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Autonomy support in Australian higher education: A review of contextual and situational applications of self-determination theory

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Autonomy Support in Australian Higher Education:
A Review of Contextual and Situational Applications of Self-Determination Theory

Nicolas Connault

A report submitted in Partial Fulfilment of the Requirements for the Award of Bachelor of
Arts (Psychology) Honours, Faculty of Computing, Health and Science, Edith Cowan
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Submitted October 2010

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Acknowledgments

I would like to express my gratitude to my supervisor, Dr. Ken Robinson, whose guidance, support and expert advice were paramount in the development of this work. His exceptional ability to be constantly available for personalised, didactic advice despite his overwhelming schedule has truly astounded me and wished all my peers could received such a level of supervision.

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Abstract

Self-Determination Theory (SDT, Deci & Ryan, 2000) is a macro-theory of motivation that has received much support from empirical research in the last twenty years. One of its main tenets is that the satisfaction of three basic psychological needs—autonomy, competence and relatedness—is universally required for the attainment of optimal psychological well-being, health, growth and self-determined behaviour. Higher education in Australia, through its outcomes-based approach to academic success, is not typically designed to promote student autonomy. Self-Determination Theory posits that promoting students' autonomy should lead to better quality of learning, higher intrinsic motivation to study, lower attrition and enhanced subjective well-being. A number of journal articles testing these hypotheses within the context of higher education are reviewed, overall showing strong support despite common methodological issues. Teacher autonomy support emerges as an important behavioural determinant of students' basic need satisfaction and its associated academic benefits. Several studies, including a few experimental designs, outline specific teacher behaviours that tend to be perceived as autonomy-supportive by students, and lead to these associated benefits. The need to focus on students' perceptions rather than on teacher behaviour is highlighted. Subjective vitality, a salient and accessible measure of subjective well-being, is proposed as an important and measurable aspect of students' perceptions. Research in the field of sport shows support for SDT's postulate that subjective vitality is enhanced when autonomy, competence and relatedness are supported, and suggests that this relationship should also hold true in the higher education context.

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Submitted: 25 October 2010

Autonomy Support in Australian Higher Education:

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It may be argued that one of the purposes of higher education, and education in general, is to enable human beings to reach their full potential. Recently, Barnett (2009) explained that there may be great value in the process of learning, above and beyond that of acquiring skills and knowledge, and that this value is a potential transformation, a becoming of the learner into an active, life-long seeker of truth with an increasing array of beneficial dispositions and qualities. One can indeed wonder which of the following two categories of benefits have the most intrinsic value: an outcomes-based approach incorporating a knowledge base and a set of skills equipping the student for the work force, or a deep enjoyment of the learning experience, an inquisitive mind, a thirst for knowledge and a dedication to life-long learning as a result of exposure to the academic milieu. These are not mutually exclusive categories, but from a user perspective, the typical higher education curriculum often seems designed to support and measure desirable outcomes which may or may not be intrinsically valued by the student, at the expense of the deep enjoyment of the learning experience that comes from self-determination. The idea that the self-determination of academic goals and regulations has substantial benefits beyond those typically measured by higher education institutions is among the principal claims of Self-Determination Theory (Deci & Ryan, 2000).

Introduction to SDT

Self-Determination Theory (SDT) is a relatively recent macro-theory of motivation that has received a large amount of support through research during the last 20 years (Deci & Ryan, 2008). It explains that people's motivations vary not just in strength, but also in degree of autonomy based on a dimension ranging from autonomous to controlled. In SDT, autonomy is not the same as independence, but refers to volition, the belief that one's actions

come from one's own free will. The idea that autonomy is an essential determinant in the quality of motivation sets SDT apart from all other widely recognised theories of motivation. Adopting an autonomy-supportive (vs. controlling) style of teaching has many educational benefits for students (Reeve, 2002), including several of the dispositions and qualities described by Barnett (2009).

Higher education in Australia follows the traditional Anglo-Saxon approach prevalent in the United Kingdom and the United States. Despite rapid advances in technology (Diaz & Cartnal, 1999; Martens, Bastiaens, & Kirschner, 2007; Murphy, Levant, Hall, & Glueckauf, 2007; Rovai, Ponton, Wighting, & Baker, 2007) and in research on education, learning and academic motivation ((Deci, 2009; Guay & Râtelle, 2008; Niemiec & Ryan, 2009; Pelletier, Séguin-Lévesque, & Legault, 2002; Ryan & Niemiec, 2009; Ryan & Weinstein, 2009), most applications of SDT have been focussed on primary and secondary education, rather than on higher education. This paper provides a review of current research in academic motivation and in specific methods which teachers can implement to enhance their students' engagement, intrinsic motivation, academic performance and well-being.

Intrinsic motivation

Intrinsic motivation is the most autonomous, self-determined type of motivation. Children at play exemplify intrinsic motivation: they are engaging in an activity for the activity's enjoyment, out of pure interest and to satisfy their curiosity. They do not perceive any external pressure to play, and perceive themselves as the author or origin of their own behaviour. Adults find it much harder to be free from external pressures and controls, particularly as the normal demands of life such as the need to earn money impose themselves and become pervasive through most of their activities (Deci & Ryan, 2000). However, according to SDT, self-determination is not a dichotomy, but a continuum between amotivation, or the complete lack of motivation, and intrinsic motivation (see Figure 1).

Motivation styles vary between these two extremes in the degree to which the behaviours (or self-regulations) are internalised, intrinsic motivation being the most internalised type of motivation. Since there are but few behaviours in which we engage purely for their own sake and enjoyment (intrinsic motivation), most of our behaviours are generated from a type of extrinsic motivation, which we have more or less internalised (Ryan & Deci, 2000a; Ryan & Connell, 1989).

Basic Needs

In a recent synopsis of SDT, Deci and Ryan (2008) claim that all human beings have organismic growth tendencies to fulfil three basic psychological needs: autonomy, competence and relatedness, the satisfaction of which is required for psychological health and optimal development. Hence, self-determination is the natural result of the satisfaction of these three basic psychological needs (Ryan & Deci, 2000a). SDT defines autonomy as the perception of freedom from external control while engaging in behaviour, and self-endorsement in relation to that behaviour (Deci & Ryan, 2008). The term “external control” includes both perceived pressures from outside the self (external locus of control) and internal appetites such as drives, habits or addictions that originate from within but are not endorsed by the self (Ryan & Deci, 2006). This definition varies considerably from the common understanding of autonomy, which tends to be associated with independence, self-governance and other individualistic concepts. This semantic disparity has been the cause of misunderstandings in the literature (Ryan & Deci, 2006). Competence is defined as the feeling of having the necessary skills, attributes and resources (energy, time, money etc.) required to perform a specific task or pursue a long-term goal. In this sense, it is similar to self-efficacy (Ryan & Deci, 2006). Relatedness refers to feeling supported and appreciated by people with whom we are frequently associated (Deci & Ryan, 2008). Some evidence (Sheldon & Niemiec, 2006) suggests that these are both deficiency needs (being low in one of

these needs motivates behaviours that enhance its satisfaction) and growth needs (being highly satisfied in one need doesn't lessen motivation to satisfy it).

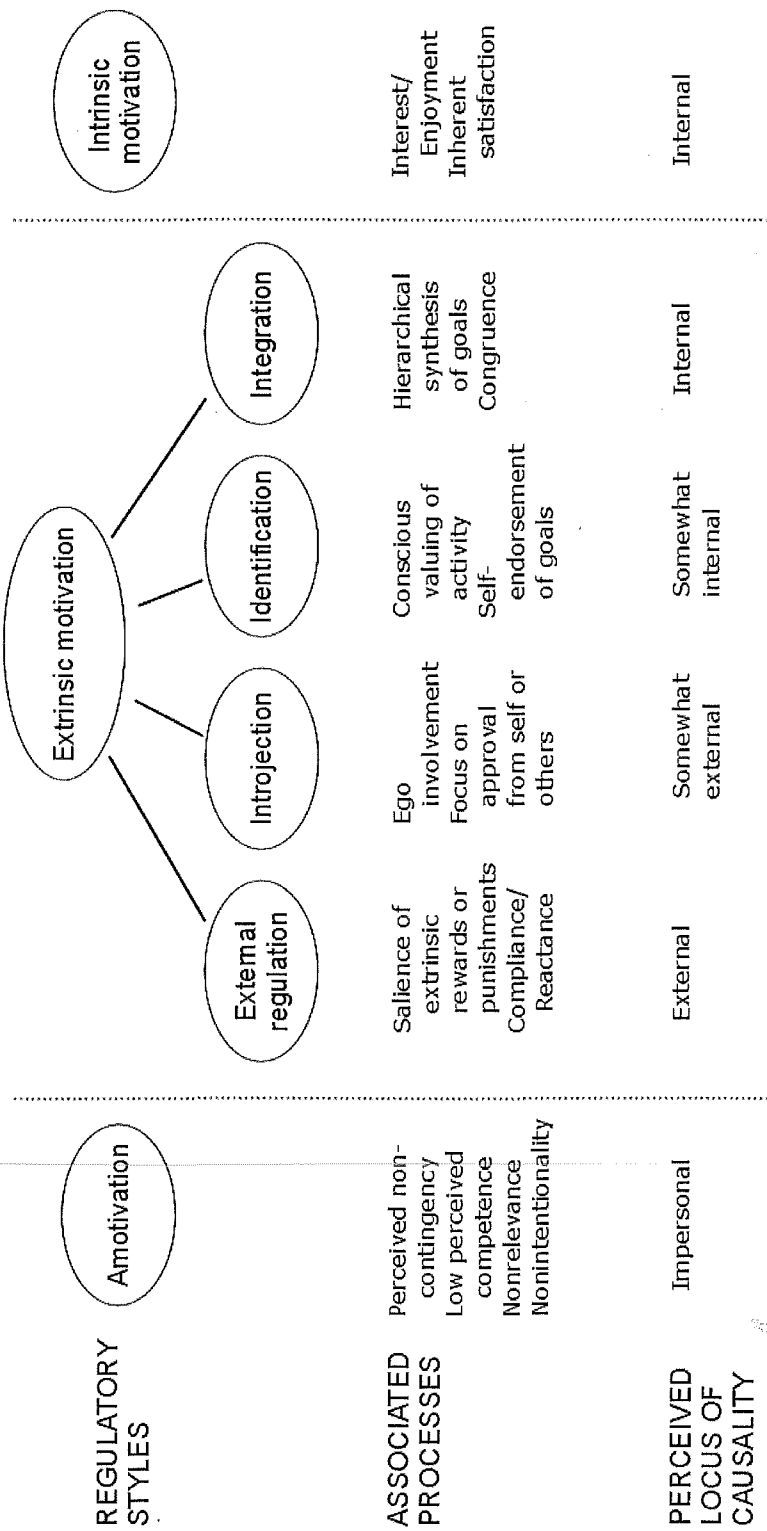


Figure 1. A taxonomy of human motivation. Adapted from “Intrinsic and extrinsic motivations: Classic definitions and new directions”, by R. M. Ryan and E. L. Deci, 2000, Contemporary Educational Psychology, 25(1), p. 61. Copyright 2000 by Academic Press.

Hierarchical Model of Intrinsic and Extrinsic Motivation

Within SDT, the three basic needs are essential for internalised motivation at three theoretical levels of generality (Vallerand, 1997). An explanatory diagram is shown as Figure 2. At the top is the global level, which includes a concept of general motivation dependent on the satisfaction of autonomy, competence and relatedness, divorced from specific contexts or situations. Next is the contextual level, which is composed of motivations that are constrained to specific domains of life, such as education, sport, or interpersonal relationships. These motivations also vary in style (intrinsic vs. extrinsic) depending on how well the basic needs for autonomy, competence and relatedness are satisfied within those domains generally. The third level, situational motivation has the most practical relevance to people on a daily basis. This level of motivation determines to a great degree whether, for example, the next hour is spent working on a research paper, or in watching television.

