*International Journal for Research in Vocational Education and Training (IJRVET)*
2025, Vol. 12, Issue 2, 236–265
https://doi.org/10.13152/IJRVET.12.2.4

# The Role of Basic Psychological Needs Satisfaction in Finnish Vocational Students' School Burnout and Dropout Intentions

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Received: 26 February 2024, Accepted: 22 November 2024

## Abstract

**Purpose:** This study examined how vocational education and training (VET) students' satisfaction of basic psychological needs in VET learning environments, namely autonomy, competence, and relatedness, is related to their burnout and intention to leave VET. Self-Determination Theory was employed in the study. The aim of the study was to contribute to the existing body of empirical knowledge on basic psychological needs in educational contexts, with a particular focus on their role in negative processes. The findings may assist in evaluating the potential of basic psychological needs support in enhancing student motivation and well-being in VET learning environments.

**Methods:** Cross-sectional online survey data were collected in 2023 from 255 students at a large vocational institution in Finland. The questionnaire included the following factors from three validated scales: Basic Psychological Need Satisfaction - Work Domain (BPNS-WD; "autonomy", "competence", "relatedness"), School Burnout Inventory (SBI; "exhaustion", "cynicism"), and dropout intentions. Data were analysed in R using correlation analysis, confirmatory factor analysis, and structural equation modeling.

**Results:** The results indicated that the factors of basic psychological needs were negatively associated with the two burnout factors and the factor of dropout intentions, confirming

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ISSN: 2197-8646
https://www.ijrvet.net

our hypotheses. However, the hypotheses were only partially confirmed as not all associations reached statistical significance. Contrary to our hypothesis, relatedness satisfaction was positively related to burnout cynicism, although the relationship was not statistically significant.

**Conclusions:** The findings suggest that supporting the basic psychological needs of VET students may reduce school burnout and the intention to drop out of school. Nevertheless, further research is required at the institutional and workplace levels to investigate the potential influence of perceived social relatedness on the development of burnout cynicism, and vice versa. Furthermore, the results indicated that female students, as well as those with older age or less work experience, experienced more burnout exhaustion than other respondents. A more comprehensive analysis is needed to gain better understanding of the factors that increase exhaustion within these groups of students.

**Keywords:** Vocational Education and Training, VET, Burnout, Dropout, Self-Determination Theory

## 1 Introduction

Motivation and wellbeing are key areas of research in education. Educators and researchers are challenged to identify how the learning environment can support students' motivation and wellbeing during their studies, or conversely, how it can undermine motivation and lead to illbeing and disengagement. In the context of Finnish vocational education and training (VET), the objective of vocational qualifications and VET is to support lifelong learning and professional growth and to help students grow into decent, well-rounded and educated human beings and members of society (Act on Vocational Education and Training, 531/2017). However, according to the School Health Promotion Study 2023, approximately one third of girls and one in five boys in grades eight and nine of basic education, general upper secondary schools, and vocational institutions consider their health to be average or poor (THL, 2024). The drop-out rate in initial VET for young people in the academic year 2021/2022 was 12.6% (Statistics Finland, 2023). These numbers indicate that further work is required to establish the necessary foundations for the aforementioned objectives. Although not all students can or will excel in the cognitive agendas that schools focus on, it is important for schools to provide supportive contexts for development which enhance students' adaptive capacity and mental health and, most importantly, do not harm students (Ryan & Deci, 2020). The national survey on Finnish VET, Amis-barometer showed that the most common reasons why VET students considered dropping out were related to interest in studying, the quality (or organisation) of teaching, learning difficulties

or health reasons (Otus & SAKKI, 2022). Consequently, further research and practical solutions are required to enhance students' motivation and well-being during their studies.

Self-determination theory (SDT) is a widely recognised theory of human development and well-being, with strong implications for education (Ryan & Deci, 2000, 2017, 2020). According to Ryan and Deci (2020), SDT posits that people are naturally prone to psychological growth and integration, and thus to learning, mastery, and connection with others, but also that these proactive human tendencies require supportive conditions to be robust. With the supporting conditions they theoretically refer to the three basic psychological needs; when people experience the satisfaction of relatedness, competence, and autonomy, they tend to internalise their value and regulation and experience activities as interesting and spontaneously satisfying, leading to increased engagement, learning, and well-being (Ryan and Deci, 2020). The objective of the study is to investigate the association between the satisfaction of three basic psychological needs (i.e., autonomy, competence and relatedness), two measures of school burnout, that is school exhaustion and school cynicism (Salmela-Aro et al., 2009), as well as students' intentions to drop out of school (Vallerand et al., 1997). To date, research on the relationship between basic psychological needs and negative consequences has been less extensive than that on positive processes (Nunes et al., 2023; Van der Broeck et al., 2021).

Although the generalisability of SDT's basic psychological need assumptions is well supported by numerous studies, it is important to appreciate cultural differences in how people perceive contexts and in how basic psychological needs are fulfilled (Ryan and Deci, 2020). For instance, previous empirical studies on SDT have shown that the emphasis between the three basic psychological needs has varied in different contexts (see e.g., Chen et al., 2015; Van den Broeck et al., 2016). Furthermore, theories and approaches to research are not static but evolving constructions of those who employ, critique, extend, or expand them in practice (Nolen, 2020). The aim of this study is to evaluate the potential of basic psychological needs support in addressing the current educational challenges pertaining to student motivation and wellbeing, burnout and dropout, in VET environments. It offers insights into the experiences of vocational students who navigate the boundaries between educational institutions and the workplace. This information will be of practical use especially to vocational teachers, but also to companies providing vocational training and interested in the development and wellbeing of their employees.

## 2 Theoretical Framework

In this study, we employ the SDT to examine the phenomenon of school burnout and dropout intentions in the Finnish VET. The following section will provide an overview of the role of basic psychological needs in the development of motivation and well-being. Furthermore,

we will discuss the concepts of burnout and dropout and their connections to basic psychological needs, based on earlier empirical studies conducted in the context of secondary education or work-based settings.

## 2.1 Basic Psychological Needs

The SDT is a broad framework for understanding the factors that facilitate or undermine motivation and psychological wellness (Ryan & Deci, 2020). The theory is known for identifying several distinct types of motivation that reflect different degrees of internalisation and integration of the value and regulation of the requested behaviour, based on the view that people experience greater autonomy in action when they internalise regulations and assimilate them to the self (Ryan & Deci, 2000). Intrinsic motivation reflects the inherent tendency to seek novelty and challenge, to extend and exercise one's capabilities, and to explore and learn, that is, to do an activity for the intrinsic satisfaction of the activity itself (Ryan & Deci, 2000). Instead, amotivation can result from either a lack of perceived competence to perform or a lack of value or interest, which is a strong negative predictor of engagement, learning and wellness (Ryan & Deci, 2020).

External motivation involves behaviours that span the continuum between amotivation and intrinsic motivation and varies in the extent to which it is regulated autonomously (Ryan & Deci, 2000): External regulation refers to behaviours that are driven by externally imposed rewards and punishments; internalisation refers to people 'taking in' a value or regulation; and integration refers to the further transformation of this regulation into one's own so that it later emerges from one's sense of self. Each of these motivations has specifiable consequences for learning, performance, personal experience, and well-being (Ryan & Deci, 2000). For instance, Van der Broeck et al.'s (2021) meta-analytic findings focused on SDT in a work context indicated that while intrinsic motivation is the most important type of motivation for employee well-being, identified regulation was more powerful in predicting performance and organisational citizenship behaviour. Research has also shown that external rewards can undermine intrinsic motivation when they are perceived as controlling or used as a means of exerting control, but they can also be provided in a way that supports individuals' autonomy and competence, enhance intrinsic motivation and foster a sense of ownership and engagement (Bandhu et al., 2024).

