sustainability

MDPI

Article

Promoting Sustainable Well-Being: Burnout and Engagement in South African Learners

Christiaan I. Bekker [1], Sebastiaan Rothmann [1,*], Magda M. Kloppers [2] and Sufen Chen [1,3]

[1] Optentia Research Unit, North-West University, Potchefstroom 2531, South Africa; christiaan.bekker@nwu.ac.za (C.I.B.); sufchen@mail.ntust.edu.tw (S.C.)
[2] Self-Directed Learning, North-West University, Potchefstroom 2531, South Africa; magda.kloppers@nwu.ac.za
[3] Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taipei City 106, Taiwan
* Correspondence: ian@ianrothmann.com; Tel.: +27-16-9103410

Abstract: This study aimed to analyze the latent profiles of burnout and engagement of learners and to investigate differences between these profiles regarding demographic and contextual variables and academic boredom. The findings have practical implications for educators and professionals in the fields of education and psychology. Grade 9 and 10 South African learners (N = 544) studying English and Mathematics as school subjects participated in the study. Five learner burnout and engagement profiles were identified: healthy engaged (10.66%), moderately balanced (27.57%), slightly disengaged (30.7%), moderately burned-out (20.4%), and burned-out (10.66%). Academic boredom in Mathematics and English was linked to burnout-engagement profiles. The healthy engaged and moderately balanced profiles exhibited significantly lower academic boredom levels in both subjects than the other profiles. Positive relationships with teachers and interest in the subject were crucial across all profiles to diminish academic boredom and enhance engagement, especially in English. Various demographic and contextual variables were associated with burnout-engagement profiles. Home study environments, nurturing positive teacher-learner relationships, and fostering intrinsic interest in subjects can enhance engagement and mitigate burnout in secondary school learners. Sustainable interventions could be created by teachers or researchers, implemented by schools, and taken up in important policies within South Africa, showcasing how the SGDs of improved health and well-being and delivering quality education could be achieved.

Keywords: academic boredom; latent profile analysis; learner burnout; learner engagement; secondary school; South Africa; sustainability

Citation: Bekker, C.I.; Rothmann, S.; Kloppers, M.M.; Chen, S. Promoting Sustainable Well-Being: Burnout and Engagement in South African Learners. *Sustainability* **2024**, *16*, 8518. https://doi.org/10.3390/su16198518

Academic Editor: Tai-Yi Yu

Received: 21 August 2024
Revised: 25 September 2024
Accepted: 27 September 2024
Published: 30 September 2024

1. Introduction

Learner burnout and engagement have not been well-researched within the South African context. With the demands of school and the pressure to perform increasing yearly, South African learners experience burnout and become disengaged over time, often leading to high dropout rates at the end of Grade 9 [1]. The boredom of learners can increase burnout and disengagement as learners struggle to find meaning in their academic activities. Therefore, academic boredom can be a precursor to both burnout and disengagement, creating a cycle that can negatively impact learners' academic success and overall well-being [2–9]. The current study aimed to identify learner burnout and engagement profiles using a person-centered approach. Further analyses of academic boredom across the profiles, considering demographic variables and contextual factors, would provide insights and suggestions on reducing boredom and burnout and increasing engagement.

1.1. Learner Burnout and Engagement

Learner burnout is a three-dimensional construct that includes exhaustion, cynicism, and a sense of inadequacy [10,11]. Exhaustion refers to a persistent feeling of weariness

or dwelling on school-related issues due to academic demands or pressure. Cynicism describes an indifferent attitude towards school or learning. A sense of inadequacy involves a reduced sense of competence and accomplishment, or the inability to find meaning in tasks [12–14]. Burnout research has been undertaken mainly in WEIRD (Western, educated, industrialized, rich, and democratic) countries, focusing on institutional, organizational, or employee well-being [15]. Burnout was initially regarded as a phenomenon in service professions. It has been extended to all activity domains [11].

Learner engagement includes affective, behavioral, and cognitive components, such as a learner's enjoyment and interest in school, involvement in the learning process, and cognitive investment [14]. Learner engagement is generally a positive, fulfilling mindset toward learning, comprising three key dimensions: energy, dedication, and absorption [16]. Energy refers to high vigor levels, dedication refers to a positive cognitive appraisal and attitude towards learning, and absorption is a flow state where a learner can fully concentrate and experienced time passing quickly [16].

Burnout and engagement levels can differ depending on the culture and system in which they are measured [17]. Burnout among adolescents is associated with various risk factors and can lead to significant mental health outcomes [11,18]. Salmelo-Aro and Upadaya [19] point out that school burnout predicts disengagement and that demanding educational goals and workload predict burnout.

