement, as well as self-reported outcomes of well-being (vitality and positive affect) and ill-being (academic stress and negative affect). In line with SDT propositions (Ryan & Niemiec, 2009), a pupil group displaying the highest satisfaction levels across the three needs is expected to demonstrate the most adaptive levels of teacher perceived achievement and self-reported well-being, as well as the lowest levels of

ill-being. Conversely, a pupil group reporting the least satisfaction across the three needs will be expected to demonstrate the highest ill-being, and lowest levels in the favourable outcomes. A group showing moderate levels of need satisfaction is hypothesised to show moderate levels in the three outcome variables. It is reasoned that any groups that are relatively high in the satisfaction of one psychological need may be able to compensate for deficits in other psychological needs and may display moderate, but not optimal, levels of classroom achievement and well-being.

METHOD

Participants

The study sample consisted of 586 pupils (387 male, 199 female; mean age = 12.61 years, SD = 0.88 years, age range = 11 – 15 years old) from three secondary schools (two co-educational, and one boys school) in the United Kingdom (UK). Each school was selective in their admission of pupils. Information on individual pupils' ethnicity and special educational needs (SEN) was not available. The three schools ranged between 16% - 21% of their total pupils that were considered from ethnic minority backgrounds which is below the UK national average (Drake, 2015). Fifteen teachers completed the ratings for the pupils' performance in their class.

Procedure

Full ethical approval was obtained from the principal researcher's university ethics committee. Once head teachers had permitted the research in their school, teachers were recruited purposively based on them being the regular teacher of a Year 7, 8 or 9 class (N=24 classrooms). Data collection was conducted in the final term of the academic year to ensure teachers had taught the pupils in that class for at least one academic year. Teachers provided written consent to participate and opt-out forms were provided to all pupils' parents to indicate if they did not wish for their child to participate. Three parents chose for their child

not to participate in the study. Pupils confirmed their willingness to participate in writing. Questionnaires were administered at the start of a school lesson by the principal researcher. Pupils with SEN status, or where English was an additional language, could have a teaching assistant on-hand to help with comprehension and clarification of any wording. All pupils were instructed that they did not have to complete the questionnaire if they did not wish to and that all items referred to the specific lesson in which the questionnaire was administered. The pupil questionnaire took approximately ten minutes to complete. The main classroom teacher remained a passive observer in the classroom and pupils were asked to direct any questions regarding the study to the principal researcher to ensure confidentiality. The taught subject varied between classes with 38% of pupils completing the questionnaire in physical education, 33% in creative Learning, 21% in citizenship lessons, and 8% in geography. In traditional UK secondary school systems, teachers train in a specialist subject and typically only teach pupils in that subject. The teacher-rated pupil achievement questionnaire was provided to teachers at the end of the school lesson and was completed in regards to the pupils within the specific class. These were returned to the principal researcher within a week of being administered.

Measures

Autonomy Satisfaction

Autonomy satisfaction was measured using six items (e.g. “I have a say regarding what skills I want to learn”) derived from previous research with young adolescents (Standage, Duda, & Ntoumanis, 2005). The stem used was, “When in this class . . .”, and responses were rated on a 7 point scale, ranging from 1 (not at all true) to 7 (very true). These six items have previously demonstrated acceptable internal consistency ($\alpha = .80$; Standage et al., 2005) which was replicated in the present study ($\alpha = .71$).

Competence Satisfaction

Competence satisfaction was measured using five items (e.g. “I think I am pretty good at activities in this class”) from the Perceived Competence subscale of the Intrinsic Motivation Inventory (McCauley, Duncan, & Tammen, 1989). Items were adapted to the broader classroom context, rather than a specific task. For example, “I am satisfied with my performance at this task” was modified to “I am satisfied with my performance in this class”. These five items have previously been used to assess young adolescent pupils’ competence satisfaction when adapted to a school subject and classroom context (e.g. Standage, Duda, & Ntoumanis, 2003; Taylor, Ntoumanis, Standage, & Spray, 2010). In both instances, internal consistency for the 5 items was shown to demonstrate good reliability (α = .85 - .87). Responses were rated on a 7 point scale, ranging from 1 (not at all true) to 7 (very true) and scores demonstrated good internal consistency in the present work (α = .86).

Relatedness Satisfaction

Relatedness satisfaction was measured using the five item Acceptance subscale of the Need for Relatedness Scale (Richer & Vallerand, 1998). The stem “When in this class I feel . . .” was followed by the items (e.g. “listened to”, “understood”, “supported,”). Responses were rated on a 7 point scale, ranging from 1 (not at all true) to 7 (very true). In accord with previous work (α = .85-.94; Richer & Vallerand, 1998), these items demonstrated good internal consistency in the present study (α = .90).

Teacher-Rated Achievement

Guided by previous measures of pupil achievement (Pianta & Stuhlman, 2004; Rabiner, Murray, Schmid, & Malone, 2004), two items were designed for the purpose of this study: “Compared to the average student, this student performs well in this class” (item 1) and “This student achieves a high academic level in this class” (item 2). Teachers rated each pupil in their specific class on both items. We used teacher perceptions of pupils’ achievement in class due to the unavailability of actual school grades. Although less objective

than school grades, teacher perceived pupil achievement has been shown to be fairly accurate in predicting actual pupil performance (Sudkamp, Kaiser, & Moller, 2012; Zhu & Urhahne, 2015). Both items were designed to reflect teachers' general perceptions of pupils' overall attainment in class, and were checked by teachers not participating in the study for clarity and comprehension. Each item was rated on a 6 point scale ranging from 1 (never) to 6 (always) and scored by averaging both items to create a composite achievement variable. Scores demonstrated acceptable internal consistency ($\alpha = .83$) and factor loadings for an achievement factor (item 1 = .86; item 2 = .83).

Subjective Vitality

Pupils' feelings of aliveness and energy available to the self in the class were measured using a five item version of the Subjective Vitality Scale (Ryan & Frederick, 1997), previously used by Bartholomew, Ntoumanis, Ryan, Bosch, and Thøgersen-Ntoumani (2011). Items were rated on a 7 point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Example items include "I have energy and spirit" and "I nearly always feel alert and awake". Scores from the items demonstrated good factorial structure and internal consistency in both previous ($\alpha = .92$; Ryan & Frederick, 1997) and the present work ($\alpha = .79$).