The SDT focuses on the processes by which non-intrinsically motivated behaviours can become truly self-determined, and the ways in which the social environment influences these processes (Ryan & Deci, 2000). Three basic psychological needs - autonomy, competence, and relatedness - are seen as particularly fundamental to supporting these processes (Ryan & Deci, 2020): *Autonomy* concerns a sense of initiative and ownership of one's actions, supported by experiences of interest and value (and undermined by experiences of external control,

whether through rewards or punishments); *Competence* concerns the feeling of mastery, the sense that one can succeed and grow. The need for competence is satisfied in well-structured environments that afford optimal challenges, positive feedback and opportunities for growth; Relatedness refers to a sense of belonging and connection, which is facilitated by the conveyance of respect and care. This need is satisfied when people see themselves as members of a group, experience a sense of communion and develop close relations (Van den Broeck et al., 2016). The SDT posits that basic psychological need support increases intrinsic motivation and internalisation, leading to higher achievement (Deci & Ryan, 2008). Furthermore, greater satisfaction of basic psychological needs will result in increased wellness, whereas greater need frustration will decrease wellness, regardless of conditional factors (Ryan & Deci, 2017). Ryan and Deci (2020) conceptualise psychological wellness in terms of full functioning. This implies according to the authors that a person can mobilise and harness psychological and physical energy to pursue valued activities, particularly activities for which the person feels ownership and motivation.

## 2.2 School Burnout and Dropout Intentions

The SDT has been used in numerous studies to examine the antecedents of motivation. In their recent review study Nunes et al. (2023) have demonstrated that SDT empirical research has focused more on the positive aspects of human functioning, with fewer studies investigating unsuccessful motivational processes. Also Van der Broeck et al.'s (2021) meta-analysis has shown that SDT's focus is still on positive outcomes although scholars have since broadened their scope and started to include ill-being (e.g., distress). The present study aims to enhance the existing knowledge regarding the relationship between BPNS and negative educational outcomes, with a specific focus on school burnout and dropout intentions among VET students.

According to Maslach et al. (2001), burnout is a prolonged response to chronic emotional and interpersonal stressors at work and is defined by the three dimensions of exhaustion, cynicism and inefficacy. While burnout was originally studied in terms of an individual's relational transactions in the workplace, the current view places the individual stress experience within a larger organisational context of people's relationship with their work (Maslach et al., 2001). Salmela-Aro et al. (2009) have introduced a concept of school burnout that is specifically designed to examine burnout in the school context through three dimensions: (a) Exhaustion at school; school-related feelings of strain, especially chronic fatigue due to overtaxing schoolwork, (b) cynicism towards the meaning of school; an indifferent or distal attitude towards schoolwork in general, a loss of interest in one's academic work and not seeing it as meaningful, and (c) sense of inadequacy at school; diminished feelings of competence

as well as less successful achievement and lack of accomplishment both in one's schoolwork and in school as a whole.

In their empirical study, Salmela-Aro et al. (2009) found that the more depressive symptoms Finnish adolescents had, the more exhaustion, cynicism and inadequacy they reported; and the lower their academic achievement and engagement in school was, the more cynicism and inadequacy they reported. Furthermore, when examining the development of school burnout among Finnish youth aged 16–18, Bask and Salmela-Aro (2013) reported that the risk of an individual with high levels of cynicism or feelings of inadequacy dropping out was clearly higher than among those who score low on these two components. These findings indicate that school burnout is not only associated with reduced levels of wellbeing and performance but also with decreased engagement and dropouts. The focus of this study is on the intentions of dropouts, rather than on actual dropouts. Vallerand et al. (1997) have suggested that the effect of motivation on behaviour is not direct, but mediated through behavioural intentions; For example, in the dropout process students first form behavioural intentions to drop out (or stay in), which are implemented several months later. Considering behavioural intentions in such situations should therefore have certain advantages, such as reflecting better the actual process through which people come to implement behaviour and allowing for better prediction of behaviour (Vallerand et al., 1997).

## 2.3 Basic Psychological Needs Satisfaction in Vocational Education

The SDT proposes that learning and educational outcomes will be improved by optimising the conditions for holistic development in schools, and therefor examines how different types of student motivation are associated with different qualities of engagement and learning, and how the climate created by teachers, parents and administrators affects both motivation and wellbeing (Ryan & Deci, 2017). In school contexts, it has been reported that the environment can either support or undermine students' experiences of themselves as competent to succeed and as autonomous or self-determined learners (Skinner & Pitzer, 2012). For example, providing meaningful choices, promoting competence-building experiences, and nurturing supportive relationships have been found to enhance intrinsic motivation and the quality of engagement (Bandhu et al., 2024). Bureau et al.'s (2022) meta-analysis (N=144 studies) has shown that autonomy-supportive behaviors from teachers and parents, as well as autonomy, competence, and relatedness satisfaction, are all generally associated with students' self-determined motivation. Prior empirical studies conducted at the secondary school level have also indicated that satisfaction of basic psychological needs is associated with enhanced intrinsic (as well as extrinsic) motivation, perceived competence and, subsequently, a reduced intention to drop out of school (e.g., Hardre & Reeve, 2003; Minnaert et al., 2011; Thi Thuy Hang et al., 2017; Vallerand et al., 1997). In addition, Solberg et al.'s (2023) scoping review

have revealed correlations between environmental factors and positive mental health among VET students, and indicated that supportive relationships between teachers and students play a pivotal role in the wellbeing of students.

VET learning environments extend beyond the conventional classroom setting and encompass workplaces as a learning environment. Several studies in organisational contexts have found that meeting basic psychological needs at work predicts positive outcomes such as work attitude, job commitment, job satisfaction, general health and life satisfaction in general (Volodina et al., 2019). Van den Broeck et al.'s (2016) meta-analytic review indicated that each of the basic psychological needs had significant relations with indicators of well-being, positive relations with job satisfaction and affective commitment (and negative relations with turnover intentions), as well as positive relations with performance measures and effort at work. Some SDT-based studies have also provided support for the relevance of BPNS in work-based learning environments. For instance, Volodina et al. (2019) studied apprentices in the two contexts of German dual VET, the vocational school and the company. Interestingly, the results showed that especially the satisfaction of competence needs in the company, but not in the vocational school, was related to VET satisfaction. Virkkula's (2020) research on Finnish vocational students showed that increasing autonomy in workshops when working with the help of professionals influenced the development of students' vocational competence which further supported the satisfaction of students' competence and relatedness needs. Wandeler et al. (2018) study on trainees in Swiss VET showed a positive relationship between hope (conceptualised as a cognitive motivational construct) and the BPNS in the workplace learning environment.

Empirical research has also shown that there is considerable variation in the learning opportunities offered by vocational learning environments. For instance, Rintala and Nokelainen (2019) have identified occupational and training-specific (school vs. workplace) differences between Finnish VET learning environments. These differences include for example the time allowed to learners to progress to more responsible tasks in the workplace, which in turn affects students' experience of competence and autonomy. In parallel, Virtanen et al. (2012) have demonstrated in the context of Finnish VET that the learning environments of different vocational fields at the interface of school and working life differ significantly from one another. Furthermore, their study indicated that the social characteristics of the workplace and the pedagogical arrangements were of greater importance for the success of the students' workplace learning than individual student-related factors. As proposed by Billett (2004), more than seeing workplaces as physical and social environments, they need to be understood as something negotiated and constructed through interdependent processes of affordance and engagement, and thus the focus should be on the learner's participation in situated work activities. The quality of learning outcomes is influenced by how individuals access both familiar and new work tasks and interact with colleagues, especially more

experienced co-workers (Billett, 2001). Similarly, Ryan and Deci (2017) posit that individuals are embedded within social structures that provide varying degrees of support for the satisfaction of basic psychological needs and opportunities to pursue those things that they value. Reciprocally, for systems or organizations to be stable and to flourish, there is a need for well-integrated members who are willing to enact their values and address their problems (Ryan & Deci, 2017). Consequently, the relationship between the BPNS and a learning environment can be seen as reciprocal and mutually reinforcing.