In an engagement analysis study in the United States, Wang and Peck [20] identified five latent groups: highly, moderately, minimally engaged, and emotionally and cognitively disengaged. Tuominen-Soini and Salmela-Aro [21] discovered four groups based on burnout in a high school sample of Finnish learners: engaged, engaged-exhausted, burned-out, and cynical. In another Finnish study with a sample of 12-year-old learners, five latent burnout-engagement profiles were found: engaged, stressed, high in cynicism, moderate in cynicism, and emerging cynicism [14]. Five to six profiles may be found in a diverse population.

Burnout and engagement share some antecedents and may mutually affect each other with some contextual variables involved. They are not exact opposites on the same continuum. Learners could be highly engaged yet possess a certain level or characteristics of burnout, creating the different profiles found and discussed in this article.

1.2. Academic Boredom

Given the risk of adolescents developing mental disorders, it seemed fitting to include the impact of academic boredom on learners' burnout and engagement. Boredom is described as an unpleasant, negative emotion related to achievement, involving a short-lived yet intense psychophysiological reaction to an educational event assumed to be meaningful [22–25]. Negative-deactivating emotions, such as anxiety or boredom, can significantly interfere with a learner's ability to learn in an academic setting [22,26,27]. Boredom among adolescents is common in today's classrooms. Learners tend to experience boredom when their activities are not challenging enough and when they experience meaningless routines [28].

Academic boredom contributes to unpleasantness and various negative consequences, including anxiety, restlessness, depression, poor grades, high dropout rates, sensation seeking, engaging in antisocial behavior, reduced motivation, a lack of self-regulation, irrelevant thinking, and substance abuse [1,2,4,6,8,9,22,29,30]. This has a direct impact on the United Nations (UN) Sustainable Developmental Goals (SDGs), especially Numbers 3 and 4, which focus on good health and well-being, as well as quality education [31]. Academic boredom has far-reaching implications for a school's and educational system's learning objectives and goals. It also hinders adolescents' development and well-being. Recent literature has stressed the need to urgently examine the impact of academic boredom on outcomes in educational settings [3,5,7].

The current study focused on boredom in Mathematics and English, two major subjects that create an increased learning demand and pressure on students. High boredom in Math-

ematics has been negatively associated with physical and psychological well-being [32]. Learners who do not see the meaning in Mathematics class or homework ask, 'What is this all for?' and feel a sense of worthlessness. This lack of meaningful engagement leaves these learners vulnerable and unable to communicate in the language of instruction, which is a second language for most in South Africa. English language proficiency has, therefore, been found to have an impact on Mathematics understanding [33]. Without additional measures being put into place to establish sustainable and quality education (SDG Goal 4), by 2030, 300 million learners will lack basic numeracy/literacy skills, with only one in six countries achieving universal secondary school completion [34].

Engagement and burnout at school affect learning, academic development, and well-being [19,35]. Specifically, academic boredom is associated with disengagement [1]. Contemporary pedagogical approaches aim to enhance engagement by exploring technology-driven practices while mitigating the risk factors that may lead to boredom [36]. As a result, boredom in Mathematics and English across different engagement-burnout profiles was investigated in this study. Addressing burnout, fostering engagement, and reducing academic boredom among secondary school learners are critical for achieving multiple SDGs. These efforts contribute to better health and well-being, quality education, reduced inequalities, and stronger, more peaceful institutions.

1.3. Influential Demographic and Contextual Variables for Boredom

Howie [33] and Spaull [37] reported that two major factors influenced academic performance in South African Grade 6 learners: learners who received homework performed better in Mathematics than learners who did not receive any homework; and speaking English at home 'sometimes' enabled learners to perform better than those who did not speak English at home at all. Studies from Zambia and Nigeria identified several demographic factors influencing Mathematics performance, including parents' educational and occupational backgrounds, parental pressure, learner attitudes and aspirations, enjoyment of Mathematics, reading skills, gender, age, and homework [33,38,39]. Similarly, these factors may also contribute to academic boredom.

Wegner et al. [40] found that girls reported significantly higher leisure boredom than boys. Black and colored students reported significantly higher leisure boredom than whites. Daschmann et al. [41] showed that girls were more likely to be bored due to being over-challenged in Mathematics classes, whereas boys were more likely to be bored due to being under-challenged. This claim is echoed by Erasmus and Hall [42], who found that females experienced higher levels of boredom than their male counterparts in South Africa. Concerning burnout dimensions, studies showed that cynicism was higher in males [43] and that exhaustion and inadequacy were higher in females [44].