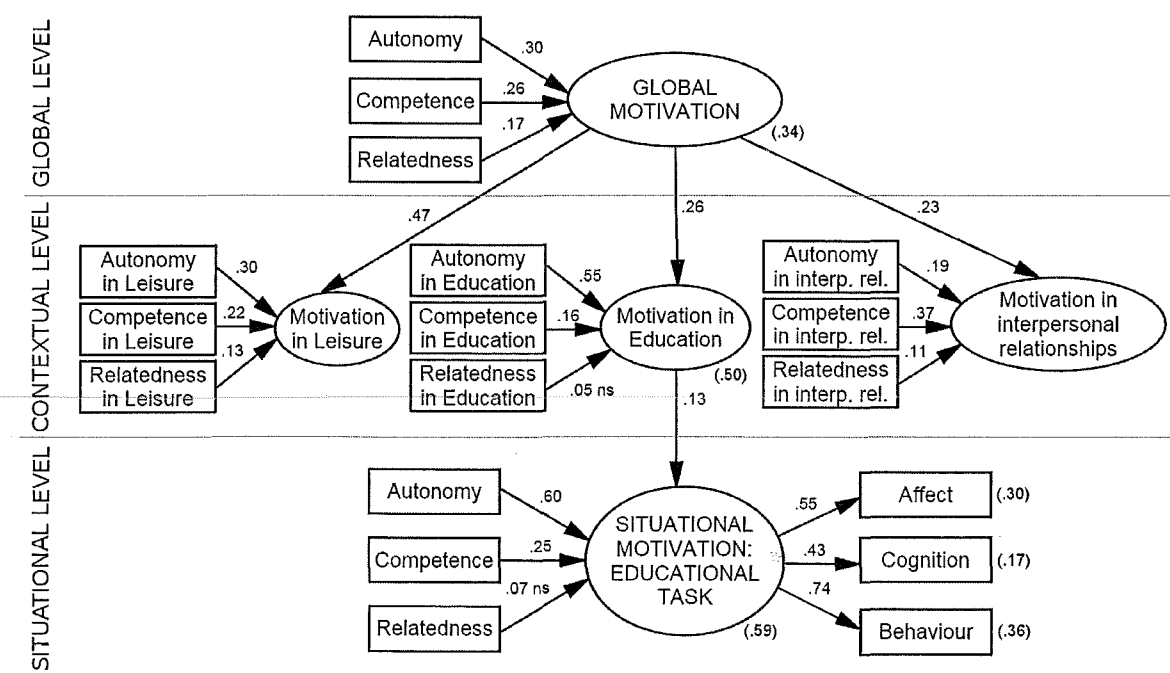


Figure 2. Confirmatory test of some postulates and corollaries of the Hierarchical model of intrinsic and extrinsic motivation. Numbers in parentheses reflect the explained variance, others are the standardized betas from the LISREL analyses. Adapted from “Toward a hierarchical model of intrinsic and extrinsic motivation”, by R. J. Vallerand, 1997, *Advances in Experimental Social Psychology*, 29(1), p. 336. Copyright 1997 by Academic Press.

The present review will begin by exploring a variety of recent journal articles that

study applications of SDT at the contextual level of higher education. It will then narrow down to the situational level within higher education. Autonomy support will be investigated as a prominent situational approach that teachers can use to enhance students' basic need satisfaction, academic motivation, academic performance and well-being. Finally, subjective vitality will be introduced as a valid and reliable measure of well-being.

Applications of SDT to Higher Education Context

The last few decades have seen the proliferation of research articles on the topic of SDT and higher education, as can be seen in Figure 3. These have been followed by a number of comprehensive literature reviews. Overall, these articles suggest that intrinsic motivation and the satisfaction of the three psychological needs as postulated by SDT (particularly through autonomy support) lead to improved quality of learning, increased well-being and vitality, higher academic performance, higher persistence, lower attrition, and higher teacher and course evaluations (Jang, 2008; Reeve & Jang, 2006; Reeve, Jang, Carrell, Jeon, & Barch, 2004). Proponents of SDT predict that educational environments that support autonomy are the most likely to promote psychological need satisfaction and enable its associated benefits (Deci & Ryan, 1994; Jang, Reeve, Ryan, & Kim, 2009). In the following studies, autonomy support in the higher education context consistently emerges as an important variable predicting adjustment and positive educational outcomes, raising important questions about the competency-focussed, outcomes-based approach to higher education that appears to prevail in Western universities, such as those in the U.S. and Australia.

In one such study, Levesque, Stanek, Zuehlke, and Ryan (2004) compared two educational contexts, German and U.S. universities, that are embedded in a similarly individualistic culture, but differ in their educational practices and the degree to which they support students' autonomy and competence.

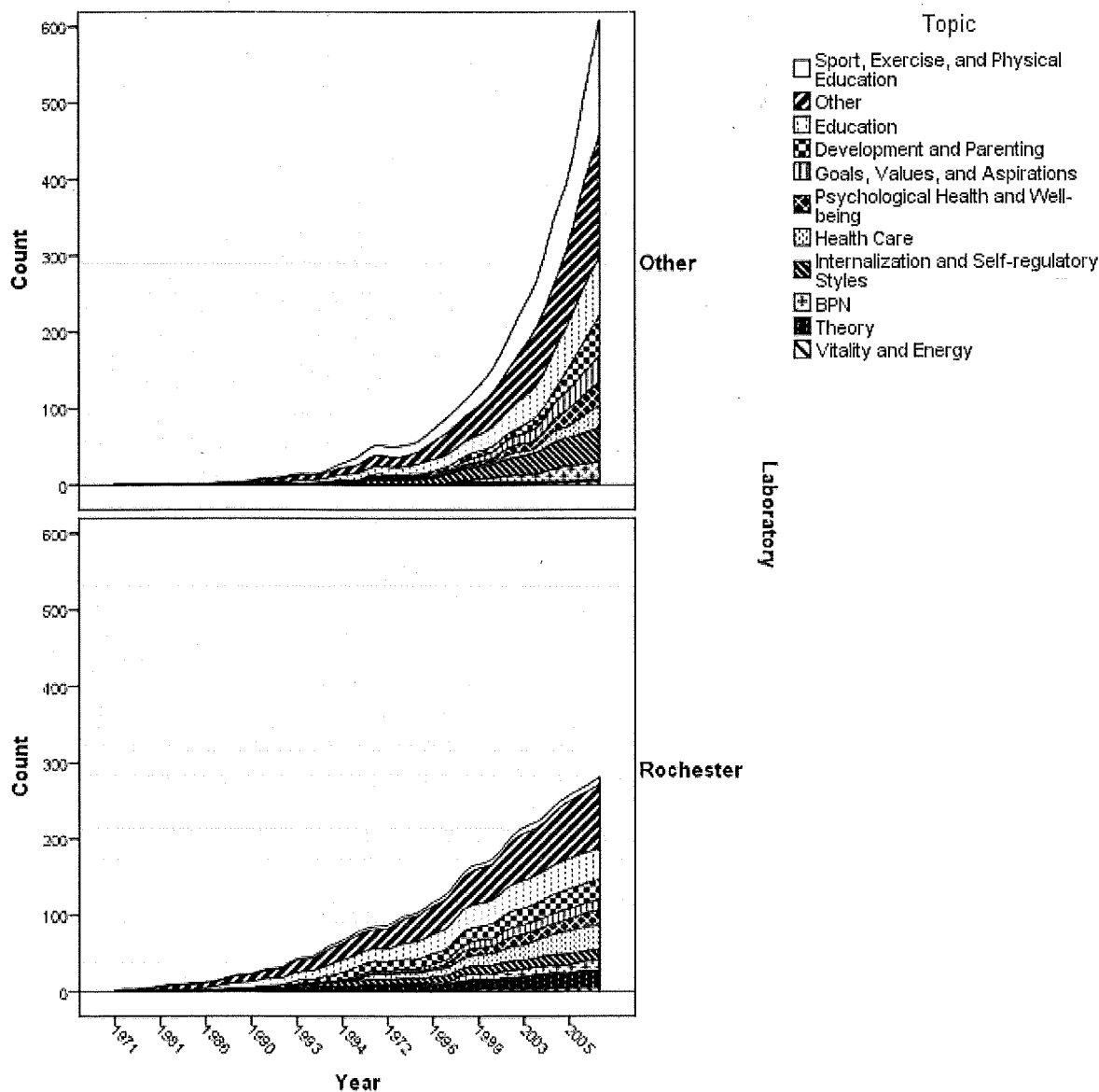


Figure 3. Cumulative count of published SDT articles by year, laboratory and topic.

Compiled from the University of Rochester SDT Website: <http://psych.rochester.edu/sdt>

For example, attendance at lectures is required in most American, but not German universities. Optional attendance at lectures is a concept that is not approved by 50% of American professors, according to one survey (Levesque et al., 2004). American students often need to attend lectures anyway, because material required for doing well at exams may not be available in any other way, whereas German students are typically given all the

learning material early on in the course, and are free to approach it in their own time and manner. Furthermore, German students are not regularly tested as in U.S. universities, but undergo extensive oral examinations only after a 2- or 3-year period of study. German professors are also open to the idea of allowing students to contribute to the development of curricula, while this idea is not popular among U.S. professors. German students are only evaluated on the subset of material they chose to focus on in their presentation or paper, whereas American students are typically all tested on the same criteria of knowledge acquisition. German students also receive individual, informational feedback along with their grade, including a rationale for the grade, an approach that is rare in U.S. universities. Because of these differences, Levesque et al. (2004) hypothesised that German students would feel more autonomous, but less competent than U.S. students because they receive less frequent feedback. Importantly, these observations about the German higher education system refer to its state as observed by Levesque et al. (2004). The recent introduction of the Bologna process throughout Europe is likely to have significant effects on these variables (Bücker & Woodruff, 2008; Lunt, 2005).

In this study (Levesque et al., 2004), students from two German universities and from two U.S. universities completed self-report measures of perceived autonomy, perceived competence and subjective well-being. The students were majoring in a variety of academic fields such as psychology, education, history, social work, business, economics, marketing, languages and biology. All students participated in exchange for extra credit, which introduces a likely sampling bias in favour of extrinsically motivated participants, a frequent limitation of SDT studies. Students of the two German universities reported significantly higher levels of autonomy ($M = 5.77$ and $M = 4.07$) than did students from the two U.S. universities ($M = 1.25$ and $M = 0.12$), $p < .05$. They also reported slightly lower levels of competence, although the differences were only statistically significant between two of the

universities ($M_{German} = 4.15$, $M_{US} = 4.42$, $p < .05$). SEM analyses revealed an adequate fitness of the SDT-based model for all four samples, $\chi^2(301) = 845.85$, $p < .001$, CFI = .95, IFI = .95, RMSEA = .08, indicating that the hypothesised relationships between basic psychological needs and subjective well-being were supported by the data across the two cultures and educational contexts.

It is not always clear, in the SDT higher education literature, which variables are predictors, mediators or outcomes. To clarify these relationships in the higher education context, Filak and Sheldon (2008) tested various models by fitting data obtained from the self-reports of 220 students of a university introductory journalism course. They started with two four-stage models based on SDT hypotheses and findings, in which the degree of autonomy support of the learning context would predict self-determined motivation, itself facilitating basic need satisfaction, which would in turn predict course-teacher evaluations and grade estimation. The second model varied only by swapping the order of self-determined motivation and need satisfaction. The data did not fit this first pair of models well [model 1: $\chi^2(9) = 324.2$, $p < .01$, CFI = .66, NFI = .66, GFI = .76, RMR = .23; model 2: $\chi^2(9) = 211.86$, $p < .01$, CFI = .78, NFI = .78, GFI = .80, RMR = .22], so Filak and Sheldon (2008) tested another pair of models, in which an additional path between autonomy support and the third variable (need satisfaction in the first model and self-determined motivation in the second) was added. The first of these (see Figure 4) was a good fit for the data, $\chi^2 = 60.7$, $p < .01$, CFI = .94, NFI = .94, GFI = .92, RMR = .05, while the second was not. The regression weights were as follows: teacher autonomy support predicted student self-determination ($\beta = .35$, $p < .01$) and student need satisfaction ($\beta = .76$, $p < .01$); student self-determination predicted student need satisfaction ($\beta = .26$, $p < .01$); student need satisfaction predicted course approval ($\beta = .74$, $p < .01$), instructor approval ($\beta = .72$, $p < .01$) and grade prediction ($\beta = .28$, $p < .01$).