# 3 Material and Methods

We have formulated two research questions for our study, followed by the hypothesis based on the prior research presented in the previous section. RQ1) *Is the factorial structure consistent and reliable in describing the relationships between BPNS, burnout exhaustion, burnout cynicism and school dropout intentions?* We hypothesise that items loading on the exogenous BPNS factors will correlate positively with each other (Hypothesis 1, H1); items loading on the endogenous school burnout and dropout intentions factors will correlate positively with each other (Hypothesis 2, H2); exogenous BPNS factors will correlate negatively with the endogenous school burnout (Hypothesis 3, H3) and dropout intentions factors (Hypothesis 4, H4). RQ2) *How do students' autonomy, competence and relatedness satisfaction relate to burnout exhaustion, burnout cynicism and dropout intentions?* We hypothesise that the BPNS factors will be significantly negatively related to burnout (Hypothesis 5, H5) and dropout intentions (Hypothesis 6, H6). Burnout and dropout intentions should be significantly positively related (Hypothesis 7, H7).

## 3.1 Participants

In Finland, VET is available to young people who have completed compulsory education, to those without vocational qualifications, and to adults who are already working (Ministry of Education and Culture, 2024b). VET is mainly organised in institutions (including on-the-job training) or as apprenticeships (Ministry of Education and Culture, 2024b). Students can acquire skills in the workplace either entirely through an apprenticeship (based on a fixed-term employment contract) or a training-agreement (the student is not employed and does not receive a salary), or flexibly combine them during their studies (Ministry of Education and Culture, 2024c). At the beginning of VET, the student and the institution draw up a personal competence development plan for the student, outlining the content, schedule and methods of study (Ministry of Education and Culture, 2024a): The scope of initial vocational qualifications is usually 180 ECVET points (further vocational 150 points, and specialist vocational qualifications 180 points). Students can acquire skills in different learning

environments and in a flexible combination of these. For example, work-based training can be combined with classroom training, e-learning environments, virtual learning environments and self-study (Finnish National Agency for Education, 2024).

The link to the online survey was sent by email in February 2023 to all students at a large secondary vocational school in Finland, which offers training in various different vocational fields. The students were contacted by email through the institution's administration. In the cover letter, the students were informed about the voluntary nature of the participation and given the following ethical principle of the research: The survey will be answered anonymously, but some background information (age, work experience, etc.) will be collected to compare the different groups of respondents; It will not be possible to identify individual students from the published research results, and the data will be processed and stored confidentially; The answers will only be used for research purposes (e.g. will not be given to vocational institutions or workplaces); The study will be conducted in accordance with the Ethical Principles of Scientific Research as defined by the Finnish National Board on Research Integrity (TENK, 2019), and the EU General Data Protection Regulation. At the end of the survey, it was optional to provide contact details for further research and/or to give open feedback on the survey or on the topics of research. The cover letter was sent in Finnish and English, and it was possible to answer the survey in either language (translated into Finnish by the authors).

After two reminder emails, 280 responses were received by March 2023 (response rate was 16.5%). 170 of the participants were female (60.7%). Gender information was missing for 24 (8.6%) participants. The average age of the participants was 24.7 years ($SD$ = 10.841, min = 16.0, $max$ = 59.0). The average age of women ($M$ = 24.8, $SD$ = 10.505) and men ($M$ = 26.0, $SD$ = 12.427) was quite similar. Age information was missing for one participant (0.4%). The study years of the participants were distributed as follows: 1st year $n$ = 147 (52.5%), 2nd year $n$ = 90 (32.1%), 3rd year $n$ = 33 (11.8%), 4th year $n$ = 0 (0.0%), 5th year $n$ = 3 (1.1%). Most participants were first- and second-year students. Their average self-rated level of success in their VET studies was 1.4 ($SD$ = 0.668) on a scale of 0 = satisfactory, 1 = good, 2 = excellent. The average total work experience was 2.5 years ($SD$ = 2.500, $min$ = 0.0, $max$ = 5.0).

After missing data and multivariate normality analyses, the final data for analyses consisted of 255 participants, of whom 153 were female (60.0%). Participants' average age was 24.7 years ($SD$ = 10.740, $min$ = 16.0, $max$ = 59.0). As in the original data, most participants were second ($n$ = 82, 32.2%) and third ($n$ = 31, 12.2%) year students.

## 3.2 Instruments

Basic Psychological Need Satisfaction (BPNS) was measured using three scales from the Basic Psychological Need Satisfaction and Frustration – Work Domain (BPNSFWD) questionnaire (Chen et al., 2015; Schultz et al., 2015): Autonomy Satisfaction (AutS), Competence

Satisfaction (ComS) and Relatedness Satisfaction (RelS). Chen et al. (2015) reported reliability values (Guttman's *coefficient α*) for these scales across four countries as follows: AutS ($\alpha$ = .69 - .82); ComS ($\alpha$ = .74 - .88); RelS ($\alpha$ = .65 - .83). Schulz et al. (2015) examined BPNS in the work context and reported a composite reliability of .90. In the current study, exploratory factor analysis (EFA) with maximum likelihood (ML) estimation and oblimin oblique rotation ($\alpha$ = 0) was conducted with the *lavaan* program (Rosseel, 2012) to investigate the relevance of the three-factor structure for the current data. The result of the analysis showed that the nine items communalities were satisfactory (.429 - .809) and they loaded on the three factors according to the theory (67.7% variance explained). The factors had the following $\alpha$ and McDonald's *omega* total ($\omega_t$) reliabilities: AutS ($\alpha$ = .75, $\omega_t$ = .77); ComS ($\alpha$ = .89, $\omega_t$ = .90); RelS ($\alpha$ = .91, $\omega_t$ = .92). Each item was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The items were worded to cover both the educational institution and the work environment, so that the student could answer the questions from the perspective of the current learning environment (see Table 1).

*School burnout* was measured using three scales from the School Burnout Inventory (SBI) (Salmela-Aro et al., 2009): *Exhaustion* (BurnExh), *Cynicism* (BurnCyn) and *Inadequacy* (BurnIna). The SBI has been validated in the Finnish context in a large study by Salmela-Aro et al. (2009) involving a total of 1418 (709 girls, 709 boys) adolescents from 13 post-comprehensive schools (six upper secondary schools, seven vocational schools) with the following reliability values: BurnExh ($\alpha$ = .80); BurnCyn ($\alpha$ = .80); BurnIna ($\alpha$ = .67). EFA was used to analyse the three-factor structure with the current data. The results showed that the structure was not present as the two inadequacy items loaded on the same factor with the exhaustion items. This result was not very surprising, because even in the scale validation study by Salmela-Aro et al. (2009) with a larger data set, the $\alpha$ value of this factor was below the desired level of .7. After omitting the inadequacy items, EFA provided a theoretically plausible two-factor solution (communalities 0.387 - 0.952, 65.1% variance explained). As a result, we decided to use a two-factor model for school burnout: BurnExh, $\alpha$ = .82, $\omega_t$ = .83 (4 items) and BurnCyn, $\alpha$ = .92, $\omega_t$ = .91 (3 items). Each item was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The items were worded to cover both the educational institution and the work environment, so that the student could answer the questions from the perspective of the current learning environment (see Table 1).

*Dropout intentions* were assessed with two items measuring vocational students' future schooling intentions ('I often consider dropping out of school' and 'I intend to drop out of school'). These prospective items were validated in a study by Vallerand et al. (1997), who proposed and tested an SDT-based motivational model of school dropout. The study showed that there was a correlation of .63 between these two items. In the current study the correlation was .54 and the internal consistency values were: $\alpha$ = .73, $\omega_t$ = .82. Both items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

As mentioned above, all internal consistency values ($\alpha$ and $\omega_t$) were above the desired level of .7 (Kline, 2016). Table 1 shows the variable names, labels, descriptive statistics and $\alpha$ values. The controlling variables for the analyses were gender (0 = female, 1 = male), age (years), total work experience (years), study year (0 = first year, 1 = second year, 2 = third year, 3 = fourth year, 4 = fifth year), and vocational study success (0 = satisfactory, 1 = good, 2 = excellent).