Furthermore, self-efficacy predicts school engagement [43] and, thus, may impact boredom. Learners in secondary and tertiary education are also more prone to boredom when they perceive their understanding and spoken English language skills as good to very good [42]. Finally, resources predict school engagement [19]. Disparities exist based on location or household wealth according to Target 4.5 of Goal 4 of the UN SDGs, with rural and less affluent families facing greater challenges [31]. Schwartze et al. [32] and Evers et al. [12] assert that health conditions and environmental circumstances, such as obesity, the COVID-19 pandemic, inadequate and disturbed sleep, social isolation, and a general feeling of dislike among peers and teachers, lead to maladaptive boredom in classroom situations.

Consequently, important demographic and contextual variables were considered in understanding boredom in this study's burnout and engagement profiles.

1.4. Rationale and Aim

Little is known about learner burnout and engagement profiles in relation to academic boredom and its prevalence in secondary school learners in the South African educational context. This study explored latent profiles of learner burnout and engagement and their

connection to academic boredom in English and Mathematics among public secondary school students. Estimating the academic boredom profiles could facilitate a better and more in-depth understanding of this construct and its configuration in schools. The Sedibeng District was selected for its diverse range of public schools, which included both affluent and less affluent schools and featured a culturally diverse student population. Additional demographic variables and contextual factors were included to explain profile membership. The originality of this research lies in the methodological identification of burnout engagement profiles and the patterns related to boredom in mathematics and English that are associated with demographic and contextual diversity.

1.5. Hypotheses

Hypothesis 1. *Different burnout-engagement profiles may be identified in a culturally and economically diverse education system.*

Hypothesis 2a. *Profiles with high(er) levels of burnout and low(er) levels of engagement are more prone to academic boredom than those with low(er) levels of burnout and high(er) levels of engagement.*

Hypothesis 2b. *Profiles with low levels of burnout and high levels of engagement have low levels of academic boredom.*

Hypothesis 3. *Profiles with high(er) levels of burnout and low(er) levels of engagement and profiles with low(er) levels of burnout and high(er) levels of engagement are related to demographic and contextual variables.*

2. Materials and Methods

2.1. Participants

A purposive sample of 544 learners in Grades 9 and 10 was taken (n_{Grade9} = 255; $n_{Grade10}$ = 226; $n_{Missing}$ = 63) from 13 schools. The criteria for participation in this study required that participants (1) be enrolled in both English and Mathematics at the same school and (2) be Grade 9 or 10 learners attending public secondary schools in the Sedibeng District. Participants' ages ranged from 14 to 19 (Mean = 15.34, SD = 0.83); a total of 343 were female, 188 were male, and 13 identified as 'other'. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics [45], female enrolment in secondary schools in South Africa tends to be higher than that of males (the ratio of males to females is 1:1.09), which could explain why more females took part or reacted to the invitation to participate in this study. The sample consisted of 56.3% English/African home language speakers, while 43.7% were Afrikaans home language speakers.

2.2. Measures

The School Burnout Inventory (SBI) was used to measure learner burnout [46]. The SBI includes nine items rated on a six-point scale, ranging from 1 (completely disagree) to 6 (completely agree). It contains three subscales: school-related exhaustion (four items, e.g., "I feel overwhelmed by my schoolwork"), cynicism about the value of school (three items, e.g., "I feel that I'm losing interest in my schoolwork"), and a sense of inadequacy as a learner (two items, e.g., "I often feel inadequate in my schoolwork"). The SBI has been adapted for school settings and is widely used across various age groups [21,47]. It provides an overview of learners' cognitive and psychological functioning [16,35]. Cronbach's alpha coefficients varied from 0.88 to 0.90, affirming the positive associations between the items in the inventory. The SBI demonstrated strong concurrent validity.

The Schoolwork Engagement Inventory (SEI) was used to evaluate study engagement [19] based on the Utrecht Work Engagement Scale developed initially by

Schaufeli et al. [48]. Nine items are measured using a seven-point scale, ranging from 1 (never) to 7 (daily). The inventory is divided into three subscales, each consisting of three items: energy (e.g., 'When I study, I feel I'm bursting with energy'); dedication (e.g., 'I am enthusiastic about my studies'); and absorption (e.g., 'Time flies when I'm studying'). In summary, the SEI is a one-dimensional measurement [19], which indicates a generally positive attitude toward studying. The SEI showed acceptable reliability and validity in Finnish studies [16]. The SEI had acceptable psychometric properties, indicating Cronbach's alpha coefficients of 0.90 using a sum score of school engagement.