Academic Stress

To measure pupils' feelings of stress in class we used the shortened four item Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) and adapted the stem to "When in this class...". Example items included "Do you feel that things are going your way" and "How often do you feel difficulties are piling up so high that you cannot overcome them". Items were rated on a 5 point scale, ranging from 1 (never) to 5 (very often). This four item scale previously demonstrated acceptable internal consistency ($\alpha = .86$) and scale validity (Cohen et al., 1983). In present study, initial internal consistency for these items was found to be below conventional levels of acceptability ($\alpha = .58$). Evaluation of removing each item

and a supplementary confirmatory factor analysis revealed one problematic academic stress item ("In this class, do you feel that you are unable to control the important things"), which was removed and improved internal consistency (α = .64).

Positive and Negative Affect

Pupils' general positive and negative feelings in class were measured using the 10 item short form of the Positive and Negative Affect Schedule (PANAS; Thompson, 2007). Both positive affect (e.g. 'alert' and 'inspired') and negative affect (e.g. 'upset' and 'ashamed') had five items. The questionnaire stem used was "Thinking about yourself and how you normally feel in this class, to what extent do you generally feel", and pupils rated how often they experienced each feeling on a 5 point scale, ranging from 1 (never) to 5 (often). The short version of the PANAS has demonstrated good factorial validity and internal consistency in previous work (positive affect: α =.74; negative affect: α =.80; Thompson, 2007), as well as the present work (positive affect: α =.76; negative affect: α =.71).

Statistical Approach

Preliminary analysis involved calculation of descriptive statistics, Cronbach's alpha coefficients, and bivariate correlations (see Table 1). Prior to group clustering, univariate (z-score values +/- 3.29, $p < 0.001$; Tabachnick & Fidell, 2001) and multivariate (high Mahalanobis values) outliers were removed. As there was not an a priori hypothesised number of clusters, a combination of both hierarchical and non-hierarchal cluster analysis was conducted (Gore, 2000), using SPSS statistical software (version 22.0). Based upon pupils' scores for autonomy, competence, and relatedness satisfaction, Ward's method was used to conduct hierarchical cluster analysis. The optimal number of clusters was determined when the squared Euclidian distances were not substantially distinguishable (Hair, Anderson, Tatham, & Black, 1998). Subsequently, iterative non-hierarchical k-means clustering

assigned pupils to a relevant cluster, using the determined number of clusters from the first step as a non-random clustering solution (Gore, 2000). Given the over-representation of males in our sample, as well as variation in age, individual school, co-educational or male only schooling, and classroom subject, we conducted chi-square difference tests to examine the distribution of these variables across the identified pupil clusters. Statistically significant chi-square differences resulted in the respective variable being controlled for in all subsequent analyses. Univariate analysis of covariance (ANCOVA) and post-hoc comparisons were conducted to explore group differences in teacher-rated pupil achievement. Multivariate analyses of covariance (MANCOVA) tests were used to explore the differences across the pupil groups in the composite well-being and ill-being outcomes. Vitality and positive affect were entered as outcome variables in a 'well-being' MANOVA, whereas academic stress and negative affect were entered in an 'ill-being' MANOVA. Significant multivariate effects were followed up with discriminant function analysis, rather than univariate ANOVA, to allow for the relationships between the dependent variables to be considered (Field, 2013).

RESULTS

Descriptive Statistics

Means, standard deviations, and bivariate correlations for all measurement scales are presented in Table 1.

INSERT TABLE 1 HERE

Identification of Pupil Psychological Need Satisfaction Profiles

Prior to conducting cluster analysis, 6 univariate and 5 multivariate outliers were removed. Inspection of the Euclidian distances (shown in Table 2) determined five

distinguishable pupil groups, explaining 53.7% of variance in autonomy satisfaction, 62.0% of variance in competence satisfaction, and 70.7% of variance in relatedness satisfaction. A three-cluster solution was found to reduce the explained variance for each need (autonomy = 37.8%; competence = 53.4%; relatedness = 59.1%), as did a four-cluster solution with the exception of competence (autonomy = 49.1%; competence = 63.0%; relatedness = 60.0%). A six-solution appeared less parsimonious than the five cluster solution and did not show substantial improvement in explained variance across the three needs (autonomy = 53.9%; competence = 67.9%; relatedness = 73.5%).

Table 3 depicts group comparisons across the five cluster solution based on mean scores for each psychological need (see Figure 1 for graphical representation). This five cluster solution consisted of a satisfied group (n = 86, 15%), comprising of pupils reporting the highest levels of satisfaction in each of the psychological needs. A competent group (n = 131, 23%) characterised by pupils high in competence satisfaction, but with relatively low autonomy satisfaction and moderate relatedness satisfaction. A moderate group (n = 149, 26%) comprised of pupils with moderate levels of satisfaction in each psychological need above or approximate to the mid-point of the scale. A low group (n = 96, 16%) emerged reporting relatively low levels of satisfaction across all three needs which were below or approximate to the mid-point of the scale. Finally, a dissatisfied group (n = 115, 20%) was characterised by pupils that reported the lowest levels of satisfaction for each need.

Across the five pupil groups, chi-squared difference tests revealed there were no significant differences in the gender distribution, χ^2 (4, n = 575) = 7.83, p = .10, or age distribution, χ^2 (16, n = 575) = 22.83, p = .12. In contrast, significant effects across the five clusters were found by individual school, χ^2 (8, n = 577) = 17.54, p = .03; by type of school (i.e. co-educational versus male only), χ^2 (4, n = 577) = 11.57, p = .02; and by class subject, χ^2 (12, n = 577) = 26.31, p = .01. Only 10% of students from the exclusively male school

were categorised in the dissatisfied group compared to 22% from the co-educational institutes. Thirty-five percent of Geography pupils were grouped in the dissatisfied group compared to 24% of Creative pupils, 18% of P.E. pupils, and 10% of Citizenship pupils. Sixteen percent of pupils in Creative lessons were categorized as competent pupils (16%) compared to the other groups (23-29%), whereas only 14% of Geography pupils were represented in the moderate group compared to the others (25-29%). On the basis of these findings, all subsequent analyses controlled for different schools, school type and class subject.