*Table 1: Descriptive Statistics*

| *Variable* | *Label* | *M* | *SD* |
|---|---|---|---|
| *Autonomy satisfaction* (α = .75) | | | |
| aut01 | At school/work, I feel a sense of choice and freedom in the things I undertake. | 3.2 | 1.245 |
| aut02 | I feel that my decisions in learning/work situations reflect what I really want. | 3.3 | 1.032 |
| aut03 | I feel I have been doing in learning/work situations what really interests me. | 3.3 | 1.048 |
| *Competence satisfaction* (α = .89) | | | |
| com01 | At school/work, I feel capable at what I do. | 3.3 | 1.128 |
| com02 | When I am at school/work, I feel competent to achieve my goals. | 3.5 | 1.154 |
| com03 | In learning/work situations, I feel I can successfully complete difficult tasks. | 3.3 | 1.154 |
| *Relatedness satisfaction* (α = .91) | | | |
| rel01 | I feel that the people I care at school/work about also care about me. | 3.4 | 1.218 |
| rel02 | I feel connected with people who care for me at school/work, and for whom I care at work. | 3.4 | 1.198 |
| rel03 | At school/work, I feel close and connected with other people who are important to me. | 3.2 | 1.279 |
| *Burnout exhaustion* (α = .82) | | | |
| be01 | I feel overwhelmed by my schoolwork/work. | 2.9 | 1.386 |
| be02 | I often sleep badly because of matters related to my schoolwork/work. | 2.6 | 1.448 |
| be03 | I brood over matters related to my schoolwork/work a lot during my free time. | 3.3 | 1.268 |
| be04 | The pressure of my schoolwork/work causes me problems in my close relationships with others. | 2.3 | 1.426 |
| *Burnout cynicism* (α = .92) | | | |
| bc01 | I feel a lack of motivation in my schoolwork/work and often think of giving up. | 3.1 | 1.512 |
| bc02 | I feel that I am losing interest in my schoolwork/work. | 2.8 | 1.537 |
| bc03 | I'm continually wondering whether my schoolwork/work has any meaning. | 2.7 | 1.537 |
| *School dropout intentions* (α = .73) | | | |
| drop01 | I often consider dropping out of school. | 2.3 | 1.528 |
| drop02 | I intend to drop out of school. | 1.4 | 0.833 |

## 3.3 Analyses

The analysis showed that 264 participants (94.3% out of 280) had answered all 18 survey questions relating to the six scales used in this study (missing data from 16 participants, 5.7%). Participants provided a total amount of 4917 responses to these questions (123

missing answers, 2.5%). Little's (1988) test was performed using the *naniar* program (Tierney & Cook, 2023) to investigate whether the data were missing completely at random (MCAR). The result indicated that this was the case: $\chi^2(165) = 126.454$, $p = 0.989$. Missing data patterns were further investigated using the mice program (van Buuren & Groothuis-Oudshoorn, 2011). Results showed that there were 14 missing data patterns. After a thorough investigation of the patterns, it was decided to remove eight participants with a high frequency (> 80%) of missing responses to items related to the six factors analysed in this study. For the remaining 272 participants, multivariate normality tests were performed using the *MVN* program (Korkmaz et al., 2014) to detect possible extreme values (outliers). After removing the most extreme outliers ($n = 17$, 6.7%), the final data for the analyses consisted of 255 participants.

Bias due to common method variance (CMV) was investigated using ex-post methods (Ding et al., 2023). First, Harman's single-factor method was applied via exploratory factor analysis (EFA). When CMV is present, the total variance explained by a single-factor unrotated solution is more than 50% (Podsakoff et al., 2003). The results obtained with the *lavaan* program showed a total variance of 42.5% with 18 items. Secondly, the unmeasured latent method construct (ULMC) (Ding et al., 2023; Podsakoff et al., 2003) approach was carried out with the confirmatory factor analysis (CFA). The results showed that the differences in the standardised regression weights between the items loading on the original set of factors and the constrained method factor were quite small (*min* = -0.46, *max* = 0.04, *M* = -0.08, *SD* = 0.155) and the model with the constrained latent method factor did not fit to the data better than the original model.

The first research question concerned the construct validity and reliability of the six factors used in this study. Both types of construct validity (convergent and discriminant) were examined with bi-variate Kendall's tau-b (τb) correlations using the *sjPlot* (Lüdecke, 2022) program. Internal consistency reliabilities of the factors were investigated with Cronbach's α, which measures the degree to which responses are consistent across the items of a scale (Kline, 2016). The justification for the factorial structure was investigated with CFA (e.g., Bollen, 1989) using the *lavaan* program.

The second research question regarding the associations between the latent and endogenous variables was investigated using structural equation modeling (SEM, e.g., Bollen, 1989; Kaplan, 2000; Kline, 2016) with the *lavaan* program. BurnExh, BurnCyn and Drop were the endogenous variables and AutS, ComS and RelS were the exogenous variables in the analysis. Maximum likelihood estimation with robust standard errors and a scaled test statistic (MLR) was used for both CFA and SEM analyses. More specifically, as the data were (at least) at random missing, FIML (full information maximum likelihood) estimation was used (by using the "missing = fiml.x" argument in *lavaan*).

The tables in this paper were produced with *Stargazer* (Hlavac, 2018), *sjPlot* (Lüdecke, 2022) and *semTable* (Johnson & Kite, 2020) programs. Figure 1 was produced with the

programs *semPlot* (Epskamp, 2022) and *semptools* (Cheung & Lai, 2022). All the analyses were performed in the *R* statistical computing environment (R Core Team, 2020) using *RStudio* (RStudio Team, 2016) and *RMarkdown* (Allaire et al., 2022).

## 4 Results

*RQ1: Is the factorial structure consistent and reliable in describing the relationships between BPNS, burnout exhaustion, burnout cynicism and school dropout intentions?*

153 bi-variate item level Kendall τb correlations between 18 survey questions are presented in Table 2. The correlations ranged from -.43 to .72. The average of all correlations (calculated from their absolute values) was 0.35 (*SD* = 0.129). Kendall τb correlation values were converted for the effect size interpretation according to the following formula (Walker, 2003): sin(3.141592654 * τb * .5). Referring to Cohen's (1988) estimations for Pearson correlation (*r*), τb > |.06| equals weak association (*r* > |.1|), τb > |.19| equals moderate association (*r* > |.3|) and τb > |.33| equals strong association (*r* > |.5|). Thus, on average, the correlations presented in Table 2 indicate quite strong associations between the variables. The items *within each scale* correlated positively, and in most cases, with strong associations (τb > |.33|). This was in line with the H1 (exogenous items correlated positively) and H2 (endogenous items correlated positively).