A subscale of the Achievement Emotions Questionnaire (AEQ) [49,50] was used to measure academic boredom. Twelve items were measured separately using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) for English and Mathematics. Learners reported their boredom (six items for each subject, e.g., 'I get bored in [subject] classes'). These items required participants to answer how they felt when attending the class of the specific subject, studying for the specific subject, and taking tests and examinations in the specific subject. High values represented increased boredom. The reliabilities of the boredom scales were acceptable ($\alpha > 0.75$) [22,50]. The biographical questionnaire and all measures were translated from English into Afrikaans and Sesotho. This was done to enable participants to respond in their home language or a language of their choice, accommodating those who preferred not to use their home language. However, all the Sesotho participants decided to complete the questionnaires in English rather than Sesotho.

2.3. Research Procedure

The researcher ensured voluntary participation, obtained parental/guardianand adolescent consent, and maintained confidentiality. Ethics approval was secured from the relevant ethics committee (NWU-00476-19-A1) and the Gauteng Department of Education Research and Knowledge Management Division (2019/259A). Thirty schools were invited to participate, with 13 agreeing and providing their goodwill permission before distributing parental/guardian consent forms. An independent individual obtained the learners' written informed consent before the researcher began collecting data at each school. Questionnaires were administered in paper format to groups of learners who agreed to participate between July and September 2021, during regular school hours, in a classroom/school hall as agreed on with each school. Independent individuals entered the data using EpiData software version 3.1, and it was verified for accuracy across multiple versions before the data analysis began.

2.4. Statistical Analysis

SPSS 27 [51] was used for descriptive statistics to describe the data. Mplus 8.7 [52] was employed to analyze the data. Maximum likelihood with robust standard errors (MLR)-based maximum likelihood estimation was utilized for the confirmatory factor analysis (CFA) [53]. Model fit was assessed based on the recommendations of [54]: for Tucker–Lewis index (TLI) and comparative fit index (CFI) values to be acceptable, scores ≥ 0.90 are required. Root mean square error of approximation (RMSEA) and standardized root mean residual (SRMR) values ≤ 0.08 indicate a close fit between the model and the data. The researcher used McDonald's omega coefficients (ω) to assess the reliability of the scales [55]. A cut-off value of 0.70 was set for scale reliability [56].

Latent profile analysis (LPA) was performed on the factor scores to identify groups (latent profiles) within the data. Various models were evaluated according to the lowest Bayesian information criterion (BIC), Akaike information criterion (AIC), and sample-size adjusted BIC (ABIC) values. The quality of class membership was determined by estimated posterior class membership probabilities (values above 0.70) and entropy values (>0.80) [57–59]. The Vuong–Lo–Mendell–Rubin likelihood ratio test, the Lo–Mendell–Rubin (LMR LR) test [60], the adjusted LMR LR (ALMR) test, and the bootstrapped likelihood ratio test (BLRT) [61] were used to test the number of profiles in mixture analysis. Finally, the

Bolck–Croon–Hagenaars (BCH) method [62] was utilized to compare the levels of academic boredom in Mathematics and English across the profiles. Asparouhov and Muthén [63] recommend using the BCH method when the covariates data is continuous.

3. Results

3.1. Confirmatory Factor Analysis for the Profile Variables

A measurement model consisting of learner burnout and engagement was tested using CFA. Burnout consisted of three latent variables: exhaustion (four observed variables), cynicism (three observed variables), and a sense of inadequacy (two observed variables). Learner engagement consisted of three latent variables: energy (three observed variables), dedication (three observed variables), and absorption (three observed variables).

The CFA showed acceptable fit: χ^2 = 388.68 (df = 120), $p < 0.001$; RMSEA = 0.06 ([0.06, 0.07]; $p = 0.001$); CFI = 0.94; TLI = 0.93; SRMR = 0.05. The overall size of the factor loadings and their cross-loadings was deemed to be acceptable (exhaustion: λ = 0.48 to 0.69; mean = 0.60; cynicism: λ = 0.67 to 0.78; mean = 0.73; a sense of inadequacy: λ = 0.55 to 0.70; mean = 0.63; energy: λ = 0.67 to 0.86; mean = 0.75; dedication: λ = 0.75 to 0.83; mean = 0.78; absorption: λ = 0.34 to 0.70; mean = 0.48). The reliability coefficients of two of the burnout factors, namely, exhaustion (ω = 0.66) and cynicism (ω = 0.74), were close to, or higher than, the recommended value of 0.70 [56]. However, the reliability of the sense of inadequacy factor (ω = 0.51) was below the recommended cut-off value. The reliabilities of two of the learner engagement factors were acceptable: energy (ω = 0.76) and dedication (ω = 0.78). The reliability of the absorption factor (ω = 0.45) was, however, lower than the cut-off value of 0.70 [56].