These findings indicate that basic need satisfaction and self-determined motivation may be reciprocal processes, both enhanced by autonomy support, and that they are associated with positive educational outcomes. They also suggest that autonomy support may not have direct effects on positive educational outcomes and well-being, but that more complex mediating processes are at play. Whether teacher autonomy support truly is an antecedent of student self-determination, however, is unclear, because it is quite possible that the students' level of self-determination has a positive influence on the teachers' provision of autonomy support, a model that was not tested in this study. As with most other SDT studies, the design was cross-sectional and correlational, which limits the power of the tests performed and the generalisability of the findings.

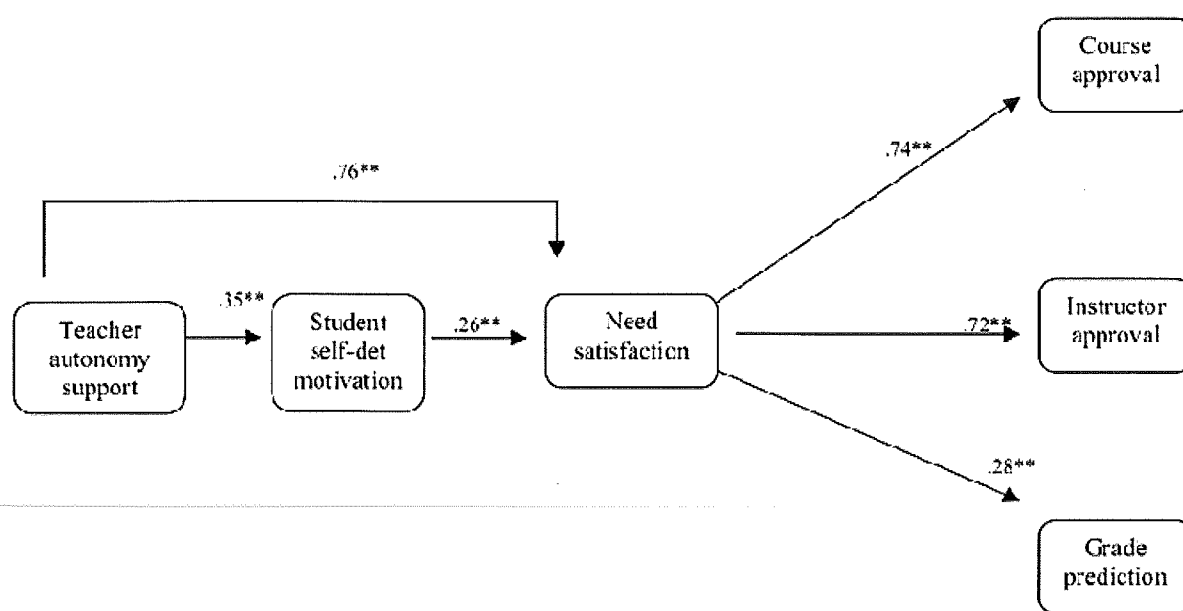


Figure 4. Final, best-fitting student-level path model with regression weights. Reprinted from "Teacher support, student motivation, student need satisfaction, and college teacher course evaluations: testing a sequential path model", by V. F. Filak, and K. M. Sheldon, 2008, *Educational Psychologist*, 28(6), p. 720. Copyright 2008 by Taylor & Francis.

The following section will define the concept of teacher autonomy support within SDT, and examine a number of studies of autonomy support at the situational level

(Vallerand, 1997) within the higher education context, as well as a number of strategies used to implement autonomy support.

Situational Applications of SDT within Higher Education

Teacher autonomy support in SDT literature refers primarily to the practices of educators, although some articles have also been written on autonomy support at the level of school policy (Deci, 2009), from parents to students (Grolnick, Ryan, & Deci, 1991; Guay & Ratelle, 2008), and for the psychological needs of educators (Pelletier et al., 2002). A teacher who supports the autonomy of his/her students tends to take the students' points of view in consideration (e.g., allow students' input into the creation of curricula), acknowledge their feelings (e.g., actively listen to students' individual verbal and non-verbal messages, and adjust the teaching approach accordingly), provide informational feedback (e.g., give a rationale for grades, explain where missing points were lost, give suggestions for improvement etc.), facilitate opportunities for choice (e.g., fewer requirements on the structure and contents of essays, more suggestions of possible approaches etc.), and minimise the use of pressures and demands (e.g., fewer deadlines, fewer threats of punishment etc.) (Jang, 2008; Reeve & Jang, 2006; Reeve et al., 2004). While these approaches seem to be designed to foster only autonomy, in practice they also tend to promote the satisfaction of students' needs for competence and relatedness. Competence is supported because the students tend to feel more empowered, and relatedness is increased because students feel more respected, trusted, and have a better rapport with their teacher (Jang et al., 2009). Therefore, most of the research reviewed in this section of the review has used autonomy support as an umbrella term for an SDT-based approach designed to enhance the situational satisfaction of all three psychological needs and self-determination for academic activities.

Black and Deci (2000) focussed on the associations between teachers' autonomy support and students' perceived autonomy and competence. They performed a prospective

study on a sample of students enrolled in a class as part of the Workshop Chemistry Project (Gosser et al., 1996). The small-group, six-to-eight-student workshops were taught by advanced students who were trained in student-centred methods of teaching, and encouraged group problem solving, peer support and active engagement with the learning material. This type of class was hypothetically more supportive of students' autonomy than the traditional lecture-based approach. 137 university students completed a battery of questionnaires at the beginning (T1) and at the end of the course (T2).

Despite no significant changes in mean Relative Autonomy Index (RAI) and Perceived Competence (PC) between T1 and T2, results showed that students with lower RAI at the beginning of the course were more likely to drop out, $F(1, 295) = 4.15, p < .05, d = .42$. RAI at T1 was associated at T2 with perceived competence, $r = .39, p < .001$, interest and enjoyment of learning, $r = .45, p < .001$, lower anxiety about learning, $r = -.29, p < .001$ and low grade orientation (the degree to which students reported being motivated by grades), $r = .25, p < .01$. RAI at T1 was not associated with performance at exams or course grade, but an increase of RAI between T1 and T2 was predictive of course grades, $\beta(3, 113) = 0.21, p < .01$. PC at T1 was associated at T2 with interest and enjoyment of learning, $r = .57, p < .001$, lower anxiety about learning, $r = -.71, p < .001$, higher performance at exams, $r = .59, p < .001$, and higher overall course grade, $r = .49, p < .001$. PC at T1 was not associated with grade orientation at T2.

Overall, these results show that students whose autonomy increased during the unit tended to achieve higher grades and were less likely to drop out than those who remained low in perceived autonomy, although autonomy and competence were not increased. A later study by Tien, Roth, and Kampmeier (2002) reported significantly higher performance [$t(1807) = -13.30, p < .01, d = 0.63$] and retention [17.4% of the control group ($n = 968$) withdrew or did not receive a final grade, whereas only 14.2% of the Workshop group ($n =$

1198) withdrew or did not receive a final grade ($p = .02$, one-tailed Fisher's exact test)] for students enrolled in the workshop, compared with students not enrolled (Tien et al., 2002). Despite the lack of experimental manipulation of the study by Black and Deci (2000), it offers some promising approaches for the implementation of autonomy-supportive learning activities in higher education. A similar workshop-style teaching environment specifically grounded in SDT would provide a valuable framework on which to base further research in autonomy support and its correlates.

SDT posits that teachers' motivating styles vary along a continuum ranging from controlling to autonomy-supporting, and that this style should explain a significant portion of the variance in students' motivational quality (Ryan & Deci, 2000b). Reeve and Jang (2006) classified 11 behaviours which autonomy-supportive teachers tend to favour, and 10 behaviours typically favoured by more controlling teachers, with the intent to identify which of these behaviours actually enhanced vs. thwarted students' perceived autonomy (see Table 1). 72 pairs of students in teaching degrees were randomly assigned to the role of either teacher or student in a laboratory design. The 10-minute teaching episode was videotaped while the teachers instructed the students on how to solve a puzzle task, and the students attempted to solve the puzzle. The students then filled out self-report measures of perceived autonomy and interest-enjoyment. One strength of this design was that the teachers' instructional style and the students' engagement and performance were assessed by two independent trained raters, based on eight separate viewings of the video recordings, rather than by the students themselves, as is often the case.

The students' perceived autonomy correlated highly with their interest-enjoyment ($r = .57, p < .01$), engagement ($r = .56, p < .01$) and performance ($r = .45, p < .01$). Eight of the 11 hypothesised autonomy-supportive behaviours were significantly correlated with perceived autonomy ($\alpha_{\text{exp}} = .009$). In a multiple regression analysis, three of these

contributed significant unique variance to perceived autonomy, $F(3, 68) = 8.85, p < .01$ ($R^2 = .53$): offering encouragements ($\beta = .30, p < .05$), time allowing students to work in own way ($\beta = .28, p < .05$) and time student talking ($\beta = .24, p < .05$).

Six of the 10 hypothesised controlling behaviours were significantly and negatively correlated with students' perceived autonomy ($\alpha_{\text{exp}} = .011$). Two of these behaviours contributed unique variance in explaining perceived autonomy, $F(2, 69) = 12.88, p < .01$ ($R^2 = .52$): asking controlling questions ($\beta = -.43, p < .01$) and making should/go statements ($\beta = -.24, p < .05$).

The laboratory design of this study might lead casual readers to think that the authors' conclusions are based on cause and effect relationships. However, this was not an experimental design: there were no experimental conditions, there was no control group and all the analyses were correlational. The fact that each teacher used his/her own mix of methods based on personal preferences suggests that most or all of the observed measures were due to interactions (between each instructional behaviour, and between teacher and student individual differences), not cause and effects. Thus, these results cannot answer the question of causality, partly because the teachers' instructional style may just as well have been influenced by the students' motivational style as have influenced it.

Future research may use an experimental design by using specific autonomy-supportive or controlling instructional behaviours in different experimental conditions. Despite these limitations, this study not only replicates the general finding that perceived autonomy is associated with positive educational outcomes, but also indicates that particular teacher behaviours are strongly linked with increases in students' perceived autonomy. The following studies suggest that autonomy-supportive behaviours may be rated according to how well they enhance students' perceived autonomy, competence and relatedness.

Table 1

Operational Definitions and Significance Levels for the Teachers' 21 Instructional Behaviours

Instructional behaviour	Operational definition
<i>11 hypothesised autonomy-supportive behaviours</i>	
Time listening	Cumulative number of seconds the teacher carefully and fully attended to the student's speech, as evidenced by verbal or nonverbal signals of active, contingent, and responsive information processing
Asking what student wants	Frequency of questions asking specifically about what the student wanted or desired, such as "Which pattern do you want to start with?"
Time allowing student to work in own way *‡	Cumulative number of seconds the teacher invited or allowed the student to work independently and to solve the puzzle in his or her own way.
Time student talking *‡	Cumulative number of seconds the student talked.
Seating arrangements	Whether or not the teacher invited the student to sit in the chair nearest to the learning materials.
Providing rationales	Frequency of explanatory statements as to why a particular course of action might be useful, such as "How about we try the cube, because it is the easiest one."
Praise as informational feedback *	Frequency of statements to communicate positive effectance feedback about the student's improvement or mastery, such as "Good job" and "That's great."
Offering encouragements *‡	Frequency of statements to boost or sustain the student's engagement, such as "Almost," "You're close," and "You can do it."
Offering hints *	Frequency of suggestions about how to make progress when the student seemed to be stuck, such as "Holding the puzzle in your hands seems to work better than laying it on the table" and "It might be easier to work on the base first."
Being responsive to student-generated questions *	Frequency of contingent replies to a student-generated comment or question, such as "Yes, you have a good point" and "Yes, right, that was the second one."
Communicating perspective-taking statements *	Frequency of empathic statements to acknowledge the student's perspective or experience, such as "Yes, this one is difficult" and "I know it is a sort of difficult one."
<i>10 hypothesised controlling instructional behaviours</i>	
Time teacher talking	Cumulative number of seconds the teacher talked.
Time holding/monopolizing learning materials †	Cumulative number of seconds the teacher physically held or possessed the puzzle.
Exhibiting solutions/answers †	Number of puzzle solutions the teacher physically displayed or exhibited before the student had the opportunity to discover the solution for himself or herself.
Uttering solutions/answers †	Frequency of statements revealing a puzzle solution before the student had the opportunity to discover it for himself or herself, such as "The cube's done this way—like this."
Uttering directives/commands †	Frequency of commands such as do, move, put, turn, or place, such as "Do it like this," "Flip it over," or "Put it on its side."
Making should/ought to statements †‡	Frequency of statements that the student should, must, has to, got to, or ought to do something, such as "You should keep doing that" and "You ought to..."
Asking controlling questions †‡	Frequency of directives posed as a question and voiced with the intonation of a question, such as "Can you move it like I showed you?" and "Why don't you go ahead and show me?"
Deadline statements	Frequency of statements communicating a shortage of time, such as "A couple of minutes left" and "We only have a few minutes left."
Praise as contingent reward	Frequency of verbal approvals of the student or the student's compliance with the teacher's directions, such as "You're smart" or "You are really good at playing with blocks."
Criticizing the student	Frequency of verbal disapprovals of the student or the student's lack of compliance with the teacher's directions, such as "No, no, no, you shouldn't do that."