INSERT TABLE 2, FIGURE 1 & TABLE 3 HERE

Group Differences in Achievement, Well-being, and Ill-being

Mean scores, univariate F-values with no covariates, effect sizes and specific group differences for all outcome variables are presented in Table 3. Results for all ANCOVA and MANCOVA are described below, with multivariate group centroids obtained from the discriminant analysis for the outcomes of well-being and ill-being shown in Table 4.

Teacher-Rated Achievement.

ANCOVA identified there was a significant difference in teacher-rated pupil achievement across the five psychological profiles, $F\ (4, 540) = 7.03$, $p < .001$; partial $\eta^2 = .05$. Tukey's post hoc tests, shown in Table 3, revealed the dissatisfied group were lower in teacher-rated achievement compared to the satisfied, competent and moderate group but not the low group (see Figure 2). No other statistical differences were found between the groups.

Well –Being.

MANCOVA revealed a significant difference across the five psychological need profiles, $F\ (8, 1136) = 45.63$, $p < .001$; Wilk's $\Lambda = 0.57$, partial $\eta^2 = .24$. Follow up discriminant analysis revealed two discriminant functions, however the second function did

not significantly differentiate the pupil clusters, $\Lambda = 0.99$, $\chi^2 = 5.78$, $p = .12$. The first function explained 98.6% of the variance, canonical $R^2 = .64$, with vitality ($r = .92$) and positive affect ($r = .84$) strongly loading. Group centroids showed that the first function discriminated between all five groups. Specifically, the satisfied group tended to report higher levels of well-being, followed by the moderate group, then the competent and low groups respectively, and the dissatisfied group reporting the lowest levels of well-being.

Ill –Being.

MANCOVA revealed a significant difference across the five psychological need profiles, $F\ (8, 1134) = 23.39$, $p < .001$; Wilk's $\Lambda = 0.74$, partial $\eta^2 = .14$. Discriminant analysis revealed two discriminant functions, however the second function did not significantly differentiate the pupil clusters, $\Lambda = 0.99$, $\chi^2 = 0.34$, $p = .95$. The first explained 99.8% of the variance, canonical $R^2 = .52$, with academic stress ($r = .96$) loading more predominately than negative affect ($r = .59$). This first function discriminated between all five groups. Specifically, the satisfied group tended to report the lower levels of ill-being, followed by the moderate, competent, and low groups respectively. The dissatisfied group reported the highest levels of ill-being.

INSERT FIGURE 2 & TABLE 4 HERE

DISCUSSION

The purpose of this study was to use a person-centred approach to determine different pupil profiles based upon their satisfaction of the psychological needs for autonomy, competence, and relatedness. The cluster-analytic results revealed five distinct psychological need profiles. Extending previous evidence on psychological need dynamics (Sheldon & Niemiec, 2006), a considerable degree of synergy was observed in satisfaction of the three psychological needs across the groups with only one group displaying a lack of synergy.

Conceptually, the findings emphasise the importance of focusing on the individual pupils and the interplay between the three needs. Deficits in pupils' experience of one need may have an influential role on the experience of the others (Ryan & Deci, 2017). The present findings also reinforce the notion that optimal academic achievement and well-being occur when the three needs are satisfied in unison and balance. From a practical perspective, the current study offers insights into why different pupil groups may thrive or struggle in classrooms. In conjunction with more broad need supportive interventions (e.g. De Naeghel, Van Keer, Vansteenkiste, Haerens & Aelterman, 2016), there may be scope to develop targeted initiatives towards individual pupil groups that have specific deficits in psychological need satisfaction.

The Composition of Pupil Profiles

As hypothesised, a degree of synergy between the three psychological needs was evidenced within four of the five clusters (i.e. the satisfied, moderate, low, and dissatisfied groups). These four groups reported consistent in-group levels of satisfaction across the three needs, albeit it with varying amounts. Such in-group consistency is rarely demonstrated in young adolescent profiles when using more disparate types of grouping criteria, such as quality motivation as opposed to psychological needs (e.g. Jaakkola et al., 2015; Ratelle et al., 2007; Wang & Biddle, 2001). The present clusters accentuate the interactive nature of the three psychological needs as proposed within SDT (Ryan & Deci, 2017). That is, the highest levels of satisfaction for each psychological need may occur with the complementary fulfilment of the other two needs (e.g. the satisfied group).

In contrast, a degree of incongruence was evident in the competent group which may suggest pupils are able to experience distinct high levels of competence satisfaction in classrooms even with relatively low satisfaction of autonomy and relatedness. One potential explanation for this incongruence may be that these pupils have a high implicit desire for

achievement, not assessed in the current study, which may be affiliated with greater experiences of competence satisfaction and mastery in classrooms (Hofer, Busch & Kiessling, 2008). It may be that pupils with achievement-orientated preferences have a particular desire to enhance and demonstrate their performance in accord with social standards (McClelland, Koestner, & Weinberger, 1989). Indeed, school classrooms typically represent achievement-focused contexts in which the need for competence may be particularly salient for pupils in this "competent" group. It may be worthwhile to investigate how pupils' implicit tendencies may impact their psychological need satisfaction profile, in addition to their conscious experience within the classroom context. For instance, it would be interesting to see if pupils with an implicit orientation for affiliation report profiles higher in autonomy or relatedness satisfaction (Hofer & Busch, 2011).

Nevertheless, the current findings highlight that optimal competence satisfaction may be unlikely experienced in the absence of autonomy and relatedness satisfaction. Contrary to portrayals of autonomy and relatedness as conflicting (Iyengar & DeVoe, 2003), high interrelation between the two needs was observed across the psychological need profiles. Although pupils may be able to experience some degree of competence satisfaction independently in the classroom, it seems unlikely pupils will experience relatedness satisfaction if they are prevented from volitional behaviour. Reciprocally, it may be difficult for pupils to autonomously engage in class if they feel unsupported or secluded by teachers and other pupils (Ryan & Deci, 2017). This interplay between the three needs would not have been uncovered with a variable-centred approach and implies an importance for teachers and researchers to consider the three psychological needs in combination rather than in isolation (Sheldon & Niemiec, 2006).