3.2. Latent Profile Analysis

Based on the responses of 544 participants, LPA was conducted. The model fit indices of the six different models are reported in Table 1.

Table 1. Comparison of different latent profile analysis models.

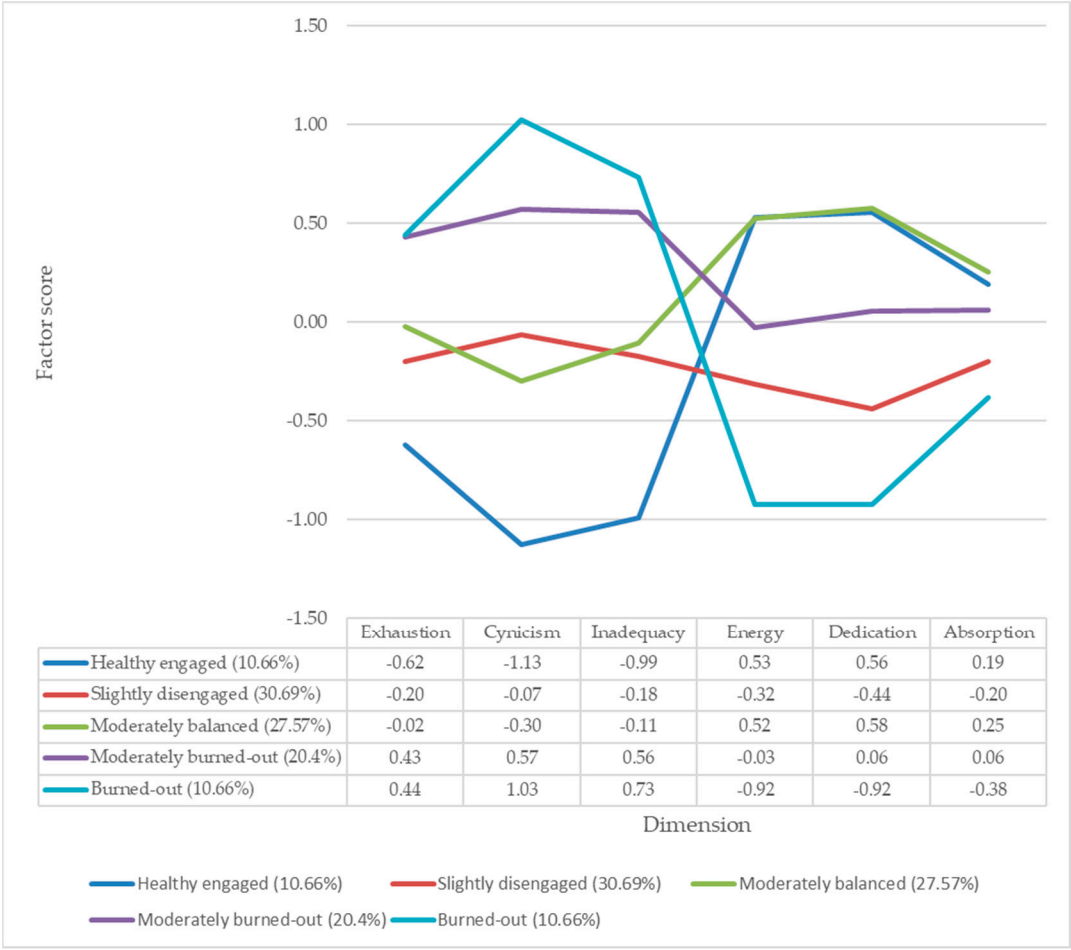
Model	AIC	BIC	ABIC	LMR LR Test *p*-Value	ALMR LR Test *p*-Value	BLRT *p*-Value	Entropy	Smallest Class Proportion
1-profile	5008.98	5060.56	5022.47	-	-	-	-	-
2-profiles	4012.87	4094.55	4034.24	0.0000 **	0.0000 **	0.0000 **	0.84	49.77%
3-profiles	3485.64	3597.41	3514.88	0.0092 **	0.0100 **	0.0000 **	0.87	22.61%
4-profiles	3198.38	3340.24	3235.49	0.0298	0.0320	0.0000 **	0.87	15.63%
5-profiles	2959.38	3131.34	3004.36	0.0591	0.0627	0.0000 **	0.89	10.66%
6-profiles	2670.04	2872.09	2722.90	0.0579	0.0616	0.0000 **	0.89	9.74%

Notes: ** $p < 0.01$; AIC = Akaike information criterion; BIC = Bayesian information criterion; ABIC = adjusted Bayesian information criterion; LMR LR = Lo–Mendell–Rubin likelihood ratio test; ALMR LR = adjusted Lo–Mendell–Rubin likelihood ratio test; BLRT = bootstrapped likelihood ratio test.