* and † significantly correlated with students' perceived autonomy, * $p = .009$, and † $p = .011$

‡ contributes unique variance in explaining students' perceived autonomy

Notes. Each quotation above represents an actual statement made by one of the participant teachers in the study.

Adapted from "What teachers say and do to support students' autonomy during a learning activity" by J. Reeve and H. Jang (2006), *Journal of Educational Psychology*, 98(1), p. 211.

One teacher behaviour, that of giving a rationale for a task, has been more closely investigated by Jang (2008). According to SDT, this behaviour should enhance students' motivation to perform a task, especially if that task is uninteresting (i.e., lacks intrinsic appeal), because it promotes the internalisation of the task, a process that is conducive to a more self-determined type of motivation. In other words, a task which does not stimulate a student's intrinsic motivation (desire to perform it for its own enjoyment) can still be performed at a satisfactory level of self-determination and autonomous motivation if the goal of the task is understood and valued by the student. This type of motivation is called "identified regulation" within SDT (see Figure 2), and has been shown to be linked with many positive educational outcomes (Burton, Lydon, D'Alessandro, & Koestner, 2006; Liu, Wang, Tan, Koh, & Ee, 2009; Vallerand & Bissonnette, 1992).

In his experimental design, Jang (2008) randomly assigned 136 university students to either one of two conditions, and organised them in small groups (averaging six people, seated so that they could not interact with each other) who were presented with some learning material on the subject of statistics. This material was designed to be uninteresting, represent an ecologically valid and school-like lesson, and possess some hidden value and relevance that could potentially be useful to participants. Groups were tested one at a time, and two trained raters who were naïve to the experimental conditions rated the students' engagement independently of each other. The small groups in the experimental condition were given a theoretically autonomy-supportive rationale (using noncontrolling language and acknowledging possible negative feelings) in addition to the regular instructions given to all groups. A questionnaire assessing several dependent measures was administered after the learning task.

Students who were given the rationale reported higher levels of perceived autonomy, $t(134) = 3.57, p < .014, d = 0.55$ (alpha levels of .014 reflect the experimentwise error rate for

7 separate *t*-tests); perceived importance of the learning material, $t(134) = 4.30, p < .014, d = 0.71$; and more use of interest-enhancing strategies, $t(134) = 3.26, p < .014, d = 0.56$. They were also given higher ratings of behavioural engagement at two points in time: T1 (during the first 10 minutes), $t(134) = 2.50, p < .014, d = 0.44$; and T2 (during the last 10 minutes), $t(134) = 3.73, p < .014, d = 0.64$. Conceptual learning was also enhanced, $t(134) = 2.69, p < .014, d = 0.39$, but not factual learning. In addition, there was a significant interaction effect of time of assessment by condition on levels of engagement, $F(1, 134) = 7.72, p < .01$, indicating that the motivational benefits of the rationale became more important as time passed during the learning task. Further research could increase the length of time of the task (only 20 minutes in this study) and obtain ratings from more than two points in time, in order to establish the linearity of this important effect. Indeed, it is possible that the beneficial effects of the rationale begin to diminish after a student has been involved in the task for a long period of time. Overall, this study suggests that providing a rationale in an autonomy-supportive way facilitates situational intrinsic motivation for uninteresting tasks.

As research uncovers specific teacher behaviours that promote students' autonomy, two important questions are whether these behaviours can be successfully taught to and implemented by teachers (especially veteran teachers) in real scholastic situations, and whether such a change would yield significant improvements in students' motivation. The first question is particularly challenging because it entails changes in individual, cultural and institutional teaching practices, and such changes are unlikely to occur without resistance. In addition to the impetus of years of habit and strong cultural expectations, teachers are often pressured to adopt a controlling teaching style by various external pressures such as large class sizes and high stake testing policies (Pelletier et al., 2002; Ryan & Weinstein, 2009).

In an attempt to answer these questions, Reeve et al. (2004) set up an experimental design in which the ten teachers in the experimental group were trained during a brief

workshop in the following aspects of autonomy support, based on previous research findings: nurture inner motivational resources; rely on informational, noncontrolling language; promote value in uninteresting activities; and acknowledge and accept students' expressions of negative affect. The other ten teachers were assigned to a delayed-treatment control group. The teachers were recruited from two separate schools, and assigned to the conditions randomly. Teachers in the experimental condition attended a one-hour workshop during week 3, and engaged in an internet self-study program during weeks 3-5. Teachers in the control group did the same, but starting at week 6. Trained, independent raters who were naïve to the experimental conditions rated all 20 teachers on measures of autonomy support and their students' level of task engagement at weeks 2 (T1), 5 (T2) and 10 (T3).

Trained teachers used significantly more autonomy-supportive methods at T2 than teachers in the control condition, controlling for autonomy supportiveness at T1, $F(1, 17) = 11.68, p < .01, d = 1.94$. This effect was strong even for the four individual autonomy-supportive methods. The teachers in the delayed-treatment control condition used more autonomy-supportive methods at T3 than at T2, $t(9) = 4.20, p < .01, d = 1.44$, an effect which was not observed for teachers in the experimental condition who did not receive additional training between T2 and T3. These are very large effect sizes, and suggest that teacher autonomy-support is more dependent on environmental factors at the cultural, institutional and situational levels, than on trait-like attributes. This also shows that teachers can learn autonomy-supportive methods during short training workshops and apply them in their teaching, even 10 weeks after exposure to the training. To answer whether students benefited from these changes, Reeve et al. (2004) performed multiple regression analyses, which showed that the teachers' autonomy-support at T2 had a unique and significant effect on student engagement at T2, as measured by levels of task involvement, $F(1, 16) = 9.63, p < .01 (\beta = .59)$, and influence attempts (students' attempts to influence the flow of classroom

events), $F(1, 16) = 6.74, p < .01$ ($\beta = .59$). These effects were even stronger at T3.

By demonstrating that specific autonomy-supportive behaviours can be taught to teachers and have important beneficial effects on students' task engagement, this study has strong practical relevance for higher education. However, a possible obstacle to the classification of autonomy-supportive behaviours is that they may obscure individual differences in students' responses to, and perceptions about them. For example, although most students might feel more autonomous when a teacher provides more choices, other students may feel less so, and would benefit more from the provision of additional structure (Wasserman, 2010). Therefore, in developing guidelines for autonomy-supportive teaching, it is important to always measure the perceptions of students (in the short and long term), rather than simply rate the teachers' behaviours, even if these behaviours are generally associated with positive outcomes.

Subjective Well-Being: A Positive Outcome of Autonomy Support

One of the important perceptions that ought to be measured in order to gauge the effectiveness of autonomy-supportive approaches is the students' subjective well-being. SDT posits that the satisfaction of autonomy, competence and relatedness is required for optimal psychological health and well-being (Deci & Ryan, 2000; Ryan, Bernstein, & Brown, 2010; Ryan & Deci, 2000b; Ryan, Huta, & Deci, 2008). If autonomy-supportive methods tend to satisfy these three needs, it can be expected that, when teachers apply them in higher education, their students will report higher levels of subjective well-being. Sheldon, Ryan, and Reis (1996) used a diary design to observe daily fluctuations in Subjective Well-Being (SWB) and Basic Need Satisfaction (BNS) for 60 psychology students, focusing mainly on competence and autonomy needs. Higher trait autonomy was predictive of higher total averaged daily well-being ($\beta = .30, p < .01$) and higher averaged daily vitality ($\beta = .29, p < .01$), while higher trait competence was only predictive of lower averaged daily negative

affect ($\beta = .31, p < .01$). Higher trait autonomy was predictive of higher daily well-being ($\beta = .17, p < .001$), higher positive affect ($\beta = .16, p < .001$), higher vitality ($\beta = .13, p < .01$) and lower symptoms ($\beta = .16, p < .001$). Higher trait competence was predictive of higher daily well-being ($\beta = .13, p < .001$) and lower daily negative affect ($\beta = .18, p < .001$). In a regression analysis of day-level variables, today's competence was the highest predictor of total daily well-being ($\beta = .31, p < .001$), positive affect ($\beta = .26, p < .001$), vitality ($\beta = .21, p < .01$), and lower negative affect ($\beta = .30, p < .001$). Autonomy was also a significant predictor of well-being ($\beta = .15, p < .01$), positive affect ($\beta = .16, p < .01$) and lower negative affect ($\beta = .11, p < .05$).

Overall, the results suggest that perceived autonomy and competence are associated with measures of subjective well-being both at the trait (global) and daily (situational) levels. An important limitation of this study is that Sheldon et al. (1996) only kept and analysed the results of students who voluntarily completed all the questionnaires, restricting the potential sample to a small number of relatively highly self-determined participants. This limits the external validity of the results, because we do not know if people with low self-determination would report similar patterns of results. They also did not gather data on the participants' academic performance, an outcome variable which would have added valuable information to this study's findings. However, most empirical studies of motivation are based on voluntary self-reports, or offer monetary incentives in exchange for participation. This leads to samples that are consistently biased in favour of self-determined or externally controlled individuals. It is unlikely that an observer measure of BNS could be devised, but this sampling bias must be taken into consideration when interpreting the results of this study and others reviewed here, because it is likely to inflate the effect. A possible experimental design that would at least partially overcome this bias would be to recruit two samples of similar size from similar populations (e.g., students from two different universities), offering a monetary compensation

for one and not for the other, then performing the same experiment with each group.

In an extension of the study by Sheldon et al. (1996), Reis, Sheldon, Gable, Roscoe, and Ryan (2000) included the need for relatedness using a similar diary design. They hypothesised that a change in any one of the three psychological needs would produce detectable variations in daily SWB, independent of the other needs, in addition to the effects of dispositional levels of BNS. The design was also a diary format over 14 days, and included 67 psychology undergraduates. Averaged within-person correlations showed the following noteworthy associations: autonomy was positively correlated with positive affect ($r = .28, p < .001$), competence was positively correlated with positive affect ($r = .25, p < .001$), vitality ($r = .18, p < .001$) and overall well-being ($r = .30, p < .001$). Additionally, competence was negatively correlated with negative affect ($r = -.25, p < .001$) and symptoms ($r = -.14, p < .001$). The finding that low autonomy was not correlated with negative affect supports SDT's claim that autonomy is a true growth variable (Deci & Ryan, 2000). However, since low competence is associated with negative affect, competence (at least as it was measured in this study) appears to cover both growth and deficiency needs. These results support the study's hypotheses and mostly replicated those reported by Sheldon et al. (1996), although this study had similar limitations to the former, where participants were likely to have been highly motivated.

Subjective Vitality: Positive Outcome of Autonomy Support at Situational Level

Subjective well-being (SWB) has historically been difficult to measure consistently, because it encompasses a vast array of subjective constructs such as happiness, pleasure, vitality, energy and life satisfaction (Diener, Suh, Lucas, & Smith, 1999). Some of these measures are described as outcomes by some researchers, but as predictors of other SWB measures by others (Kashdan, Biswas-Diener, & King, 2008). Ryan and Frederick (1997) proposed subjective vitality as an indicator of well-being that is directly affected by the

satisfaction or thwarting of the basic needs for competence, autonomy and relatedness. They defined subjective vitality as the positive feeling of having energy emanate from the self, an “accessible and salient phenomenal marker of one’s health and spirit” (Ryan & Frederick, 1997). The educational benefits of autonomy support discussed above (performance, persistence and engagement) are made possible because the satisfaction of the basic psychological needs enhances subjective vitality. It is therefore worth extending SDT to SV as opposed to SWB with higher education participants.