Group Differences in Classroom Achievement, Well-Being and Ill-Being

Extending previous variable-centred evidence regarding pupils' need satisfaction and frustration (Erturan- Ilker et al., 2018; Jang, Kim, & Reeve, 2016), the present person-oriented findings accentuate SDT's proposition that pupil groups reporting a satisfied psychological need profile will function better psychologically and academically in classrooms compared to their dissatisfied counterparts (Niemiec & Ryan, 2009; Sheldon & Niemiec, 2006). These associations were found when controlling for differences in school and classroom subject. In regards to academic achievement, pupils reporting a dissatisfied psychological need profile may be at particular risk of poor academic performance compared to pupils with higher levels of satisfaction across the three needs or a specific psychological need. Previous evidence has shown the satisfaction of each need has been associated with corresponding behaviours that may facilitate higher academic achievement, such as increased helping-seeking (Marchand & Skinner, 2007) and higher engagement (Raufelder, Regner, Drury, & Eid, 2015).

Nonetheless, these group differences in pupil achievement were small in effect size. To avoid reliance on pupil self-report measures, our assessment of achievement was teacher-rated and, therefore, would not be vulnerable to inflated effect sizes associated with common method variance (Lindell & Whitney, 2001). Furthermore, teachers' perceptions of student achievement are still subjective and may translate into how they interact with pupils, which in turn may influence how pupils' report psychological need satisfaction in the classroom (Diseth, Danielsen & Samdal, 2012; also see work on teacher expectations and self-fulfilling prophecies, McKown, Gregory, & Weinstein, 2010). Future research may extend the present findings by considering the addition of objective school recorded attainment grades to provide a more comprehensive examination of the relationship between pupils' psychological need profiles and classroom achievement. School achievement is also dynamic and can be

influenced by a number of factors, in addition to psychological need satisfaction, which could be incorporated into future studies examining variation in pupil achievement, such as academic support from parents or teachers (e.g., Levpušček, Zupančič, & Sočan, 2012), prior numeracy or literacy skills (Duncan et al., 2007) or behavioural engagement (e.g., school attendance; Li & Lerner, 2011).

In regard to well-being, the satisfied psychological need profile was associated with the highest levels of well-being, and lowest levels of ill-being. In line with previous evidence (Sheldon & Niemiec, 2006), even when not highly satisfied, a more balanced psychological need profile (i.e. the moderate group) was associated with higher well-being and lower ill-being compared an imbalanced need profile (i.e. competent group), despite the competent group reporting higher competence satisfaction. Both autonomy and relatedness have been associated with young adolescent pupils' quality of life, well-being and social adjustment (Duchesne et al., 2017; Gillison, Standage, & Skevington, 2008; Van Ryzin, Gravely, & Roseth, 2009). Competence satisfaction has also been shown fundamental for current and future well-being (Véronneau at al., 2005), and it is unlikely that groups of pupils will display optimal well-being in class if they lack belief in their ability to be successful (Legault, Green-Demers, & Pelletier, 2006). The present findings highlight the importance for teachers to be aware of pupils experiencing a lack (i.e. dissatisfied group) or sub-optimal (i.e. low group) satisfaction across all three needs, as these pupils represent the highest risk of ill-being which, in turn, may result in classroom disengagement or poor pupil behaviour (Earl et al., 2017; Jang et al., 2016).

Implications of Findings

The present study is among the first to use a person-centred methodology to cluster pupils based on satisfaction of all three psychological needs. Theoretically the findings add to SDT's claim of interdependence between the three needs (Ryan & Deci, 2017). Although

each psychological need represents an independent construct, the present work alludes to the synergy that may exist between the three pairs of psychological needs and how they function in combination. This potential synergy between the needs may stem from social contextual influences, particularly in regards to autonomy supportive versus controlling school contexts, which can facilitate or disrupt fulfilment of all three needs (Cheon & Reeve, 2015; Reeve, 2009; 2015). We also acknowledge that this synergy may be, in part, accountable to the three needs being less distinguishable through the use of self-report measurements. Future research may assess if the similar pattern of pupil profiles are replicated when using alternative measures, such as pupils' interview responses, to assess pupils' psychological need satisfaction.

From an applied perspective, the findings can be used to help teachers become more aware of specific groups of pupils that experience psychological need deficits in class. It seems important that classroom contexts do not nurture one need at the expense of another. Autonomy represented the least satisfied need within each respective profile. Teachers may benefit from interventions to help them apply autonomy supportive teaching strategies more effectively (e.g., Cheon & Reeve, 2013; Reeve, Jang, Carrell, Jeon, & Barch, 2004), especially given that the compulsory nature of many classroom activities may be easily interpreted as coercive by many pupils (Reeve, 2009). Autonomy supportive teaching strategies welcome pupil opinion, offer patience rather than pressure towards learning, allow meaningful choice and emphasise the relevance of activities (Jang, Reeve, & Halusic, 2016; Reeve, 2006; 2015). In accord with SDT, the support of pupil autonomy is also an essential component to simultaneously fostering pupils' competence satisfaction and relatedness (Hospel & Galand, 2016; Jang, Reeve, & Deci, 2010; Ryan & Powelson, 1991).

Akin with previous work (Erturan-İlker et al., 2018), the present study indicates that diverse school subjects may offer different opportunities for pupils to experience

psychological need satisfaction. For instance, a higher proportion of pupils in classroom based subjects (i.e. Geography and Creative) were categorised in the dissatisfied group compared to pupils from less classroom based subjects (i.e. P.E. or Citizenship). It may be that subjects not exclusively taught in traditional classroom contexts provide pupils with more freedom and opportunities to work with others. These subjects may also involve less academic assessment compared to more exclusive classroom subjects that typically involve more stringent classroom rules and evaluations. It may be particularly important that targeted need supportive teaching strategies are implemented in classroom based subjects.

Directions for Future Research and Practical Application

The current findings provide valuable insights that advance the application of SDT with young adolescent pupils. It is notable that many pupils were categorised differently in their psychological need profile. The satisfaction of psychological needs is a subjective and intrapsychic experience (i.e. functional significance; see Deci & Ryan, 2000) and thus the development of targeted teacher interventions, despite being essential, may only partly address deficits in pupils' psychological needs. Even if teachers provide need supportive behaviours, pupils may not always perceive this to be the case (e.g., Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2014). Additional interventions that target the pupils themselves, and their relative awareness of their psychological needs, may also be valuable in nurturing pupils' satisfied need profiles (see Ryan, Curren, & Deci, 2013).