*Table 2: Item-Level Bi-Variate Kendall τb Correlations*

| | aut01 | aut02 | aut03 | rel01 | rel02 | rel03 | com01 | com02 | com03 | be01 | be02 | be03 | be04 | bc01 | bc02 | bc03 | drop01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| aut02 | .39 | | | | | | | | | | | | | | | | |
| aut03 | .42 | .42 | | | | | | | | | | | | | | | |
| rel01 | .42 | .34 | .33 | | | | | | | | | | | | | | |
| rel02 | .41 | .38 | .31 | .69 | | | | | | | | | | | | | |
| rel03 | .33 | .35 | .27 | .63 | .69 | | | | | | | | | | | | |
| com01 | .41 | .39 | .40 | .47 | .42 | .38 | | | | | | | | | | | |
| com02 | .35 | .41 | .41 | .48 | .45 | .42 | .68 | | | | | | | | | | |
| com03 | .40 | .31 | .35 | .36 | .33 | .31 | .64 | .64 | | | | | | | | | |
| be01 | -.24 | -.18 | -.20 | -.18 | -.13 | -.09 | -.23 | -.25 | -.22 | | | | | | | | |
| be02 | -.31 | -.27 | -.27 | -.32 | -.28 | -.23 | -.27 | -.33 | -.34 | .49 | | | | | | | |
| be03 | -.16 | -.04 | -.02 | -.21 | -.17 | -.12 | -.19 | -.22 | -.24 | .37 | .43 | | | | | | |
| be04 | -.29 | -.25 | -.29 | -.36 | -.30 | -.22 | -.27 | -.34 | -.30 | .47 | .54 | .34 | | | | | |
| bc01 | -.39 | -.37 | -.42 | -.31 | -.27 | -.23 | -.34 | -.38 | -.35 | .48 | .45 | .23 | .47 | | | | |
| bc02 | -.39 | -.40 | -.42 | -.33 | -.30 | -.28 | -.36 | -.43 | -.35 | .39 | .42 | .20 | .45 | .72 | | | |
| bc03 | -.37 | -.38 | -.37 | -.36 | -.31 | -.24 | -.33 | -.41 | -.38 | .37 | .39 | .25 | .53 | .61 | .71 | | |
| drop01 | -.34 | -.33 | -.39 | -.39 | -.31 | -.28 | -.37 | -.42 | -.37 | .44 | .41 | .25 | .49 | .60 | .61 | .62 | |
| drop02 | -.26 | -.23 | -.30 | -.25 | -.22 | -.22 | -.29 | -.31 | -.28 | .26 | .28 | .08 | .28 | .39 | .42 | .38 | .54 |

*Note*. See Table 1 for item descriptions.

Table 3 presents 15 correlations between six factors. Factor variables were constructed by averaging the values of the survey items loading on each factor. Factor correlations ranged from -.5 to .6. The average of all correlations (calculated from the absolute values) was .4 (*SD* = 0.095). On average, the correlations in Table 3 indicate quite strong associations between the factors. In parallel with H3, the results showed that the BPNS factors were at least moderately ($\tau b > |.19|$) negatively associated with Burnout exhaustion and cynicism. H4 was also confirmed, as mostly strong ($\tau b > |.33|$) negative associations were found between the BPNS factors and Dropout intentions.

*Table 3: Factor-Level Bi-Variate Kendall τb Correlations*

| | AutS | ComS | RelS | BurnExh | BurnCyn |
|---|---|---|---|---|---|
| ComS | .49 | | | | |
| RelS | .44 | .44 | | | |
| BurnExh | -.28 | -.32 | -.25 | | |
| BurnCyn | -.47 | -.42 | -.31 | .48 | |
| Drop | -.41 | -.41 | -.32 | .45 | .61 |

*Note*. AutS = Autonomy satisfaction, ComS = Competence satisfaction, RelS = Relatedness satisfaction, BurnExh = Burnout exhaustion, BurnCyn = Burnout cynicism, Drop = School dropout intentions.

The justification for the six-factor model was further analysed using CFA. Before the analysis, the assumption of just-identification (equal number of observations and parameters) or over-identification (less parameters than observations) was examined (Kline, 2016). As the CFA model had 18 observed manifest variables, the maximum number of observations was 18(18 + 1) / 2 = 171. The model met the identification assumption (over-identified) as the number of non-redundant elements was greater than the number of parameters to be estimated: 171 - 69 = 102.

Required minimum sample size for the CFA model was investigated with the *semPower* (Moshagen, 2021; Moshagen & Erdfelder, 2016) program (chi-square model test). The effect was set to .05 (desired threshold value of Root-Mean-Squared Error of Approximation, see Kline, 2016, p. 274) alongside with the traditional α (.05) and power (1 - β = .80) values. Simulation analysis indicated that the sample size of current data ($n$ = 255) exceeded the minimum sample size requirement ($n$ = 202).

The results (Table 4) showed that the factor loadings were quite high with a reasonable amount of error. The fit measures showed that the model explained the data quite well. The Root Mean Square Error of Approximation (*RMSEA*) is a parsimony *corrected indice* that takes the number of parameters of the model into account. The value of .06 (90% C.I. .05 - .07) was below the fair fit level of .08 (Themessl-Huber, 2014). The *absolute fit indice*, Standardized Root Mean Square Residual (*SRMR*) estimate (.05) was clearly below the level of .10

(Kline, 2016). The *incremental fit indices* also showed a good fit of the model to the data, as both the Comparative Fit Index (*CFI* = 0.96) and the Tucker-Lewis Index (*TLI* = 0.94) estimates were above the desired level of .90 (Kline, 2016). In conclusion, the six-factor model was justified and fitted the data quite well. It should be noted that the p-value of the $\chi^2$ test was less than .05 (indicating poor fit between the model and the data). However, this test is known to be sensitive to larger sample sizes (Themessl-Huber, 2014).

*Table 4: Unstandardized (B) and Standardized (β) Confirmatory Factor Analysis Results*

| | *RQ 1 model* | |
|---|---|---|
| | *B(S.E.)* | *β(S.E.)* |
| | *Factor Loadings* | |
| AutS | | |
| aut01 | 1.00+ | 0.70(0.05) *** |
| aut02 | 0.83(0.09)*** | 0.69(0.05) *** |
| aut03 | 0.86(0.09)*** | 0.71(0.05) *** |
| ComS | | |
| com01 | 1.00+ | 0.88(0.02) *** |
| com02 | 1.05(0.06)*** | 0.87(0.03) *** |
| com03 | 0.98(0.06)*** | 0.81(0.04) *** |
| RelS | | |
| rel01 | 1.00+ | 0.87(0.03) *** |
| rel02 | 1.03(0.06)*** | 0.90(0.03) *** |
| rel03 | 1.02(0.07)*** | 0.85(0.03) *** |
| BurnExh | | |
| be01 | 1.00+ | 0.73(0.04) *** |
| be02 | 1.12(0.09)*** | 0.79(0.03) *** |
| be03 | 0.70(0.08)*** | 0.57(0.05) *** |
| be04 | 1.09(0.09)*** | 0.78(0.04) *** |
| BurnCyn | | |
| bc01 | 1.00+ | 0.86(0.02) *** |
| bc02 | 1.08(0.04)*** | 0.92(0.01) *** |
| bc03 | 1.01(0.05)*** | 0.86(0.02) *** |
| Drop | | |
| drop01 | 1.00+ | 0.95(0.03) *** |
| drop02 | 0.28(0.03)*** | 0.63(0.05) *** |
| | *Fit Indices* | |
| $\chi 2$ (*df*) | 224.48(120) | |
| p | < .001 | |
| RMSEA | 0.06 | |
| $p_{H0:<=.05}$ | 0.08 | |

| | |
|---|---|
| *C.I.* lower | 0.05 |
| *C.I.* upper | 0.07 |
| *SRMR* | 0.05 |
| *CFI* | 0.96 |
| *TLI* | 0.94 |

*Note*. See Table 1 for item descriptions. + = Fixed parameter, * = $p < .05$, ** = $p < .01$, *** = $p < .001$, AutS = Autonomy satisfaction, ComS = Competence satisfaction, RelS = Relatedness satisfaction, BurnExh = Burnout exhaustion, BurnCyn = Burnout cynicism, Drop = School dropout intentions, $\chi^2$ = Value for Maximum likelihood estimation, *df* = Degrees of freedom, *p* = Probability for null hypothesis that the model fits the data perfectly (preferred $p > .05$). RMSEA = Root mean square error of approximation, $p_{(H0 \leq .05)}$ = Probability for null hypothesis that RMSEA is smaller or equal than .05 (preferred $p > .05$), *C.I.* lower = Lower 90% confidence interval for *RMSEA*, *C.I.* upper = Upper 90% confidence interval for *RMSEA*, *SRMR* = Standardized Root Mean Square Residual, *CFI* = Comparative Fit Index, *TLI* = Tucker-Lewis Index.