The model proposed by SDT, whereby autonomy support enhances need satisfaction, which in turn enhances subjective vitality, has been mostly tested in the context of physical exercise, where vitality is particularly salient. For example, Wilson et al. (2006) conducted a longitudinal study of BNS and SV in 57 women ($M_{\text{age}} = 35.99$, $SD = 11.14$), mostly already exercising strenuously three or more times each week (88.7%), mostly employed full-time (83%). The correlations between BNS and SV were as follows: competence: $r = .41$, $p < .01$, autonomy: $r = .42$, $p < .01$, relatedness: $r = .17$, *ns*. A sampling bias was quite evident in this study, because participants who are already exercising strenuously several times a week at the time of sampling are likely to represent a very self-determined portion of the general population.

In another study, Adie, Duda, and Ntoumanis (2008) obtained self-report measures of competence, autonomy, relatedness, subjective vitality and perceived coach autonomy support from 539 participants ($M_{\text{age}} = 22.75$). Their ratings of coach autonomy support predicted their basic need satisfaction for autonomy, competence and relatedness. In turn, and in line with the study by Wilson et al. (2006), basic need satisfaction predicted greater subjective vitality when engaged in sport (autonomy: $\beta = .24$, $p < .05$, competence $\beta = .26$, $p < .05$, relatedness: $\beta = .17$, $p < .05$). It is reasonable to assume that this model should hold true for higher education, especially considering SDT’s claims of cross-contextual validity of the

basic needs, and the existing research on autonomy support in higher education. This assumption is partially validated by the findings from a study by Vansteenkiste et al. (2005) with Chinese students living in Belgium. In their structural model, parental autonomy support predicted relative autonomy ($\beta = .37, p < .01$), which predicted optimal learning ($\beta = .44, p < .01$) and adjustment ($\beta = .43, p < .01$), and the data provided a good fit for this model, $\chi^2 (2, N = 79) = 4.01, ns$, GFI = .97, CFI = .95, SRMR = .07.

Future Directions

Future research is needed to explore the effects of autonomy support on subjective vitality in higher education. Currently very few studies have used this measure of well-being, and most of them have been in the context of physical exercise, despite subjective vitality being described in SDT as a salient measure of psychological and somatic well-being across contexts, cultures and genders (Ryan & Frederick, 1997).

Overall, SDT research in higher education is still in its infancy, and this is reflected in the prevalent use of cross-sectional and correlational designs. Although many SDT studies sample university students, they seldom do so to purposefully examine that particular demographic. Encouragingly, a few experimental designs have been conducted (Jang, 2008; Reeve & Jang, 2006; Reeve et al., 2004), and it can be anticipated that future research will include the experimental manipulation of SDT-based teaching approaches in higher education. In addition, longitudinal designs comparing control groups with groups using autonomy-supportive learning activities would add greatly to the understanding of causal relationships between the SDT variables discussed in this review.

Another research area that is likely to receive attention is the meta-analytic study of interrelations between motivation types (Guay & Ratelle, 2008). Due to the recency of much of SDT research, few meta-analyses have been published. However, since the authors of SDT claim it to be an empirical framework to study motivation (Deci & Ryan, 2008; Ryan &

Deci, 2000b), meta-analyses are precisely the type of study that we can expect to emerge in the near future, consolidating the existing fast-growing body of literature on the subject.

Another area that has not received much attention is the influence of students' friends on their academic motivation. Much has been written about parents' and teachers' autonomy support for students, but friends likely play an important part in students' psychological need satisfaction, subjective vitality and intrinsic motivation in higher education.

Finally, it is likely that the operational definition and investigation of motivational profiles, as a reflection of individual differences in academic motivation, will receive increased attention in the future (Ratelle, Guay, Vallerand, Larose, & Senécal, 2007).

Conclusions

Self-Determination Theory is a theoretical framework upon which much research has been conducted in the last few decades on the subject of intrinsic motivation, and has particular relevance to the context of education. Despite frequent methodological limitations such as over-reliance on self-reports from a single source, sampling biases and non-experimental designs, SDT research is consistently showing strong and cross-culturally reliable associations between teacher autonomy support, the satisfaction of the basic psychological needs for autonomy, competence and relatedness, and positive academic outcomes such as persistence, intrinsic motivation to study, high quality learning and subjective vitality. Specific teacher behaviours that enhance students' autonomy and enable these positive outcomes are being identified and can inform future research into teacher development programs and autonomy-supportive learning environments in higher education.

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The Influence of Basic Psychological Need Satisfaction on Subjective Vitality
in Australian Higher Education: A Test of Self-Determination Theory

Nicolas Connault

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Abstract

Deci and Ryan's (2000) self-determination theory (SDT) is a testable, empirical framework for exploring the underlying processes involved in healthy psychological development that naturally develops from self-determined, autonomous behaviour. SDT posits that the consistent satisfaction of three innate and universal psychological needs (autonomy, competence and relatedness) leads to self-determined behaviour, and to higher subjective well-being and vitality in all domains of life, including higher education. Despite the abundant research on SDT in the last two decades, no study has specifically tested the effects of psychological need satisfaction on subjective vitality in a higher education context. The present research tested this postulate of SDT by collecting self-report measures of perceived autonomy, competence, relatedness and subjective vitality from 179 students enrolled in an undergraduate psychology course at a Western Australian university. The Basic Psychological Needs Scale was simplified and improved following difficulties in establishing a coherent factor structure. Using Structural Equation Modelling, the SDT-based model provided a good fit for the data, even after paths and variances were constrained to match the findings of another study in a different context. Contrary to expectations, only competence was a significant predictor of subjective vitality. Additionally, students under 21 years of age reported feeling significantly less competent than their older peers. These results suggest that the SDT model is valid for Higher Education, and that students' psychological needs and subjective vitality are worth measuring alongside traditional outcome-based measures of academic success.

Keywords: Self-determination theory, subjective vitality, higher education, autonomy

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Introduction

It can be argued that one of the purposes of higher education, and education in general, is to enable human beings to reach their full potential. Recently, Barnett (2009) explained that there may be great value in the process of learning, above and beyond that of acquiring skills and knowledge, and that this value is a potential transformation, a becoming of the learner into an active, life-long seeker of truth with an increasing array of beneficial dispositions and qualities. One can indeed wonder which of the following two categories of benefits has the most intrinsic value: a knowledge base and a set of skills equipping the student for the work force, or a deep enjoyment of the learning experience, an inquisitive mind, a thirst for knowledge and a dedication to life-long learning as a result of exposure to the academic milieu. Although these are not mutually exclusive categories, from a user perspective, the typical higher education curriculum often seems designed to support and measure desirable outcomes which may or may not be intrinsically valued by the student, at the potential expense of the deep enjoyment of the learning experience that comes from self-determination. The idea that the self-determination of academic goals and regulations has substantial benefits beyond those typically measured by higher education institutions is among the principal claims of self-determination theory (Ryan & Deci, 2000).

Self-Determination Theory (SDT) is a relatively recent macro-theory of motivation that has received a large amount of support through research during the last 20 years (Deci & Ryan, 2008). It explains that people's motivations do not just vary in strength but also in degree of autonomy on a dimension ranging from autonomous to controlled. In SDT, autonomy is not the same as independence, but refers to volition, the belief that one's actions originate from one's own free will. The idea that autonomy is an essential determinant in the quality of motivation sets SDT apart from all other widely recognised theories of motivation. Autonomous motivation has many educational benefits for students (Reeve, 2002), including

several of the dispositions and qualities described by Barnett (2009).

According to SDT, self-determination is the natural result of the satisfaction of three basic psychological needs: autonomy, competence and relatedness (Deci & Ryan, 2000). Autonomy is the feeling that one's actions come from and are endorsed by the self, independent of external control or compulsion. For example, if a student is required to read a certain number of large articles each week as part of his course requirements, he is less likely to be motivated to read them than if he is selecting the articles himself in search of answers to specific questions that interest him. Competence refers to the feeling of having the necessary skills, attributes and resources (energy, time, money etc.) required to perform a specific task or pursue a long-term goal. Relatedness refers to feeling supported and appreciated by people with whom we are frequently associated (Deci & Ryan, 2008).

A postulate of SDT is that Psychological Need Satisfaction (PNS) leads to higher subjective well-being (SWB) and psychological adjustment (Ryan & Deci, 2000). Reeve (2002) reviewed literature that shows that pleasure, self-worth, positive emotionality and creativity are all indicators of SWB. Research on this effect of PNS has burgeoned during the last two decades, touching on a variety of different domains such as work, relationships, education, sport and health. For example, Sheldon, Ryan, and Reis (1996) used a diary design to observe daily fluctuations in SWB and PNS for 60 psychology students, focusing mainly on competence and autonomy needs. They found that people who reported higher daily satisfaction of autonomy and competence, and those who displayed higher trait autonomy and competence (general dispositions), tended to report higher levels of vitality and SWB, and lower levels of negative affect and physical symptoms. An important limitation of this study is that Sheldon et al. only kept and analysed the results of students who voluntarily completed all the questionnaires, restricting the potential sample to a relatively small number of highly self-determined participants. This limits the external

validity of the results, because we do not know if people with low self-determination would report similar patterns of results. However, most empirical studies of motivation are based on voluntary self-reports, which lead to samples that are consistently biased in favour of self-determined individuals. It is unlikely that an observer measure of PNS could be devised, but this sampling bias must be taken into consideration when interpreting the results of this study and others reviewed here, because it is likely to inflate the effect. Despite this caveat, the results show that competence and autonomy have significant and distinguishable effects on SWB.

In an extension of the study by Sheldon et al. (1996), Reis, Sheldon, Gable, Roscoe, and Ryan (2000) included the need for relatedness in a similar diary design. They hypothesised that a change in any one of the three psychological needs would produce detectable variations in daily SWB, independent of the other needs, in addition to the effects of dispositional levels of PNS. The design also employed a diary format over 14 days, and included 67 psychology undergraduates. The hypotheses were strongly supported by the results, and mostly replicated those reported by Sheldon et al. (1996). A new finding was that, unlike competence and autonomy, a low level of relatedness did not explain much of the variance in negative affect and symptoms, although it had a significant effect on positive affect and vitality. This study was also subject to a sampling bias, wherein participants were likely to have been highly motivated.

More recently, Sheldon and Niemiec (2006) demonstrated that PNS was a strong predictor of SWB. Their study dealt with some of the limitations of the previous two, by using large samples and analysing the results of four different research designs: concurrent (PNS and SWB assessed simultaneously, 315 participants), longitudinal (PNS and SWB assessed initially, then SWB assessed three months later, 145 participants), cross-sectional (using a daily diary method assessing PNS and SWB at 8 different times during the semester,

91 participants) and observer-report (students rated by their mothers, 200 participating students and 162 responding mothers). The results showed that satisfaction of the three needs predicted higher SWB ($R^2_{study1} = .45, p < .01$; $R^2_{study2} = .51, p < .01$; $R^2_{study3} = .43, p < .01$).

SWB has historically been difficult to measure consistently, because it encompasses a vast array of subjective constructs such as happiness, pleasure, vitality, energy and life satisfaction (Diener, Suh, Lucas, & Smith, 1999). Some of these measures are described as outcomes by some researchers, but as predictors of other SWB measures by others (Kashdan, Biswas-Diener, & King, 2008). Ryan and Frederick (1997) proposed subjective vitality as an indicator of well-being that is directly affected by the satisfaction or thwarting of the basic needs for competence, autonomy and relatedness. They defined subjective vitality as the positive feeling of having energy emanate from the self, an “accessible and salient phenomenal marker of one’s health and spirit” (Ryan & Frederick, 1997, p. 557). As such it is of global scope, and is more stable than more context-specific measures of SWB (Reis et al., 2000; Sheldon et al., 1996; Wilson, Longley, Muon, Rodgers, & Murray, 2006). It is therefore worth extending SDT to SV as opposed to SWB with higher education participants.

SV has been measured in a large sample size of university undergraduates (N=263) to confirm the validity of the Subjective Vitality Scale (Bostic, McGartland Rubio, & Hood, 2000). Despite this, there are no current studies examining the effects of PNS on SV in the higher education context. The purpose of the present study was to test the postulate of SDT that the satisfaction of basic psychological needs for autonomy, competence and relatedness is positively correlated with the experience of SV, and to do so within higher education.