The fit indices showed a significantly better fit for Profile 2 than Profile 1 (ΔAIC = 999.11; ΔBIC = −966.01; ΔABIC = −988.23). The LMR LR ($p < 0.01$), ALMR LR ($p < 0.01$), and BLRT ($p < 0.01$) of Profile 2 were statistically significant, indicating that the k + 1 model fitted the data significantly better. The fit indices for Profile 3 showed a significantly better fit than Profile 2 (ΔAIC = −527.23; ΔBIC = −497.14; ΔABIC = −519.36). The LMR LR ($p < 0.01$), ALMR ($p < 0.01$), and BLRT ($p < 0.01$) for Profile 3 were also statistically significant. The indices showed a better fit for Profile 4 compared to Profile 3 (ΔAIC = −287.26; ΔBIC = 257.17; ΔABIC = −279.39). The LMR LR ($p > 0.01$) and ALMR ($p > 0.01$) were not statistically significant, but the BLRT ($p < 0.01$) for Profile 4 was statistically significant. The indices showed a better fit for Profile 5 than Profile 4 (ΔAIC = −239.00; ΔBIC = −208.90; ΔABIC = −231.13). The LMR LR ($p > 0.01$) and ALMR ($p > 0.01$) were not statistically significant, but the BLRT ($p < 0.01$) for Profile 5 was statistically significant. The indices showed a better fit for Profile 6 than Profile 5 (ΔAIC = −289.34; ΔBIC = −259.25; ΔABIC = −281.46).

The LMR LR ($p > 0.01$) and ALMR ($p > 0.01$) were not statistically significant, but the BLRT ($p < 0.01$) for Profile 6 was statistically significant.

While the AIC values, BIC values, and ABIC values did not reach a minimum, the LMR, ALMR, and BLRT values remained statistically significant ($p < 0.05$), except for the LMR LR and ALMR LR ($p > 0.05$) of the last two profiles. Howard et al. [64] suggest that indicators may improve without reaching a minimum and that it may be possible to determine the optimal number of profiles by looking at the sample size. Another profile was added with quantifiable differences compared to the model with only four profiles. Adding a sixth profile did not contribute anything theoretically meaningful, hence the decision to work with the parsimonious five-profile model. Therefore, Hypothesis 1 was accepted. Each group size was higher than 10%. The average posterior probabilities for being assigned to the five classes in the five-profile model ranged from 0.89 to 0.95, well above the cut-off value of 0.70 [59], indicating a clear distinction between the different classes. The entropy statistic was 0.89, indicating a good classification [55]. The latent profiles of participants are illustrated in Figure 1.



	Exhaustion	Cynicism	Inadequacy	Energy	Dedication	Absorption
Healthy engaged (10.66%)	-0.62	-1.13	-0.99	0.53	0.56	0.19
Slightly disengaged (30.69%)	-0.20	-0.07	-0.18	-0.32	-0.44	-0.20
Moderately balanced (27.57%)	-0.02	-0.30	-0.11	0.52	0.58	0.25
Moderately burned-out (20.4%)	0.43	0.57	0.56	-0.03	0.06	0.06
Burned-out (10.66%)	0.44	1.03	0.73	-0.92	-0.92	-0.38

Figure 1. Latent profiles of burnout and engagement.

Five profiles of secondary school learners' experiences of burnout and engagement were identified. Profile 1 was named healthy engaged because of the low to very low levels of burnout and moderate to high levels of engagement. Profile 1 comprised 10.66% ($n = 58$) of the total participants. Profile 2 was named slightly disengaged and showed low levels of burnout, combined with even lower levels of engagement (especially on dedication). Profile 2 comprised 30.7% ($n = 167$) of the participants. It contained the largest proportions of the five profiles. Profile 3 was moderately balanced and had slightly lower levels of burnout (especially cynicism) and moderate engagement (especially dedication). Profile 3

comprised 27.57% (n = 150) of the total participants. Profile 4 was named moderately burned-out and showed moderate levels of burnout (especially on cynicism and inadequacy) and average engagement (especially on energy). Profile 4 comprised 20.4% (n = 111) of the total participants. Finally, Profile 5 was labeled burned-out, demonstrating moderate to high levels of burnout (especially cynicism) and low levels of engagement (especially energy and dedication). Profile 5 comprised 10.66% (n = 58) of the total participants.