*RQ2: How do students' autonomy, competence and relatedness satisfaction relate to burnout exhaustion, burnout cynicism and dropout intentions?*

The latent regression model (Figure 1 and Table 5) investigated whether the three exogenous BPNS factors (Autonomy, Competence, Relatedness) were related to three endogenous factors (Burnout exhaustion, Burnout cynicism, School dropout intentions). The analysis was performed with the controlling variables (participants' age, gender, study year, school success and total work experience).

Before the analysis, the assumption of just-identification was examined (Kline, 2016). As the model had 18 observed manifest variables, the maximum number of observations was 18(18 + 1) / 2 = 171. The model met the identification assumption (over-identified) as the number of non-redundant elements was greater than the number of parameters to be estimated: 171 - 84 = 87. The required minimum sample size for the model was investigated with the *RMSEA* effect set to .05 alongside with the traditional α (.05) and power (1 - β = .80) values. Simulation analysis indicated that the sample size of the current data ($n = 255$) exceeded the minimum sample size requirement ($n = 181$).

The model showed quite satisfactory fit (*CFI* = .92, *TLI* = .90), but the *RMSEA* = .07 (90% C.I. = .06 - .08) and *SRMR* = .10 values were slightly above their desired threshold levels (the lower 90% C.I. of *RMSEA* < .05 and *SRMR* < .10). To improve the model fit for RMSEA and SRMR, the non-significant controlling "study year" (skewed towards the first- and second-year students), and "school success" (skewed towards excellent marks) variables were omitted from the model. In addition, examination of the modification indices showed that the model would benefit from allowing one burnout item bc03 ("I'm continually wondering whether my schoolwork/work has any meaning.") to covary with two other burnout items, namely bc01 ("I feel a lack of motivation in my schoolwork/work and often think of giving up.") and be04 ("The pressure of my schoolwork/work causes me problems in my close relationships with others."). After these modifications, the model fit indices were satisfactory: *CFI* = .95, *TLI* = .94, *SRMR* = .08., *RMSEA* = .05 (90% *C.I.* = .04 - .07).

Next, we report statistically significant unstandardised (*B*) and standardised (β) regression estimates alongside standard errors (*S.E.*) and *p*-values. The results (Figure 1 and Table 5) showed that autonomy, competence, and relatedness satisfaction had negative relations with BurnExh, but only the regression estimate of autonomy was statistically significant [*B* = -0.39 (β = -0.33), *S.E.* = 0.19, *p* = .038]. This finding partially supports H5, as it was expected that stronger negative relationships would be observed. In parallel with H5, AutS was negatively related to BurnCyn, *B* = -1.17 (β = -0.77), *S.E.* = 0.22, *p* < .001. In other words, higher levels of autonomy satisfaction were related to lower levels of burnout cynicism. Also, ComS had a negative relation to BurnCyn, but the regression estimate was not statistically significant. Contrary to the hypothesis, RelS was positively (but not significantly) related to BurnCyn.

According to the results, school dropout intentions decreased alongside higher levels of autonomy satisfaction, *B* = -0.66 (β = -0.42), *S.E.* = 0.21, *p* = .002. ComS and RelS also had negative (non-significant) relations with Drop, partially supporting H6. The conclusion based on these results is that both H5 and H6 were partially supported, as the BPNS factors (with one exception) were negatively related to the burnout and dropout factors, and only three relations were statistically significant.

H7 was supported, as the covariances of the endogenous factors were significantly positive: BurnExh was positively related to BurnCyn (*B* = 0.42, β = 0.58), *S.E.* = 0.09, *p* < .001, BurnExh was positively related to Drop (*B* = 0.35, β = 0.45), *S.E.* = 0.10, *p* < .001, and also BurnCyn was positively related to Drop (*B* = 0.61, β = 0.67), *S.E.* = 0.07, *p* < .001.

The age of the participants had a positive effect on BurnExh, *B* = 0.02 (β = 0.22), *S.E.* = 0.01, *p* = .042. This indicates that as students get older, their burnout exhaustion increases. Gender was negatively related to BurnExh [*B* = -0.39 (β = -0.18), *S.E.* = 0.14, *p* = .006], indicating higher burnout exhaustion for female students. Total work experience was negatively related to BurnExh, *B* = -0.18 (β = -0.37), *S.E.* = 0.0, *p* = .010.

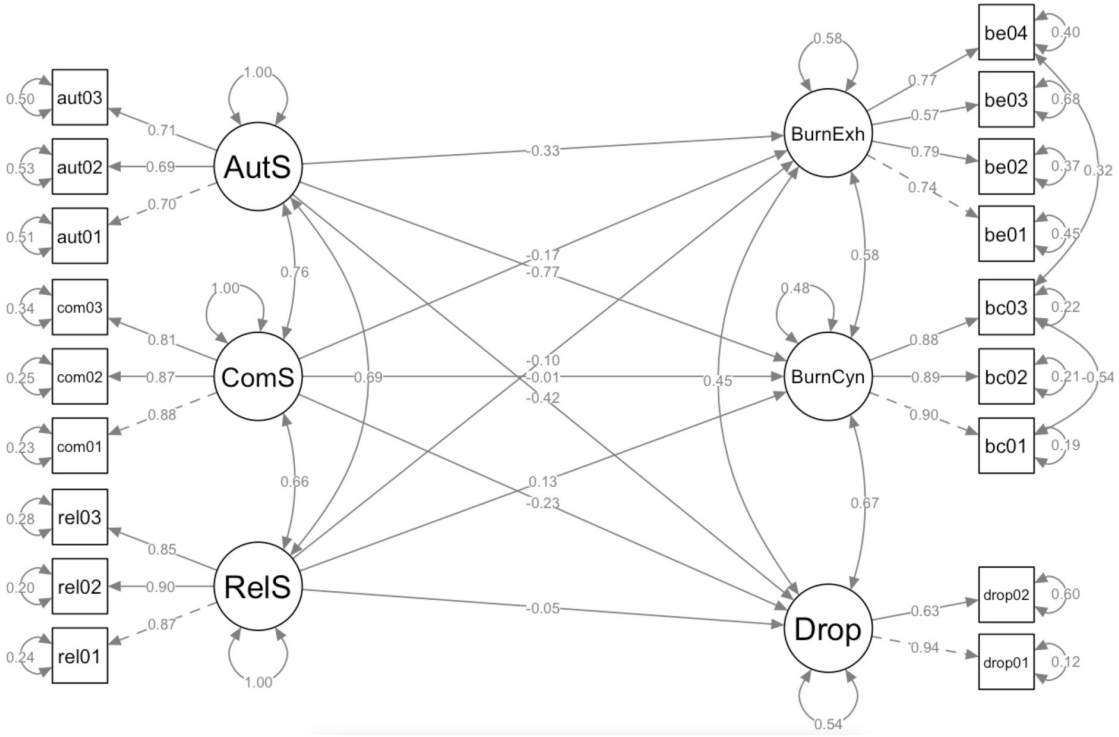
The model explained quite large part of the variances of the endogenous factors: $R^2$ = .42 (41.8%), $R^2$ = .52 (51.9%), $R^2$ = .46 (46.4%). The exogenous variables explained best the variance of burnout cynicism.