Furthermore, it is important to understand the factors that explain the individual differences in PNS. With higher education becoming more available in Australia thanks to technology and socio-cultural changes, the studying population is becoming less homogeneous, increasing these differences. School leavers are likely to differ from mature

age students in their needs for autonomy; external students may feel more autonomous and competent than on-campus students, but more relatedly challenged; full-time workers sometimes manage to undertake full-time studies, but how are their psychological needs met compared with part-time students or full-time students who do not work? It can be expected that young students yet to enter the workforce feel less competent than more mature students who have a well-established career. The weight and variance explained predicting SV may change depending on the type of student, and so the influence of variables such as student maturity, full-time work, mode of enrolment and cultural influences were also explored.

This study was designed to answer two research questions: (1) Can the satisfaction of the needs for autonomy, competence and relatedness each significantly predict levels of subjective vitality in higher education? (2) Which student variables are significantly correlated with student need satisfaction?. Specifically, it was hypothesised that the satisfaction of the basic psychological needs for autonomy, competence and relatedness as measured by the Basic Psychological Needs Scale (Deci & Ryan, 2000) would significantly predict subjective vitality as measured by the Subjective Vitality Scale (Ryan & Frederick, 1997).

Method

Participants

The participants were 179 undergraduate psychology students from Edith Cowan University, a Western Australian higher education institution. Demographic information is displayed in Table 1.

Participants were recruited in two ways. First, an invitation to participate in the study through the online (Internet) questionnaire was posted to psychology students through the University's Virtual Learning Environment (BlackBoard). A total of 99 responses were recorded through the online questionnaire. Secondly, 80 second- and third-year psychology

students filled out the paper version of the questionnaire voluntarily while attending one of their classes. A background and rationale for the study was presented by the researcher to the students, after which they were given a copy of the questionnaire and asked to fill it out at the time. An information letter was provided to all students (Appendix I), and the study had been approved by the Faculty of Computing, Health and Science Ethics Subcommittee.

Table 1

Frequency Distribution of Student Demographic Variables (N = 179)

Gender	n	%	Study weight	n	%
Male	30	16.8	Full-time	88	49.2
Female	149	83.2	Part-time	91	50.8
Age group	n	%	Extracurricular commitments	n	%
Under 21 (range: 17-20)	60	33.5	<= 20 hours per week	64	35.8
21 and over (range: 21-69)	119	66.5	> 20 hours per week	115	64.2
Study mode	n	%	Cultural orientation	n	%
On campus	126	70.4	Individualistic	135	75.4
External	53	29.6	Collectivistic	44	24.6
Source	n	%	Study year	n	%
Online	99	55.3	2 nd or 3 rd year undergraduate	164	91.6
Writing	80	44.7	Other	15	8.4

Materials

The materials presented to participants included a cover letter, the Basic Psychological Needs Scale (BPNS), the Subjective Vitality Scale (SVS) and a small personal details survey, including age, gender, extracurricular commitment, number of units enrolled in for that semester, number of units taken externally, and cultural affinity (inclination towards individualistic vs. collectivistic ideals). These three sub-sections were presented as one questionnaire, and the questions of the SVS were presented after those of the BPNS (see Appendix II).

For external students, an online version of the questionnaires was made available. The online questionnaire consisted of a single web page with form controls replicating the layout of the printed questionnaire. This was written in plain HTML, with some simple Javascript validation to avoid missing or invalid entries. PHP was used as the backend to capture the participants' input, perform some additional validation, and record the responses in a MySQL database. Only the fields captured by the online questionnaire were recorded in the database.

For internal and mixed mode students, the questionnaire was in paper form, and so the results were entered manually into the same database. Online questionnaires are being increasingly used as an alternative to paper-based questionnaires, and several studies have shown that they do not significantly differ in responses from one another (Ritter, Lorig, Laurent, & Matthews, 2004; Riva, Teruzzi, & Anolli, 2003; Yu & Yu, 2007). A multivariate analysis of variance (MANOVA) showed no significance difference in any of the dependent variables between the two modes of response.

Basic Psychological Need Scale (BPNS).

The BPNS is a 21-item self-report scale concerning the three needs for competence, autonomy and relatedness. All items are rated on a 7-point Likert scale from 1 (not at all true) to 7 (very true). A version of this scale was used in several studies, indicating strong internal validity and cross-cultural reliability (Baard, Deci, & Ryan, 2004; Deci et al., 2001; Gagné, 2003). For example, Deci et al. (2001) reported Cronbach's alpha coefficients of .73, .79 and .84 for the competence, autonomy and relatedness subscales respectively, and .89 for total need satisfaction. Similarly, Gagné (2003) reported internal consistency coefficients of .71 for competence, .69 for autonomy, .86 for relatedness and .89 for total need satisfaction. In the present data set, the internal consistency coefficients were .72 for competence, .68 for autonomy, .81 for relatedness and .78 for total need satisfaction, in line with existing

literature. As an example, the first item of the scale is “Often, I do not feel very competent”, and is designed to measure the satisfaction of the need for competence.

Subjective Vitality Scale (SVS), individual difference level version.

The SVS is a 7-item self-report scale measuring subjective vitality as a measure of subjective well-being (Ryan & Frederick, 1997). Ryan and Frederick (1997) performed a principal components analysis on these items with 2,557 observations. The analysis revealed a single factor with an Eigenvalue of 4.91, all items loading above .50, explaining 70% of the variance ($\alpha = .92$). All items are rated on a 7-point Likert scale from 1 (not at all true) to 7 (very true). Bostic et al. (2000) confirmed the validity of this scale by performing a Structural Equation Modelling analysis on the scale, using two large samples. Their analysis also revealed that the scale was more valid when the second item, which was negatively worded, was removed entirely. The resultant 6-item version of the scale was used in the present study. The internal consistency coefficient in the present data set was .90. An example of item from this scale is “I nearly always feel alert and awake”.

Demographic information

This survey had 8 items, namely: gender, age, age group, number of enrolled units, number of external units, average number of hours worked per month, extra-curricular commitment and cultural affinity. Extra-curricular commitment was a dichotomous measure defined by the answer to the question: “Are you committed to non-school work or duties that require at least 15 hours of your time per week?” Age group was defined by participant age, with two categories: non school leavers (over 20 years old before 1st August 2010, $n = 119$) and school leavers (all other participants, $n = 60$). Study load differentiated students studying full-time (at least three units in the semester) from those studying part-time. Study mode distinguished students studying entirely on-campus from those studying either externally or only partially on-campus. Cultural affinity was a reflection of a person's individualistic or

collectivistic orientation, and was determined by the participants' response to the question: "Which of the following is more important to you? Your own individual goals in life or the goals of the groups you belong to? (Family, religious or spiritual group, neighbourhood, culture etc.)" This was an arbitrary measure intended to provide exploratory correlational data. Study year and the source of input (written vs. online) were also recorded.

An additional dichotomous "Imbalance" variable was computed based on the absolute paired differences between scores of autonomy, relatedness and competence, to test for the reported effect that higher consistency between the needs leads to higher subjective well-being (Sheldon & Niemiec, 2006). The imbalance score was computed by adding up the absolute differences between each pair of need variables, with a minimum of 0 (equal satisfaction among the three needs) and a maximum of 12 (for need scores of 1, 4 and 7).

Analysis and Results

A series of Factor Analyses (FA) were performed on the items from the BPNS to confirm that each item loaded appropriately on their expected factor. Principal Axis Factoring with direct Oblimin rotation was used, because the items were highly intercorrelated. No appropriate solution could be found, and the negatively-worded items of the BPNS consistently loaded on a factor of their own, regardless of the need they were intended to measure. This introduced a great amount of confounding variance to the analysis, so all these items were removed for the next FA, which revealed three distinct factors. One of the items for the Autonomy sub-scale (item 14, "People I interact with on a daily basis tend to take my feelings into consideration") loaded highly on the Relatedness factor, so it was removed for the next FA. This analysis showed three distinct factors, with five relatedness items on factor 1, three competence items on factor 2 and three autonomy items on factor 3, none of them cross-loading at more than .32 (10% of explained variance). Finally, the two relatedness items with the lowest loadings on factor 1 were removed to obtain three items for

each factor. The scale items, communalities and factor loadings for this final analysis are shown in Table 2. These 9 items were used for all subsequent analyses, while the others were ignored. Internal consistencies for these shortened sub-scales were examined using Cronbach's alpha. The alphas were adequate considering the small number of items per scale: .65 for competence, .74 for relatedness, .67 for autonomy and .69 for total need satisfaction. Interestingly, if internal consistency for total need satisfaction was computed by entering all the scale items at once (instead of just the means of each subscale), the alpha coefficient for the original scale was only .36, while it was .79 for the shortened version. This indicates that the shortened version of the BPNS is a more appropriate measure of total need satisfaction than the original version.

Structural Equation Modelling (SEM) analyses were performed on the data to test the measurement and structural models, and to compare the structural model to a similar model (Adie, Duda, & Ntoumanis, 2008). In SEM analyses, the first indicator of goodness-of-fit usually interpreted is the χ^2 -test, which, if low and non-significant, indicates a good fit of the model for the data. However, this statistic tends to be very sensitive to large samples, in which case a significant χ^2 value is not necessarily an indication of poor fit. Other goodness-of-fit indicators commonly used are GFI and CFI, while a series of indices that indicate the degree of parsimonious fit of the model are also often reported, such as TLI (also known as NNFI), RMSEA, SRMR and PGFI (Tomarken & Waller, 2005; Weston & Gore, 2006; Willse, Fan, Witta, & Sivo, 2006). Willse et al. (2006) reported optimal index values for different sample sizes, designed to reduce the risk of rejecting correct models. These optimal values have been reproduced in Table 3 for some selected indices, and a sample size of 150, which is the closest category to the sample size of this study. Following recommendations by Weston and Gore (2006), only CFI, RMSEA, SRMR and PGFI will be reported in this study.

Table 2

Factor loadings and communalities for a principal axis factoring analysis with oblimin rotation, and regression weights from a CFA on 9 items from the condensed version of the Basic Psychological Needs Scale (BPNS) (N = 179)

BPNS Item	Competence		Factor Relatedness		Autonomy		Communi- nality
	FL	β	FL	β	FL	β	
I have been able to learn interesting new skills recently	.76	.61*					.29
Most days I feel a sense of accomplishment from what I do	.61	.76*					.39
People I know tell me I am good at what I do	.36	.51*					.25
People in my life care about me			-.80	.74*			.39
People are generally pretty friendly towards me			-.65	.71*			.38
I consider the people I regularly interact with to be my friends			-.64	.67*			.34
I feel like I can pretty much be myself in my daily situations					-.77	.68*	.37
I feel like I am free to decide for myself how to live my life					-.56	.66*	.32
I generally feel free to express my ideas and opinions.	.35				-.37	.59*	.29

Note. Factor loadings < .35 are suppressed, FL = Factor Loading

* $p < .001$

Table 3

Optimal cut-off values of fit indices for accepting correct models and rejecting misspecified models, for a sample size of 150. Adapted from “The search for ‘optimal’ cutoff properties: Fit index criteria in structural equation modeling” by J. Willse et al. (2006), The Journal of Experimental Education, 74(3), pp. 276-280.

Fit Index	GFI	CFI	TLI	RMSEA	PGFI	RMR	SRMR
Optimal accept value	.89	.95	.95	.06	.72	.14	.12
Optimal reject value	.94	1.0	1.0	.00	.79	.02	.12

The measurement model was designed based on the condensed version of the BPNS discussed above, and was estimated using Confirmatory Factor Analysis (CFA) with the AMOS statistical software. This analysis requires that each latent variable be represented by

multiple, preferably a minimum of three observed indicators (Weston & Gore, 2006). The three items for each scale were used as the observed indicators, and a subjective vitality latent variable was modelled with three parcelled indicators, each aggregating two items from the SVS. The model is shown in Figure 1. This measurement model provided a good fit for the data, $\chi^2(48) = 64.95$, $p = .052$, CFI = .98, PGFI = .58, RMSEA = .045, SRMR = .045. In contrast, a more simple model in which only the means for each complete subscale of the original BPNS were used as predictors of SV provided a very poor parsimonious fit, PGFI = .28. This indicates that the students' responses to the SVS and the condensed version of the BPNS could be represented on the distinct factors of perceived autonomy, competence, relatedness and subjective vitality.