Secondly, the present findings are representative of pupils' reported psychological need satisfaction and teachers' ratings of achievement within a specific classroom context and therefore may differ in an alternative classroom or taught subject. Examining how pupils' psychological need profiles may be consistent across multiple school classrooms may provide educators with greater insights into how pupils may function personally and academically at school more generally. We also recognise that school classrooms are not the only contexts

that may influence pupils' psychological needs (Milyavskaya & Koestner, 2011). Future person-centred SDT studies could investigate if pupils clustered within specific sub-groups predominately come from similar family or socio-economic backgrounds, as well as investigate how inter-individual differences, such as their motivational dispositions (e.g. Hagger & Chatzisarantis, 2011), influence a pupil's psychological need profile. Such investigations may help detect specific pupil types that represent a higher risk for maladaptive psychological need profiles at school. Furthermore, psychological need frustration has been shown to be distinct from a lack of need satisfaction and associated with more maladaptive emotional and academic outcomes (e.g. Jang et al., 2016; Haerens, Aelterman, Vansteenkiste, Soenens & Van Petegem, 2015). The inclusion of psychological need frustration in future profiling studies may help identify specific pupils groups experiencing higher classroom ill-being and poorer academic performance (Vansteenkiste & Ryan, 2013).

CONCLUSIONS

The present study adopted a person-centred approach, identifying five distinct pupil profiles based upon the satisfaction of their psychological needs of autonomy, competence, and relatedness. The findings provide empirical support for SDT's proposal of synergy between the three psychological needs with the optimal satisfaction of each need existing when the two other needs are simultaneously satisfied (Ryan & Deci, 2017). Pupils reported optimal achievement and emotional well-being in classrooms when all three needs were satisfied congruently as opposed to simply feeling competent towards school work. This knowledge may have both scientific and practical implications, highlighting the dynamic interplay between the three psychological needs and the importance of examining pupils as individuals rather than in relation to isolated variables. The current pupil-oriented methodology may also help teachers be aware of specific psychological need deficits that

pupils may experience and the importance of targeted need supportive teaching in classrooms.

REFERENCES

Aelterman, N., Vansteenkiste, M., Van den Berghe, L., De Meyer, J., & Haerens, L. (2014). Fostering a need-supportive teaching style: Intervention effects on physical education teachers' beliefs and teaching behaviors. Journal of Sport & Exercise Psychology, 36, 595-609. doi: 10.1123/jsep.2013-0229

Badri, R., Amani-Saribaglou, J., Ahrari, G., Jahadi, N., & Mahmoudi, H. (2014). School culture, basic psychological needs, intrinsic motivation and academic achievement: Testing a casual model. Mathematics Education Trends and Research, 4, 1-13. doi: 10.5899/2014/metr-00050

Bartholomew, K., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. Personality & Social Psychology Bulletin, 37, 1459–1473. doi:10.1177/0146167211413125

Baumeister, R.F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. Psychological Bulletin, 117, 497–529. doi:10.1037/0033-2909.117.3.497

Bergman, L. R., & Andersson, H. (2010). The person and the variable in developmental psychology. Zeitschrift fur Psychologie /Journal of Psychology. 218, 155-165. doi:10.1027/0044-3409/a000025.

Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. Development and psychopathology, 9, 291-319. doi:10.1017/S095457949700206X

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., ... & Ryan, R. M. (2015). Basic psychological need satisfaction, need frustration, and need

strength across four cultures. Motivation and Emotion, 39, 216-236. doi: 10.1007/s11031-014-9450-1

Cheon, S. H., & Reeve, J. (2013). Do the benefits from autonomy-supportive PE teacher training programs endure? A one-year follow-up investigation. Psychology of Sport and Exercise, 14, 508-518. doi: 10.1016/j.psychsport.2013.02.002

Cheon, S. H., & Reeve, J. (2015). A classroom-based intervention to help teachers decrease students' amotivation. Contemporary Educational Psychology, 40, 99-111. doi:10.1016/j.cedpsych.2014.06.004

Cheon, S. H., Reeve, J., & Moon, I. S. (2012). Experimentally based, longitudinally designed, teacher-focused intervention to help physical education teachers be more autonomy supportive toward their students. Journal of Sport and Exercise Psychology, 34(3), 365-396. doi: 10.1123/jsep.34.3.365

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24, 385-396. Retrieved from http://hsb.sagepub.com/

Curran, T., & Standage, M. (2017). Psychological needs and the quality of student engagement in physical education: Teachers as key facilitators. Journal of Teaching in Physical Education, 36, 262-276. doi: 10.1123/jtpe.2017-0065

De Naeghel, J., Van Keer, H., Vansteenkiste, M., Haerens, L., & Aelterman, N. (2016). Promoting elementary school students' autonomous reading motivation: Effects of a teacher professional development workshop. The Journal of Educational Research, 109, 232-252. doi: 10.1080/00220671.2014.942032

deCharms, R. (1968). Personal causation: The internal affective determinants of behavior. New York, NY: Academic.

Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry: An International Journal for the Advancement of Psychological Theory, 11, 319–338. doi:10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2011). Levels of analysis, regnant causes of behavior and well-being: The role of psychological needs. Psychological Inquiry, 22, 17-22. doi:10.1080/1047840X.2011.545978

Diseth, Å., Danielsen, A. G., & Samdal, O. (2012). A path analysis of basic need support, self-efficacy, achievement goals, life satisfaction and academic achievement level among secondary school students. Educational Psychology, 32, 335-354. doi: 10.1080/01443410.2012.657159

Drake, R. (2015). Schools, pupils and their characteristics. London: Department of Education. Retrieved June 6, 2018 from https://www.gov.uk/government/ statistics/schools-pupils-and-their-characteristics-january-2015.