*Table 5: Unstandardized (B) and Standardized (β) Estimates of the Latent Variable Model*

| | *RQ 2 model* | |
|---|---|---|
| | *B(S.E.)* | *β(S.E.)* |
| | *Regression Slopes* | |
| *BurnExh* | | |
| AutS | -0.39(0.19)* | -0.34(0.16)* |
| ComS | -0.18(0.15) | -0.17(0.14) |
| RelS | -0.10(0.10) | -0.10(0.10) |
| Age | 0.02(0.01)* | 0.22(0.11)* |

| | | |
|---|---|---|
| Gender | -0.39(0.14)** | -0.18(0.06)** |
| Total workexp | -0.18(0.07)** | -0.37(0.14)** |
| *BurnCyn* | | |
| AutS | -1.17(0.22)*** | -0.77(0.13)*** |
| ComS | -0.01(0.17) | -0.01(0.12) |
| RelS | 0.17(0.13) | 0.13(0.10) |
| Age | -0.01(0.01) | -0.10(0.09) |
| Gender | -0.17(0.14) | -0.06(0.05) |
| Total workexp | -0.08(0.08) | -0.12(0.12) |
| Drop | | |
| AutS | -0.66(0.21)** | -0.42(0.13)** |
| ComS | -0.32(0.18) | -0.23(0.12) |
| RelS | -0.06(0.13) | -0.05(0.10) |
| Age | 0.02(0.01) | 0.16(0.09) |
| Gender | -0.29(0.16) | -0.10(0.06) |
| Total workexp | -0.15(0.08) | -0.24(0.13) |
| | *Fit Indices* | |
| $\chi^2(df)$ | 294.23(163.00) | |
| *p* | < .001 | |
| RMSEA | 0.05 | |
| $p_{H0:<=.05}$ | 0.31 | |
| *C.I.* lower | 0.04 | |
| *C.I.* upper | 0.07 | |
| *SRMR* | 0.08 | |
| *CFI* | 0.95 | |
| *TLI* | 0.94 | |

*Note*. * = $p < .05$, ** = $p < .01$, *** = $p < .001$, AutS = Autonomy satisfaction, ComS = Competence satisfaction, RelS = Relatedness satisfaction, BurnExh = Burnout exhaustion, BurnCyn = Burnout cynicism, Drop = School dropout intentions, $\chi^2$ = Value for Maximum likelihood estimation, *df* = Degrees of freedom, *p* = Probability for null hypothesis that the model fits the data perfectly (preferred $p > .05$). *RMSEA* = Root mean square error of approximation, $p_{(H0\leq.05)}$ = Probability for null hypothesis that *RMSEA* is smaller or equal than .05 (preferred $p > .05$), *C.I.* lower = Lower 90% confidence interval for *RMSEA*, *C.I.* upper = Upper 90% confidence interval for *RMSEA, SRMR* = Standardized Root Mean Square Residual, *CFI* = Comparative Fit Index, *TLI* = Tucker-Lewis Index.




*Note*. AutS = Autonomy satisfaction, ComS = Competence satisfaction, RelS = Relatedness satisfaction, BurnExh = Burnout exhaustion, BurnCyn = Burnout cynicism, Drop = School dropout intentions. The solid lines represent paths freely estimated by the model (standardised parameter estimates) and the dashed lines indicate fixed paths (to set the scale of latent variables).

*Figure 1: Path Diagram of the Structural Equation Model With Standardized Estimates*

# 5 Discussion

This study examined the association between the satisfaction of three basic psychological needs (i.e., autonomy, competence and relatedness), two measures of school burnout, that is school exhaustion and school cynicism (Salmela-Aro et al., 2009), as well as students' intentions to drop out of school (Vallerand et al., 1997). The first research question investigated the justification of the six-factor model in the context of Finnish VET using bi-variate correlations and CFA. Correlation analyses showed that the items within each factor correlated positively strongly, confirming H1 (BPNS: Autonomy, Competence, Relatedness) and H2 (Burnout Exhaustion, Burnout Cynicism, Dropout). The BPNS factors were negatively associated with the two burnout factors (H3) and the dropout intention factor (H4), confirming both hypotheses. The results of CFA showed that CMV was not present, and the model fitted the data rather well.

The results of the second research question showed that all BPNS factors were negatively related to school burnout exhaustion, but only relation of autonomy was statistically significant. Autonomy and competence had negative relations with school burnout cynicism but - again - only the relation of autonomy was statistically significant. Interestingly, relatedness was *positively* (but non-significantly) related to school burnout cynicism. H5 was thus only partially confirmed. As expected, all three BPNS factors were negatively related to school dropout intentions, but only the relation of autonomy was statistically significant. These findings partially confirmed H6. Finally, there were statistically significant positive associations between school burnout and dropout intentions factors (confirming H7). Overall, the statistical results indicate that supporting the BPNS of VET students has the potential to reduce school burnout and their intentions to drop out of school. Nevertheless, the findings call for further research at the institutional and workplace levels to investigate the potential influence of perceived social relatedness on the development of burnout cynicism, and vice versa.

## 5.1 Limitations

It is important to acknowledge the limitations of our study when interpreting the results. Firstly, the sample size was relatively small, and the data was collected in one VET institution. Further investigation with a larger sample size and a broader range of institutions would provide more conclusive evidence for the results in the future. Secondly, although the data contained a rather diverse sample of different occupational sectors, a more detailed consideration of the learning environments in which the participants were situated at the time, for instance whether they were primarily situated in an educational institution or in a workplace, would have offered valuable insights into this study. While workplaces are dependent on learners' own preferences and goals, they also impose certain expectations and norms to ensure their own continuity and

survival (Billett, 2004). Furthermore, the survey questions were designed to measure only students' experiences of BPNS within the learning environments of educational institutions and workplaces. Consequently, the focus of the study was on investigating how learning environments can promote vocational students' satisfaction with autonomy, competence and relatedness, without considering these factors in reverse. The use of qualitative data in future studies would facilitate a more comprehensive understanding of the reciprocal dynamics between basic psychological needs and learning environment. For example, a more in-depth data set may have allowed a deeper understanding of the mechanisms through which social relatedness in a VET context was positively (though not statistically significantly) associated with cynicism. Overall, given that studies on SDT have concentrated on examining how the learning environment can be structured to foster intrinsic motivation and autonomy (Bandhu et al., 2024), there is a need for further research exploring how these situational and reciprocal relationships are constituted in a variety of learning environments and how they impact all stakeholders involved.

Thirdly, the current study did not utilise the full potential of SBI and BPNSFWD instruments, as the third scale of SBI (inadequacy at school) and three frustration scales from BPNSFWD were not included in the analyses. Although the items related to the SBI inadequacy factor were included in the questionnaire, its exclusion from the analysis was not very surprising, since even in the scale validation study by Salmela-Aro et al. (2009) with a larger data set, the alpha value of this factor was below the desired level of .7. Although existing research (e.g., Olafsen et al., 2021) recommends investigation of the basic psychological needs satisfaction and frustration simultaneously due to their asymmetric nature (i.e., the absence of need satisfaction does not necessarily imply the presence of need frustration, but the presence of need frustration does imply the absence of need satisfaction), the frustration component was not included in the analysis because we wanted to focus on the positive indicators (exogenous variables) of the student well-being in this study. A future study with a larger sample (allowing more complex CFA and SEM models, also including the frustration component) should address this issue, being able to provide a more comprehensive view of the research topics.

Fourthly, cross-sectional design and mono-measurement are the limitations of this study as the former does not allow causal interpretations of the results (e.g., Pearl, 2000) and the latter increases the risk of common method variance (CMV). Potential sources of CMV include self-reporting bias, survey instrument's complexity, length, and design (e.g., order of items). As the research suggests the use of ex-ante (prior to data collection) rather than ex-post (e.g., latent method factor) procedures to control CMV (e.g., Ding at al., 2023; Podsakoff et al., 2003), an effort was made to reduce the impact of CMV by emphasising the protection of respondents' anonymity and the absence of right or wrong answers to the questions. Efforts were also made to reduce the CMV by using previously validated instruments and following their instructions regarding the order in which questions were presented (e.g., the burnout exhaustion and cynicism questions appeared in a mixed order).