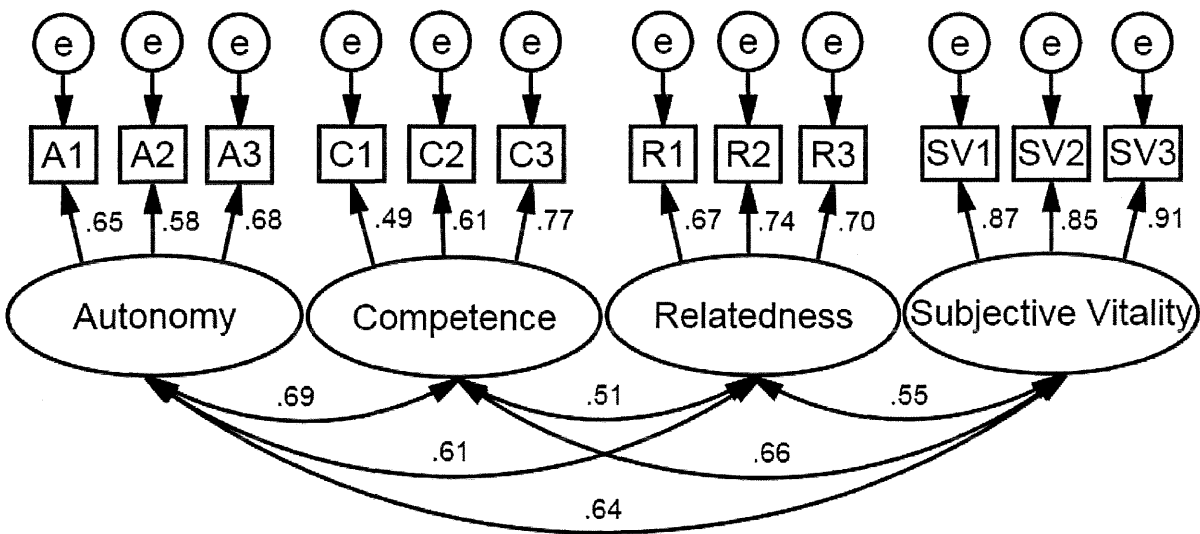


Figure 1. Measurement model with standardised regression weights and correlations
Notes: numbers next to straight lines are regression weights, those next to curved lines are correlations. All regression weights and correlations are significant at $p < .001$

A test of the structural model revealed that the latent variables representing the three needs for autonomy, competence and relatedness explained 53% of the variance in subjective vitality, although only competence was a significant predictor ($\beta = .38$, $p = .007$), the weights for autonomy $\beta = .26$, $p = .061$) and relatedness $\beta = .20$, $p = .083$) being not significant at the .05 alpha level. The model (shown in Figure 2) provided a very good fit for the data, $\chi^2(48) =$

64.952, $p = .052$, CFI = .98, PGFI = .58, RMSEA = .045, SRMR = .045. The structural model was then constrained using standardised weights between the three needs and subjective vitality, and variances for the latent variables representing the three needs from a model drawn from the study by Adie et al. (2008). This constrained model still provided a very good fit for the data, while improving its parsimonious fit as measured by PGFI, $\chi^2(54) = 80.16$, $p = .012$, CFI = .97, PGFI = .65, RMSEA = .052, SRMR = .058.

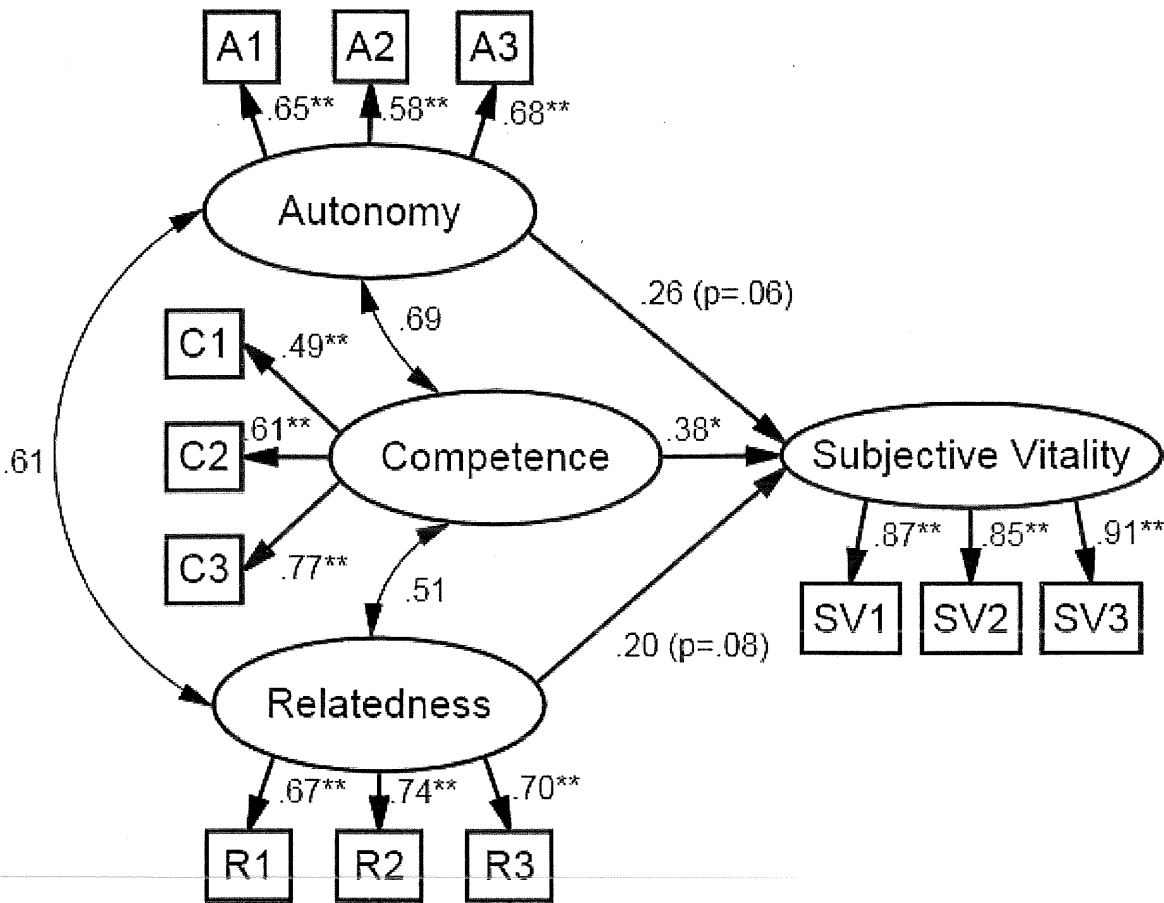


Figure 2. Structural model with standardised regression weights and correlations
Notes: numbers next to straight lines are regression weights, those next to curved lines are correlations. Error variables were omitted for added clarity.
* $p < .05$, ** $p < .001$

Correlational analyses did not reveal any significant effects of Gender, Study Weight, Study Year, Input Source, Cultural Orientation and Extracurricular Commitments on any of the dependent measures, so these six variables were not used in any subsequent analyses.

Intercorrelations between the remaining measures are reported in Table 4.

Consistent with previous research, the levels of satisfaction of the three psychological needs were significantly correlated, with autonomy-competence $r = .48, n = 179, p < .001$, autonomy-relatedness $r = .43, n = 179, p < .001$ and competence-relatedness $r = .37, n = 179, p < .001$. All three needs were also strongly correlated with subjective vitality: autonomy $r = .51, n = 179, p < .001$, competence $r = .51, n = 179, p < .001$, and relatedness $r = .46, n = 179, p < .001$. As expected, needs imbalance was negatively associated with subjective vitality, $r = -.35, n = 179, p < .001$.

Table 4
Correlation Matrix, Means and Standard Deviations for 7 Measured Variables

Variable	1	2	3	4	5	6	7
1. Autonomy	--						
2. Competence	.48***	--					
3. Relatedness	.43***	.37***	--				
4. Subjective Vitality	.51***	.51***	.46***	--			
5. Imbalance	-.28***	-.59***	-.12	-.35***	--		
6. Age Group	.15	.26***	.15*	.17*	-.01	--	
7. Study Mode	.07	.19*	-.01	.13	-.05	.38***	--
<i>M</i>	5.52	5.31	5.91	4.76	2.01	0.66	0.30
<i>SD</i>	0.92	0.96	0.82	1.11	1.34	0.47	0.46

* $p < .05$, ** $p < .01$, *** $p < .001$

Amongst the demographic variables, the most noteworthy correlations with dependent variables were for Age Group, which was moderately correlated with subjective vitality, $r = .17, n = 179, p = .027$; with relatedness, $r = .15, n = 179, p = .043$; and more strongly with competence, $r = .26, n = 179, p < .001$. To explore these relationships in more depth, a MANOVA was performed to analyse the effects of age group on competence, autonomy,

relatedness and subjective vitality scores. The assumption of homogeneity of variance of the variance-covariance matrices was satisfied. Collinearity was not an issue for this analysis, as no correlations between dependent variables were above .51. There were no significant outliers likely to adversely affect the analysis. Significant differences were found between the two age groups on the dependent measures, Wilk’s $\lambda = .93$, $F(4, 174) = 3.45$, $p = .010$. Univariate analyses of variance (ANOVAs) for each dependent variable were conducted as follow-up tests to the MANOVA. Using the Bonferroni method for controlling Type I error rates for multiple comparisons, each ANOVA was tested at the .0125 level. Table 5 presents the means, standard deviations and univariate F-ratios of the dependent variables for the two age groups. The ANOVA of the competence scores was significant, $F(1, 178) = 13.26$, $p < .001$, $d = .58$, indicating that students under 21 were significantly lower in competence than older students. All other ANOVAs were non-significant.

Table 5:
Means, Standard Deviations, and Univariate F-ratios for 4 Dependent Variables by Age Group

Age Group	Competence		Autonomy		Relatedness		Subjective Vitality	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Under 21	4.95	0.90	5.33	1.03	5.74	0.95	4.51	1.17
21 and over	5.48	0.94	5.61	0.84	6.00	0.73	4.89	1.05
Univariate <i>F</i>	13.26*		3.78		4.17		4.96	

* $p < .0125$ (Bonferroni type adjustment)

Discussion

The major aim of this study was to test the hypothesis that the satisfaction of the three basic psychological needs for competence, autonomy and relatedness would be positively correlated with and individually predict a significant proportion of the variance in levels of subjective vitality for higher education students (Reis et al., 2000). This hypothesis was partially supported by the results, with the structural model explaining 53% of the variance in

subjective vitality, while the measurement and structural models provided a good fit for the data, even after being constrained to match the results of another study (Adie et al., 2008). These results give strong support for the SDT-based model, and suggest that students' psychological needs for autonomy, competence and autonomy are worthwhile measuring and enhancing. They also give support for the construct of subjective vitality in higher education, as a valid measure of students' well-being with strong associations with psychological need satisfaction.

In the SEM analysis, competence was the only significant predictor of subjective vitality, whereas SDT's premise is that autonomy and relatedness should also be significant predictors (Reis et al., 2000). A possible explanation is that no causal path was drawn between the three needs, preventing the analysis from reporting direct, indirect and total effects of each need on subjective vitality. Considering the high correlations between the three needs, it is likely that considerable reciprocal processes are at play. For example, it is possible that autonomy influences subjective vitality mainly through its effects on perceived competence. Despite this limitation, the variance explained by the present model was very high and provides a solid foundation for future studies.

The importance of perceived competence for subjective vitality in this study is interesting, because it is consistent with what might be expected for the population sampled. Indeed, as part of the Anglo-Saxon tradition, higher education in Australia places a high value on competence. This is evident in the way academic success is typically measured, through standardised assessments, high-stake testing and the labels ascribed to numerical grades. Secondly, and more specifically, psychology in Australia is a very competitive academic discipline, in which perceived competence (or incompetence) often determines persistence or attrition. For this reason, it is reasonable to surmise that students' feelings of subjective vitality are intricately linked not only with their feelings of competence, but also with the

feedback they receive on how competent they are perceived to be by lecturers and tutors. In other words, to most Australian students in psychology, it is likely that being told one is doing well (through grades or verbal feedback) is more vitalising than being given more autonomy or having more satisfying interpersonal relationships.