3.3. Associations between Latent Profiles and Academic Boredom

Next, we analyzed the association between the five latent profiles and academic boredom.

3.3.1. Testing the Measurement Model of Academic Boredom

A measurement model consisting of learner boredom (Mathematics and English) was tested using CFA. The results showed acceptable fit: χ^2 = 473.92 (df = 116), $p < 0.0000$; RMSEA = 0.08 ([0.07, 0.08], $p < 0.001$); CFI = 0.97; TLI = 0.97; SRMR = 0.04. Overall, the factor loadings were acceptable: boredom—Mathematics: λ = 0.75 to 0.89; mean = 0.84; and boredom—English: λ = 0.66 to 0.91; mean = 0.82. The relationship between academic boredom in Mathematics and English was analyzed using factor scores derived from the measurement model. Morin et al. [65] suggest that the use of factor scores controls for measurement error by increasing the weighting of items with smaller measurement errors. The means and standard deviations for Mathematics and English boredom were 2.08 (0.99) and 2.35 (1.09) on a five-point scale. The omega reliabilities were 0.90 for both. The Pearson correlation of the two was 0.39 ($p < 0.01$).

3.3.2. Latent Profiles and Academic Boredom

The latent profile model of burnout and engagement was estimated using three factors each. Mean-level factor score differences were examined between the five profiles regarding boredom in Mathematics and boredom in English.

Table 2 shows significant differences in boredom among the profiles ($\Delta_{\text{Mathematics}}$ = 145.70, $p < 0.001$; Δ_{English} = 203.48, $p < 0.001$). Findings regarding Mathematics and English boredom had similar patterns. Learners in the healthy engaged profile reported statistically significantly lower levels of boredom than the other profiles. The moderately balanced group had significantly higher academic boredom than the healthy engaged group but lower boredom than the rest of the profiles.

Table 2. Equality tests of means across profiles.

Boredom—Mathematics			**Boredom—English**		
	Mean	*SE*		Mean	*SE*
Healthy engaged	−0.65	0.09	Healthy engaged	−0.66	0.09
Slightly disengaged	0.08	0.05	Slightly disengaged	0.20	0.06
Moderately balanced	−0.27	0.06	Moderately balanced	−0.39	0.06
Moderately burned-out	0.23	0.08	Moderately burned-out	0.09	0.07
Burned-out	0.83	0.11	Burned-out	0.89	0.09
	χ^2	p		χ^2	p
Overall test	145.70	0.001 **	Overall test	203.48	0.001 **
Healthy engaged vs. Slightly disengaged	50.54	0.001 **	Healthy engaged vs. Slightly disengaged	65.29	0.001 **
Healthy engaged vs. Moderately balanced	11.32	0.001 **	Healthy engaged vs. Moderately balanced	5.74	0.017 **
Healthy engaged vs. Moderately burned-out	55.00	0.001 **	Healthy engaged vs. Moderately burned-out	43.00	0.001 **
Healthy engaged vs. Burned-out	110.40	0.001 **	Healthy engaged vs. Burned-out	141.57	0.001 **
Slightly disengaged vs. Moderately balanced	17.59	0.001 **	Slightly disengaged vs. Moderately balanced	47.28	0.001 **

Table 2. *Cont.*

Boredom—Mathematics			Boredom—English		
Slightly disengaged vs. Moderately burned-out	2.37	0.123	Slightly disengaged vs. Moderately burned-out	1.41	0.234
Moderately balanced vs. Moderately burned-out	23.31	0.001 **	Moderately balanced vs. Moderately burned-out	24.94	0.001 **
Slightly disengaged vs. Burned-out	38.12	0.001 **	Slightly disengaged vs. Burned-out	38.74	0.001 **
Moderately balanced vs. Burned-out	76.15	0.001 **	Moderately balanced vs. Burned-out	129.80	0.001 **
Moderately burned-out vs. Burned-out	19.37	0.001 **	Moderately burned-out vs. Burned-out	44.57	0.001 **

Note: ** $p < 0.01$.

Although the estimated means of the slightly disengaged profile were lower than those of the moderately burned-out profile in Mathematics and the opposite in English, they were statistically insignificant. Learners in the slightly disengaged and moderately burned-out profiles experienced indistinguishable levels of academic boredom. These two groups expressed significantly higher boredom than the previous two leading profiles and lower boredom than the burned-out profile. Finally, the burned-out profile addressed the highest boredom among the profiles. This profile of 10.66% of learners possessed a strong, negative, deactivating emotion towards learning in both Mathematics and English. Hypothesis 2a is accepted. Profiles with high(er) levels of burnout and low(er) levels of engagement are more prone to academic boredom than those with low(er) levels of burnout and high(er) levels of engagement.