## 5.2 Results in Light of Earlier Research

The results of this study support the findings of previous SDT research, indicating the value of addressing basic psychological needs in educational settings. This study provided insights into the experiences of vocational students operating in both institutional and work-based environments. The results can be considered relevant to other countries where VET is implemented in a broadly similar manner through collaboration between educational institutions and workplaces. Nevertheless, the mean age of Finnish participants (24.7 years) must be taken into account, as it may be higher than in other countries. This is due to the Finnish education system, which also provides education to adults already engaged in employment. Furthermore, the findings align with those of prior SDT research conducted in the context of secondary education. Previous research has shown, for example, a link between basic psychological needs and academic achievement and motivation, which in turn is linked to dropping out of school (e.g., Hardre & Reeve, 2003; Minnaert et al., 2011; Thi Thuy Hang et al., 2017; Vallerand et al., 1997). The present study was concerned with the direct associations between BPNS, school burnout and intentions to drop out of VET.

In contrast with our initial hypothesis, relatedness satisfaction was not found to be a factor only in reducing school burnout. Instead, it was positively associated with school cynicism, although the relationship was not statistically significant. Parallel findings have been reported in some previous studies. Chen et al. (2015) reported, for example, in their study of late adolescents that both autonomy and competence satisfaction contributed to well-being, but no unique association was found between relatedness satisfaction and well-being (although a positive relation with self-esteem and a negative relation with depressive symptoms were observed at the correlational level). Further research is required to identify the various factors that may influence the deviant role of social relatedness, particularly in work-based settings. As stated by Billett (2004), while workplace participatory practices provide a platform on which to construct a workplace pedagogy, it requires an understanding of the role of interdependent processes; Although participation may be actively supported, welcomed, resented or actively opposed, despite efforts to regulate participation, individuals will decide how they will participate in and what they learn from what they experience. For example, empirical research in the context of Finnish VET has indicated that the relationship between the learner and the workplace trainer may be negatively affected by such factors as the learner's poor work ethic or the trainer's lack of personal engagement and unpredictable behaviour (Rintala, 2020). Consequently, although VET research has long demonstrated the importance of students' social integration, particularly in work-based learning, much remains to be investigated in this area. A more comprehensive analysis of the vocational student's role as both a novice/trainee worker in the workplace and a vocational student in a classroom setting, would provide a more accurate understanding of the social relationships that may increase the risk of cynicism.

The SDT framework is guided by the view that basic psychological needs are universal, and that the fact that they need to be satisfied for people to experience optimal well-being does not depend on culture - however, the way the needs tend to get satisfied may differ by culture (Deci & Ryan, 2008). A more detailed examination of the cultural and professional characteristics of the studied context would allow for a deeper understanding of the manifestation of BPNS in Finnish culture and across different occupations and work cultures. For instance, it is possible that the results regarding social relatedness are related to the occupations represented in the sample used in this study. In Virtanen et al.'s (2009) study on workplace learning among Finnish vocational students, it was found that the mean value for working alone was slightly higher than that for social learning, with students of commerce and administration giving the lowest scores for social learning compared to students of social sciences and health care, who gave the highest scores for social learning. Rintala's (2020) research in the Finnish VET system has demonstrated that there are differences between vocational sectors in the extent to which students are entrusted with responsibility in the workplace. This has a profound impact on their experiences of autonomy and the manner in which they can demonstrate their vocational competence (Rintala, 2020). Moreover, it is important to consider that the social network of vocational students may extend beyond the immediate workplace, depending on the specific vocational field and their particular role within it. As the social relationships and interpersonal interactions of students may vary considerably, encompassing a diverse array of networks, more comparative analyses is needed between vocational sectors and organisations.

Gender was found to be one of the predictors of burnout in this study, with female students reporting more burnout exhaustion than male students. In parallel, a study by Salmela-Aro et al. (2009) showed that in the Finnish context, girls were more likely to suffer from school burnout than boys (and those with higher great point averige) in both comprehensive and upper secondary schools. Great point averige was not examined in the current study, but self-reported academic performance in VET studies was not found to be a statistically significant factor in relation to burnout or dropout intentions. Moreover, Finnish Amisbarometer (Otus & SAKKI, 2022) have revealed that the exposure of gender minorities to risk factors for dropping out is worryingly high and that around one in five of those of the other gender (other than female or male) and those who did not wish to report their gender had considered dropping out or changing their place of study. Consequently, further investigation is required to determine the factors that contribute to higher levels of burnout and dropout among different genders and gender identities. In addition, it is also important to examine the ways in which the situation differs between female-dominated and male-dominated occupational sectors. In Finland, for example, female and male students are more likely to drop out of education in different fields of education; in initial VET in the academic year 2021/2022, the fields of education with the highest number of students by gender had the lowest drop-out

rates (e.g., for women this was health and social work, where the drop-out rate was 11.7%; for men this was technical fields, where the drop-out rate was 13.3%). Nevertheless, in almost all fields of education, males drop out more often than females at all ages (Statistics Finland, 2023).

Finally, the results of this study showed that burnout exhaustion increased with older age, whereas total work experience was negatively related to burnout exhaustion. Van den Broeck et al. (2016) found in their large meta-analysis of SDT in the work context that autonomy and competence were positively related to both age and organisational tenure. Thus, the changes in the basic psychological needs with study years, age and career development are important to be considered in future research. Ryan and Deci (2017) also recommend a within-person level of analysis as part of SDT, as they posit that variations in need satisfaction and frustration over time and across situations predict variations in optimal functioning and wellness versus illness. A within-person level of analysis and longitudinal research would be particularly valuable in the Finnish context, where a large proportion of vocational students are adults, many of whom may already have some work experience in their field of study. Overall, future VET research requires a multifaceted approach to address basic psychological needs, such as longitudinal data, a more in-depth focus on individual groups of students, and consideration of the diversity of VET learning environments.

## 5.3 Practical Implications and Conclusions

The results of this study indicated that supporting vocational students' satisfaction of basic psychological needs in VET settings has a mostly positive impact on preventing dropout and reducing dropout intentions. In this section, we present some recommendations for the implementation of basic psychological needs support in practice. Within the educational institution, autonomy can be supported by offering choices in courses, projects, and assignments that help students feel a greater sense of ownership and control over their learning. Creating personalised learning plans and goals will help students feel that their individual needs and interests are being addressed. Moreover, providing constructive and encouraging feedback helps students feel capable and in control of their own learning. Sense of competence can be supported by providing challenging yet achievable tasks that help students build their skills and confidence. Clear instructions and learning resources will enable students to understand what is expected of them and how to achieve it. Regular constructive feedback and opportunities for practice and revision will help students identify their progress and areas for improvement, thereby increasing their sense of competence. Relatedness can be promoted by fostering a collaborative and inclusive classroom environment that helps students feel connected to their peers and instructors. Group projects and peer learning opportunities will encourage students to build relationships and work together. In addition, providing supportive

and accessible faculty members who are interested in students' well-being will help students feel valued and understood.

In the workplace, autonomy can be supported by providing opportunities to work independently and make decisions in tasks, sufficient guidance and support (while providing space and trust), and regular feedback and opportunities to reflect on learning and work. Sense of competence can be supported by providing tasks that match students' skill levels and the gradual increase in task complexity to support their development of competence. Providing mentoring and hands-on training will help students learn new skills in a supportive environment. Regular assessment of performance and constructive feedback will help students identify their strengths and areas for improvement, thereby increasing their sense of competence. Relatedness can be fostered by creating a welcoming and inclusive work culture that helps students feel part of the team. Encouraging teamwork and collaboration on projects will help students build relationships with colleagues. Offering regular check-ins and mentoring opportunities will provide students with sense of support and guidance, helping them feel connected and valued by their supervisors and peers. Finally, educators must develop an awareness of the various stakeholders involved in VET learning environments and the capacity to provide pedagogical assistance in workplaces to support the satisfaction of basic psychological needs.

## Ethics Statement

This paper follows the Ethical Principles of the IJRVET Ethics Statement. The study has been conducted in accordance with the Ethical Principles of Scientific Research by the Finnish National Board on Research Integrity.

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