The present study highlighted the usefulness of Structural Equation Modelling, particularly when testing hypothesised relationships between psychological constructs represented by self-report measures. The analyses made it possible to identify issues of collinearity in the original Basic Psychological Needs Scale and to reduce it to a better factor structure through factor analysis. This reduced a source of unexplained variance which obscured the real effects of basic need satisfaction on subjective vitality. The elimination of negatively-worded items also greatly improved the factor structure, a finding that is explained by previous research (Schriesheim, Eisenbach, & Hill, 1991). This shortened scale needs to be validated with other samples, or better instruments need to be devised to measure the distinct dimensions of perceived autonomy, competence and relatedness, such as those explored by Sheldon et al. (2001). Incidentally, such a test of validity was made possible post-hoc thanks to an independent set of 313 responses to the original BPNS by university undergraduates, provided by Frederick Philippe from the Human Motivation Lab at McGill University in Montreal, Canada. This data set yielded similar results for the shortened version of the BPNS as used in the present study, with similar internal consistency alphas and CFA goodness-of-fit indices, giving empirical support for the validity of this scale. However, considering that the short BPNS has higher internal consistency for general need satisfaction than for its three subscales, it is perhaps better suited to measure basic need satisfaction as a single construct.

The present study builds on the theoretical foundation of SDT by providing a model for predicting students' subjective vitality. This model has important implications for higher

education institutions, because subjective vitality is theoretically predictive of persistence and academic performance. Although empirical evidence is currently lacking to support these hypothetical associations, the very definition of subjective vitality—the positive feeling of having energy emanate from the self—presupposes intrinsic motivation, enthusiasm and resilience, all of which are required for persistence and performance in undergraduate psychology courses. Further research could explore the correlates and consequents of subjective vitality in higher education.

As in most other studies (Adie et al., 2008; Reis et al., 2000; Vlachopoulos & Karavani, 2009; Wilson, Longley, Muon, Rodgers, & Murray, 2006), need satisfaction was remarkably high and stable, with no standard deviation above 1 for any of the three needs. One possible reason for this stability is that the present study only measured global need satisfaction. According to SDT, people are naturally drawn towards behaviours and environments that satisfy their basic psychological needs (Deci & Ryan, 2000), so it is likely that, should students not find their university environment psychologically satisfying, they would obtain that satisfaction from the other contexts in their lives, such as exercise, work, socialising or family life. Future research could administer situational measures of need satisfaction and subjective vitality to explore how these vary from one learning situation to another.

The importance of balance in need satisfaction was explored previously by Sheldon and Niemiec (2006), and was validated in the present study: higher imbalance between the needs lead to lower subjective vitality. This suggests that, although competence was the most important predictor of subjective vitality, its effects and those of the other needs may be mediated by how well the three needs are balanced. Further analyses beyond the scope of the present study could explore various mediational models through SEM analyses, and could extend the theoretical underpinnings of the associations between need satisfaction and

subjective vitality.

Another aim of this study was to explore various correlates and possible antecedents to psychological need satisfaction. Apart from age which had a moderate association with perceived competence, none of these additional variables added any significant predictive value to the SEM analyses. The fact that gender, age and cultural orientation did not have significant correlations with any of the dependent variables (with the exception of age group which was significantly correlated with competence) supports SDT's claim of the universality of the three needs (Vlachopoulos & Karavani, 2009).

The cultural orientation deserves further exploration, as it was measured only on a single item which was not formulated on any theoretical basis, and may not fully reflect the participants' true cultural orientation. According to the SDT literature, however, even a valid and reliable measure of cultural orientation would not explain much of the variance in the dependent variables, because the three basic needs are theorised to be universal across cultures (Chirkov, 2009).

As could be expected, students over 20 felt significantly more competent than younger students, although this difference was not sufficient to lead to a significant difference in subjective vitality. Students who recently completed high school, still live at home and have little or no experience of the work force are likely to feel overwhelmed by some of the demands placed upon them at university, and to feel less able to complete its requirements. Further research could examine whether this difference is more pronounced for first-year students, compared with students more advanced in their undergraduate degrees.

The results from the present study warrant the discussion of follow-up research. The methodology could be extended in several directions. For example, basic needs and subjective vitality could be assessed at several points in time, while additional predictor variables could also be measured to better understand variations in perceived autonomy,

competence and relatedness. An experimental design similar to those examining autonomy support (Jang, Reeve, & Deci, 2010; Reeve & Jang, 2006; Reeve, Jang, Carrell, Jeon, & Barch, 2004) could include measures of subjective vitality and explicate causal relationships between these variables. Furthermore, projective studies could be implemented in Australian universities, following the example of the Workshop Chemistry project (Black & Deci, 2000; Gosser et al., 1996).

In the Workshop Chemistry project (Gosser et al., 1996), small-group, six-to-eight-student workshops were taught by advanced students who were trained in student-centred methods of teaching, and encouraged group problem solving, peer support and active engagement with the learning material. This type of class was hypothetically more supportive of students' autonomy than the traditional lecture-based approach, and led to higher interest and enjoyment of learning, lower anxiety about learning, higher performance, and lower attrition than for a control group (Black & Deci, 2000; Tien, Roth, & Kampmeier, 2002). Introductory chemistry was chosen as the subject of the study because it is required for most science undergraduate courses, and is typically very challenging and marked with pronounced attrition rates. Students are exposed to new concepts, symbols and formulae that appear foreign and can seem overwhelming. In this regard, introductory chemistry courses share some common points with undergraduate psychology courses, from which the participants of the present study were sampled. Students enrolling in psychology courses are all required to learn inferential statistics—a subject also replete with new concepts, symbols and formulae—a reality that is usually unexpected, as the lay perception of psychology is more often associated with interpersonal than with analytical and research skills. Thus, the prospective design of the Workshop Chemistry project could be applied to undergraduate psychology courses and provide valuable information—such as its effects on attrition and learning quality—about potential advances in autonomy-supportive teaching methods.

The present study has some limitations that are worth discussing. First, its design is cross-sectional and correlational, thus preventing the formulation of causal explanations for the observed associations between need satisfaction and subjective vitality. Secondly, the scale used to measure psychological need satisfaction (BPNS) was found to be inadequate, in that its three subscales were highly intercorrelated, failing to measure autonomy, competence and relatedness with sufficient discrimination. This reflects the fact that the BPNS has thus far not been formally validated, unlike the Subjective Vitality Scale. This required the ad-hoc development of a shortened version of the scale, which is an improvement on the original, and apparently has external validity, as mentioned previously. It is encouraging to see that more appropriate measurement instruments for autonomy, competence and relatedness are currently being developed in the contexts of work (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, *in press*) and sport (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, *in press*). These scales were developed using much more rigorous processes (including Exploratory Factor Analyses, and CFAs with multiple samples) than the BPNS, and have much better criterion validity. They also distinguished between need-satisfaction and need-frustration items. This will hopefully lead to similar developments for the context of education.

Thirdly, no predictors of psychological need satisfaction were measured. Following the example of recent studies (Adie et al., 2008; Vlachopoulos & Karavani, 2009), it would have been informative to measure students' perception of their teachers' autonomy support, and test whether that perception was predictive of basic need satisfaction. Another important predictor currently emerging from the literature is the provision of structure (Jang et al., 2010; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). Further research could measure autonomy support and structure provision in higher education, preferably in experimental designs, and observe how these influence basic need satisfaction and subjective

vitality. Following the operationalisation and development of appropriate and valid measures of autonomy support, structure provision, and students' perceptions of these behaviours, experimental conditions could be designed in which autonomy supportive and/or structure provision methods are used in a teaching situation, and students' perceptions are assessed before and after the teaching period. This type of design would enable the exploration of causal links between teacher behaviours and students' need satisfaction.

In conclusion, Australian higher education typically measures outcomes or outputs from students, not their level of psychological need satisfaction nor any indicators of their well-being such as subjective vitality (Anderson, 2006). Considering the purposes of higher education and its potential for helping students become life-long, self-determined learners (Barnett, 2009; Deci & Ryan, 1994), not considering these variables and focusing solely on outcomes may be detrimental and costly for the Australian Higher Education sector. Besides, SDT research consistently demonstrates that enhancing autonomy, competence and relatedness doesn't just maintain traditionally valued academic outcomes, it tends to enhance them (Faye & Sharpe, 2008; Reeve, 2002; Ryan & Weinstein, 2009; Vallerand, Koestner, & Pelletier, 2008). The present study has shown that SDT is applicable to the higher education of psychologists in an Australian context. This study has trialled the scales associated with the theory, and demonstrated an interpretable model. Although it is too early to summarise the benefits of applying the model to psychology and to other disciplines within Australian higher educational institutions, this report has shown a quantitative approach that may well be useful in assisting Australian students in attaining unto the life-long personal benefits the higher education environment is capable of making available to them.

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Appendix I

Information Letter

Basic psychological needs satisfaction and subjective vitality at University

Participant Information Sheet

You are invited to participate in a study which consists of answering a **short, anonymous questionnaire**. This study is conducted by Nicolas Connault as part of a 4th year honours thesis at Edith Cowan University, Faculty of Computing, Health and Science, and has been approved by the Faculty Ethics Subcommittee.

The aim of this study is to test the theory that the satisfaction of three basic psychological needs (competence, relatedness and autonomy) leads to enhanced subjective vitality in the higher education context. Vitality is a specific measure of well-being, reflecting energy and enthusiasm that comes from within and is in harmony with personal values.

Participating in this study will help you to better understand the factors that lead to **enjoyment** of and **motivation** for your university studies. The results will also help higher education institutions at large, by helping to identify ways to **enhance the learning experience** of their students through the satisfaction of their basic psychological needs.

Participation in this study is **entirely voluntary**. The questionnaire does not ask for any data that could uniquely identify you in any way, so your **anonymity will be preserved** throughout the study.

The questionnaire includes a short demographic survey which will be used to explore variables that may have an effect on subjective vitality and basic needs satisfaction. It also includes two short 7-point rating scales which are used to measure basic psychological needs satisfaction and subjective vitality. It should take no longer than 20 minutes to fill out this questionnaire.

Should you wish to participate, simply fill out the questionnaire accompanying this information sheet and return it to me in person. Your data will then be entered into an electronic database. Paper copies of the questionnaires will be destroyed once the research is completed, and a copy of the database will be archived on a hard drive for 5 years, after which it will be deleted permanently.

Since the questionnaire is entirely anonymous, you will not be able to retrieve your responses after having submitted them. The results, however, will be made available through publication and/or an oral presentation.

If you would like to learn more about this study before completing this questionnaire, or would like to complete it later, you may **complete this questionnaire online** by accessing <http://connault.com.au/honours> . If you would like independent opinions on this study, you may contact Dr Justine Dandy or my Supervisor Dr Ken Robinson. Contact details are provided below:

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Questionnaire

What is your gender?

☐ Male ☐ Female

What was your age on 1st August 2010?

How many units are you enrolled in, this semester?

How many units are you taking **externally**?

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In average, how many hours of work (paid or voluntary) do you do each month?

Are you committed to non-school work or duties that require at least 15 hours of your time per week?

☐ Yes ☐ No

Which of the following is more important to you? (tick only one)

☐ Your own individual goals in life?

☐ The goals of the groups you belong to? (family, religious or spiritual group, neighbourhood, culture etc.)

Please read each of the following statements carefully, thinking about how it relates to your life, and then indicate how true it is for you.

[illegible]

[illegible]

	Statement	Not at all true		Somewhat true			Very true	
		1	2	3	4	5	6	7
23	Sometimes I feel so alive I just want to burst.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	I have energy and spirit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	I look forward to each new day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	I nearly always feel alert and awake.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	I feel energized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

That's it! Please return this filled out questionnaire to your lecturer.

Thank you for your time and participation!

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Graphics files are welcome if supplied as Tiff, EPS, or PowerPoint files. The minimum line weight for line art is 0.5 point for optimal printing.

When possible, please place symbol legends below the figure instead of to the side.

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