Duchesne, S., Ratelle, C. F., & Feng, B. (2017). Psychological need satisfaction and achievement goals: Exploring indirect effects of academic and social adaptation following the transition to secondary school. The Journal of Early Adolescence, 37, 1280-1308. doi: 10.1177/0272431616659561

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., ... & Sexton, H. (2007). School Readiness and Later Achievement. Developmental Psychology, 43, 1428-1446. doi:10.1037/0012-1649.43.6.1428

Earl, S. R., Taylor, I. M., Meijen, C., & Passfield, L. (2017). Autonomy and competence frustration in young adolescent classrooms: different associations with active and passive

disengagement. Learning and Instruction, 49, 32-40. doi: 10.1016/j.learninstruc.2016.12.001

Erturan-İlker, G., Quested, E., Appleton, P., & Duda, J. L. (2018). A cross-cultural study testing the universality of basic psychological needs theory across different academic subjects. Psychology in the Schools, 55, 350-365.doi: 10.1002/pits.22113

Fall, A. M., & Roberts, G. (2012). High school dropouts: Interactions between social context, self-perceptions, school engagement, and student dropout. Journal of adolescence, 35, 787-798. doi: 10.1016/j.adolescence.2011.11.004

Field, A. (2013). Discovering statistics using IBM SPSS statistics. Sage.

Friedman, I. A. (1995). Student behavior patterns contributing to teacher burnout. The Journal of Educational Research, 88, 281-289. doi:10.1080/00220671.1995.9941312

Gillison, F., Standage, M., & Skevington, S. (2008). Changes in quality of life and psychological need satisfaction following the transition to secondary school. British Journal of Educational Psychology, 78, 149-162. doi: 10.1348/000709907X209863

Gore, P. A., Jr. (2000). Cluster analysis. In H. E. A. Tinsley & S. D. Brown (Eds.), Handbook of applied multivariate statistics and mathematical modelling, 297–321. San Diego, CA: Academic Press.

Gray, D. L. (2017). Is psychological membership in the classroom a function of standing out while fitting in? Implications for achievement motivation and emotions. Journal of school psychology, 61, 103-121. doi: 10.1016/j.jsp.2017.02.001

Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement: Mediating and additive effects. Learning and Individual Differences, 20, 644-653. doi:10.1016/j.lindif.2010.08.001

Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education

students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. Psychology of Sport and Exercise, 16, 26-36. doi: 10.1016/j.psychsport.2014.08.013

Hagger, M. S., & Chatzisarantis, N. L. (2011). Causality orientations moderate the undermining effect of rewards on intrinsic motivation. Journal of Experimental Social Psychology, 47(2), 485-489. doi: 10.1016/j.jesp.2010.10.010

Hair, J. R., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis. Upper Saddle River, NJ: Prentice-Hall.

Hansen, D. M., & Jessop, N. (2017). A Context for Self-Determination and Agency: Adolescent Developmental Theories. In Wehmeyer, M.L., Shogren, K. A., Little, T.D. & Lopez, S.J. Development of self-determination through the life-course (pp. 27-46). Springer, Dordrecht.

Hofer, J., & Busch, H. (2011). Satisfying one's needs for competence and relatedness: Consequent domain-specific well-being depends on strength of implicit motives. Personality and Social Psychology Bulletin, 37, 1147-1158. doi:10.1177/0146167211408329

Hofer, J., Busch, H., & Kiessling, F. (2008). Individual pathways to life satisfaction: The significance of traits and motives. Journal of Happiness Studies, 9, 503-520. doi:10.1007/s10902-007-9086-x

Hospel, V., & Galand, B. (2016). Are both classroom autonomy support and structure equally important for students' engagement? A multilevel analysis. Learning and Instruction, 41, 1-10. doi:10.1016/j.learninstruc.2015.09.001

Iyengar, S. S., & DeVoe, S. E. (2003). Rethinking the value of choice: Considering cultural mediators of intrinsic motivation. In Murphy-Berman, V., & Berman, J.J. (2003). Cross-

cultural Differences in Perspectives on the Self. Nebraska symposium on motivation, 49, 129-174.

Jaakkola, T., Wang, C. K., Soini, M., & Liukkonen, J. (2015). Students' perceptions of motivational climate and enjoyment in Finnish physical education: A latent profile analysis. Journal of Sports Science and Medicine, 14, 477-483. Retrieved from http://www.jssm.org.

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. Learning and Instruction. 43, 27-38. doi: 10.1016/j.learninstruc.2016.01.002

Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. Journal of Educational Psychology, 102, 588-600. doi.org/10.1037/a0019682

Jang, H., Reeve, J., & Halusic, M. (2016). A New Autonomy-Supportive Way of Teaching That Increases Conceptual Learning: Teaching in Students' Preferred Ways. The Journal of Experimental Education, 1-16. doi: 10.1080/00220973.2015.1083522

Jang, H., Reeve, J., Ryan, R. M., & Kim, A. (2009). Can self-determination theory explain what underlies the productive, satisfying learning experiences of collectivistically oriented Korean students?. Journal of Educational Psychology, 101, 644. doi:10.1037/a0014241

Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. Journal of Educational Psychology, 98, 567–582. doi:10.1037/0022-0663.98.3.567

León, J., & Liew, J. (2017). Profiles of adolescents' peer and teacher relatedness: Differences in well-being and academic achievement across latent groups. Learning and Individual Differences, 54, 41-50. doi: 10.1016/j.lindif.2017.01.009

Levpušček, M. P., Zupančič, M., & Sočan, G. (2012). Predicting achievement in mathematics in adolescent students: The role of individual and social factors. The Journal of Early Adolescence. doi: 10.1177/0272431612450949

Li, Y., & Lerner, R. M. (2011). Trajectories of school engagement during adolescence: implications for grades, depression, delinquency, and substance use. Developmental Psychology, 47, 233. doi: 10.1037/a0021307

Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. Journal of Applied Psychology, 86, 114-121. doi: 10.1037/0021-9010.86.1.114

Liu, W. C., Wang, C. K. J., Kee, Y. H., Koh, C., Lim, B. S. C., & Chua, L. (2014). College students' motivation and learning strategies profiles and academic achievement: a self-determination theory approach. Educational Psychology, 34, 338-353. doi:10.1080/01443410.2013.785067

Marchand, G., & Skinner, E. A. (2007). Motivational dynamics of children's academic help-seeking and concealment. Journal of Educational Psychology, 99, 65. doi:10.1037/0022-0663.99.1.65

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. Psychological review, 98, 224. .doi:10.1037/0033-295X.98.2.224

Marshik, T., Ashton, P. T., & Algina, J. (2017). Teachers' and students' needs for autonomy, competence, and relatedness as predictors of students' achievement. Social Psychology of Education, 20, 39-67. doi: 10.1007/s11218-016-9360-z

McCauley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric properties of the intrinsic motivation inventory in a competitive sport setting: A confirmatory factor analysis. Research Quarterly for Exercise and Sport, 60, 48–58. doi:10.1080/02701367.1989.10607413

McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? Psychological review, 96(4), 690-702. doi: 10.1037/0033-295X.96.4.690

McKown, C., Gregory, A., & Weinstein, R. S. (2010). Expectations, stereotypes, and self-fulfilling prophecies in classroom and school life. In Meece, J.L. & Eccles, J.S. Handbook of research on schools, schooling, and human development, pp. 256-274. Routledge.

Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. Personality and Individual Differences, 50, 387-391. doi:10.1016/j.paid.2010.10.029

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. Theory and Research in Education, 7, 133–144. doi:10.1177/1477878509104318

Ntoumanis, N. (2005). A prospective study of participation in optional school physical education using a self-determination theory framework. Journal of educational psychology, 97, 444. doi:10.1037/0022-0663.97.3.444

Pianta, R. C., & Stuhlman, M. W. (2004). Teacher-child relationships and children's success in the first years of school. School Psychology Review, 33, 444-458. Retrieved from http://naspjournals.org/loi/spsr

Rabiner, D. L., Murray, D. W., Schmid, L., & Malone, P. S. (2004). An exploration of the relationship between ethnicity, attention problems, and academic achievement. School Psychology Review, 33, 498-509. Retrieved from http://naspjournals.org/loi/spsr

Raufelder, D., Regner, N., Drury, K., & Eid, M. (2015). Does self-determination predict the school engagement of four different motivation types in adolescence? Educational Psychology, 1-22. doi:10.1080/01443410.2015.1008405

Ratelle, C. F., & Duchesne, S. (2014). Trajectories of psychological need satisfaction from early to late adolescence as a predictor of adjustment in school. Contemporary Educational Psychology, 39, 388-400. doi:10.1016/j.cedpsych.2014.09.003

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. Journal of Educational Psychology, 99, 734. doi: 10.1037/0022-0663.99.4.734

Reeve, J. (2006). Teachers as facilitators: What autonomy-supportive teachers do and why their students benefit. The Elementary School Journal, 106, 225-236. doi:10.1086/501484

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy-supportive. Educational Psychologist, 44, 159 - 175. doi:10.1080/00461520903028990

Reeve, J. (2015). Giving and summoning autonomy support in hierarchical relationships. Social and Personality Psychology Compass, 9, 406-418. doi: 10.1111/spc3.12189

Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. Motivation and Emotion, 28, 147-169. doi: 10.1023/B:MOEM.0000032312.95499.6f

Richer, S.F., & Vallerand, R.J. (1998). Construction et validation de l'échelle du sentiment d'appartenance social (Construction and validation of the perceived relatedness scale). Revue Européenne de Psychologie Appliquée, 48, 129–137.

Ryan, R. M., Curren, R. R., & Deci, E. L. (2013). What humans need: Flourishing in Aristotelian philosophy and self-determination theory. In A. S. Waterman (Ed.), The best within us: Positive psychology perspectives on eudaimonia (pp. 57–75). Washington, DC: American Psychological Association.

Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. New York: Guilford Publishing.

Ryan, R.M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. Journal of Personality, 65, 529-65 doi:10.1111/j.1467-6494.1997.tb00326.x

Ryan, R. M., & Niemiec, C. P. (2009). Self-determination theory in schools of education: Can an empirically supported framework also be critical and liberating? Theory and Research in Education, 7, 263-272. doi:10.1177/1477878509104331

Ryan, R. M., & Powelson, C. L. (1991). Autonomy and relatedness as fundamental to motivation and education. The journal of experimental education, 60, 49-66. doi: 10.1080/00220973.1991.10806579

Saeki, E., & Quirk, M. (2015). Getting students engaged might not be enough: the importance of psychological needs satisfaction on social-emotional and behavioral functioning among early adolescents. Social Psychology of Education, 18, 355–371. doi:10.1007/s11218-014-9283-5

Scholte, R. H., Van Lieshout, C. F., & Van Aken, M. A. (2001). Perceived relational support in adolescence: Dimensions, configurations, and adolescent adjustment. Journal of research on adolescence, 11, 71-94. doi: 10.1111/1532-7795.00004

Sheldon, K. M., & Niemiec, C. P. (2006). It's not just the amount that counts: balanced need satisfaction also affects well-being. Journal of personality and social psychology, 91, 331-341. doi.org/10.1037/0022-3514.91.2.331

Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. Journal of Educational Psychology, 95(1), 97-110. doi: 10.1037/0022-0663.95.1.97

Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. British Journal of Educational Psychology, 75, 411-433. doi:10.1348/000709904X22359

Sudkamp, A., Kaiser, J., & Moller, J. (2012). Accuracy of Teachers' Judgments of Students' Academic Achievement: A Meta-Analysis. Journal of Educational Psychology, 104, 743-762. doi: 10.1037/a0027627

Tabachnick, B.G. & Fidell, L.S. (2001). Using Multivariate Statistics (4th ed).
7 Needham Heights, MA: Allyn and Bacon.

Taylor, I.M., & Lonsdale, C. (2010). Cultural differences in the relationships among autonomy support, psychological need satisfaction, subjective vitality, and effort in British and Chinese physical education. Journal of Sport & Exercise Psychology, 32, 655-673. Retrieved from http://journals.humankinetics.com/jsep

Taylor, I. M., Ntoumanis, N., Standage, M., & Spray, C. M. (2010). Motivational predictors of physical education students' effort, exercise intentions, and leisure-time physical

activity: A multilevel linear growth analysis. Journal of Sport and Exercise Psychology, 32(1), 99-120. Retrieved from http://journals.humankinetics.com/jsep

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). Journal of cross-cultural psychology, 38, 227-242. doi: 10.1177/0022022106297301

Tian, L., Chen, H., & Huebner, E. S. (2014). The longitudinal relationships between basic psychological needs satisfaction at school and school-related subjective well-being in adolescents. Social Indicators Research, 119, 353-372. doi: 10.1007/s11205-013-0495-4

Van Ryzin, M. J., Gravely, A. A., & Roseth, C. J. (2009). Autonomy, belongingness, and engagement in school as contributors to adolescent psychological well-being. Journal of youth and adolescence, 38, 1-12. doi:10.1007/s10964-007-9257-4

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. Journal of Psychotherapy Integration, 23(3), 263-280. doi: 10.1037/a0032359

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. Journal of Educational Psychology, 101, 671. doi. 10.1037/a0015083

Vansteenkiste, M., Sierens, E., Goossens, L., Soenens, B., Dochy, F., Mouratidis, A., ... & Beyers, W. (2012). Identifying configurations of perceived teacher autonomy support and structure: Associations with self-regulated learning, motivation and problem behavior. Learning and Instruction, 22, 431-439. doi: 10.1016/j.learninstruc.2012.04.002

Véronneau, M. H., Koestner, R. F., & Abela, J. R. (2005). Intrinsic need satisfaction and well–being in children and adolescents: An application of the self–determination theory. Journal of Social and Clinical Psychology, 24, 280-292. doi:10.1521/jscp.24.2.280.62277

Wang, C. J., & Biddle, S. J. (2001). Young people's motivational profiles in physical activity: A cluster analysis. Journal of Sport and Exercise Psychology, 23, 1-22. Retrieved from http://journals.humankinetics.com/jsep

Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. American Educational Research Journal, 47, 633-662. doi: 10.3102/0002831209361209

White, R. W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66, 297–333. doi:10.1037/ h0040934

Zhu, M., & Urhahne, D. (2015). Teachers' judgements of students' foreign-language achievement. European Journal of Psychology of Education, 30, 21-39. doi:10.1007/s10212-014-0225-6

Table 1
Descriptive Statistics and Bivariate Correlations Among Study Variables

Variable	Range	Mean	SD	1	2	3	4	5	6	7	8
1. Autonomy	1-7	3.36	1.00	-							
2. Competence	1-7	4.69	1.30	.33**	-						
3. Relatedness	1-7	4.49	1.32	.50**	.50**	-					
4. Vitality	1-7	4.39	1.26	.51**	.52**	.54**	-				
5. Academic Stress +	1-5	2.64	0.81	-.31**	-.47**	-.45**	-.37**	-			
6. Positive Affect	1-5	3.41	0.78	.50**	.52**	.59**	.73**	-.43**	-		
7. Negative Affect	1-5	1.86	0.65	-.14**	-.35**	-.35**	-.25**	.45**	-.19**	-	
8. Achievement	1-6	4.30	0.81	.06	.26**	.16**	.18**	-.16**	.21**	-.17**	-

Note: *p < .05. **p < .01. + Factor analysis revealed one problematic item for this factor which was removed to increase internal consistency.

Table 2
Euclidian Distances From Hierarchical Cluster Analysis

Number of Clusters	Fusion coefficient
1	2560.89
2	1569.93
3	1225.26
4	1068.93
5	932.91
6	845.53
7	771.45

Table 3

Group Differences in Mean Scores for all Grouping Variables and Outcome Variables with SD's, F values and effects sizes.

Variable	1. Satisfied		2. Competent		3. Moderate		4. Low		5. Dissatisfied		F	η_p^2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Grouping Variables												
Autonomy	4.38 ^{2,3,4,5}	0.83	2.76 ^{1,3,4,5}	0.60	3.94 ^{1,2,4,5}	0.67	3.59 ^{1,2,3,5}	0.57	2.35 ^{1,2,3,4}	0.74	170.972**	.55
Competence	6.12 ^{2,3,4,5}	0.61	5.51 ^{1,3,4,5}	0.70	4.90 ^{1,2,4,5}	0.84	3.58 ^{1,2,3}	0.88	3.31 ^{1,2,3}	0.93	228.173**	.62
Relatedness	6.23 ^{2,3,4,5}	0.54	4.15 ^{1,3,5}	0.76	5.33 ^{1,2,4,5}	0.73	4.03 ^{1,3,5}	0.47	2.85 ^{1,2,3,4}	0.91	340.763**	.71
Outcome Variables												
Vitality	5.56 ^{2,3,4,5}	1.02	4.33 ^{1,3,5}	1.08	4.81 ^{1,2,4,5}	1.09	4.15 ^{1,3,5}	0.93	3.24 ^{1,2,3,4}	0.99	71.349**	.34
Positive Affect	4.06 ^{2,3,4,5}	0.57	3.43 ^{1,3,5}	0.62	3.72 ^{1,2,4,5}	0.54	3.26 ^{1,3,5}	0.63	2.60 ^{1,2,3,4}	0.70	85.241**	.38
Academic Stress	2.14 ^{2,4,5}	0.81	2.52 ^{1,4,5}	0.68	2.34 ^{4,5}	0.61	2.90 ^{1,2,3,5}	0.72	3.33 ^{1,2,3,4}	0.74	45.374**	.24
Negative Affect	1.58 ^{4,5}	0.57	1.79 ^{5}	0.59	1.71 ^{4,5}	0.54	1.97 ^{1,3,5}	0.65	2.24 ^{1,2,3,4}	0.72	16.527**	.11
Achievement	4.51 ^{5}	0.97	4.45 ^{5}	0.87	4.37 ^{5}	0.87	4.24	0.83	3.92 ^{1,2,3}	0.84	7.202**	.05

Note. Numerical superscripts indicate statistically significant differences ($p < .05$) between the respective groups for each given variable, based on Tukey's honestly significant difference test. $^{*}p < .05$. $^{**}p < .001$.

Table 4
Group Centroid Values for the Well-Being and Ill-Being Composites

Pupil Profiles	Function	
	1	2
Well-Being		
Satisfied	1.23	0.18
Competent	-0.01	-0.10
Moderate	0.53	-0.07
Low	-0.26	-0.02
Dissatisfied	-1.38	0.90
Ill-Being		
Satisfied	-0.75	-0.01
Competent	-0.18	-0.00
Moderate	-0.44	0.02
Low	0.37	-0.05
Dissatisfied	1.03	0.02