3.3.3. Differences Based on Demographic and Contextual Variables

Next, two regression models were specified using Mplus 8.7 [52]. The first regression was a multinomial logit model in which home language, gender, liking the teacher (of Mathematics or English), having a room of their own, having a study desk and chair at home, focusing on schoolwork at home, finding the subject (i.e., Mathematics or English) interesting, and marks received in Mathematics or English were used to predict profile membership. The second regression was a linear regression in which these variables were used to predict two variables: academic boredom in Mathematics and academic boredom in English. In the latter regression, the regression slope coefficients and associated parameters were restricted to be the same across all profiles. The within-class regression models specified the corresponding variables, allowing slope coefficients to vary across classes. Table 3 shows the results of these regression analyses.

Table 3. Variations in academic boredom in Mathematics and English across demographic variables in different profiles.

Variable	Healthy Engaged			Slightly Disengaged			Moderately Balanced			Moderately Burned-Out			Burned-Out		
Boredom—Maths	Est	SE	*p*	Est	SE	*p*	Est	SE	*p*	Est	*SE*	*p*	Est	SE	*p*
Gender	0.32	0.15	0.032 *	−0.01	0.12	0.916	−0.21	0.18	0.234	0.17	0.17	0.322	0.21	0.17	0.223
Marks—Maths	−0.09	0.07	0.180	0.01	0.05	0.798	−0.03	0.06	0.568	−0.08	0.06	0.139	−0.05	0.08	0.562
Home language	−0.43	0.16	0.008 **	−0.05	0.14	0.696	0.05	0.22	0.821	−0.25	0.20	0.212	−0.21	0.32	0.517
Having own room	0.07	0.18	0.708	−0.01	0.15	0.947	−0.17	0.13	0.195	0.04	0.17	0.819	−0.21	0.23	0.367
Focus schoolwork	−0.14	0.07	0.053 *	−0.03	0.05	0.647	0.06	0.09	0.484	−0.03	0.10	0.802	−0.10	0.07	0.136

Table 3. *Cont.*

Variable	Healthy Engaged			Slightly Disengaged			Moderately Balanced			Moderately Burned-Out			Burned-Out		
No desk/chair	0.09	0.22	0.661	0.04	0.14	0.756	−0.33	0.14	0.020 *	−0.08	0.18	0.644	0.79	0.28	0.004 **
Like teacher	−0.06	0.06	0.323	−0.06	0.05	0.200	−0.18	0.04	0.001 **	−0.17	0.05	0.001 **	−0.09	0.08	0.302
Maths interesting	−0.09	0.08	0.275	−0.16	0.05	0.001 **	−0.15	0.07	0.032 *	−0.06	0.07	0.421	−0.24	0.10	0.013 **
Boredom—English	Est	SE	*p*	Est	SE	*p*	Est	SE	*p*	Est	SE	*p*	Est	SE	*p*
Gender	0.37	0.13	0.006 **	−0.06	0.09	0.474	0.05	0.15	0.725	0.07	0.15	0.647	0.23	0.15	0.124
Marks—English	−0.05	0.05	0.352	−0.05	0.04	0.246	0.04	0.05	0.419	0.03	0.06	0.672	−0.02	0.07	0.731
Home language	−0.68	0.14	0.001 **	−0.35	0.11	0.002 **	−0.08	0.18	0.638	−0.07	0.17	0.686	−0.24	0.27	0.378
Having own room	0.43	0.18	0.019 *	−0.13	0.12	0.277	−0.11	0.12	0.347	−0.10	0.16	0.535	0.22	0.26	0.387
Focus schoolwork	0.05	0.06	0.430	0.00	0.05	0.970	−0.03	0.07	0.662	−0.05	0.07	0.521	−0.01	0.07	0.902
No desk/chair	0.28	0.20	0.159	−0.14	0.11	0.191	−0.17	0.14	0.217	−0.32	0.16	0.044 *	0.16	0.43	0.716
Like teacher	−0.12	0.04	0.006 **	−0.13	0.04	0.001 **	−0.13	0.04	0.001 **	−0.10	0.05	0.032 *	−0.12	0.05	0.028 *
English interesting	−0.12	0.06	0.054 *	−0.07	0.03	0.035 *	−0.17	0.06	0.003 **	−0.19	0.06	0.002 **	−0.16	0.07	0.021 *

Notes: * $p < 0.05$, ** $p < 0.01$; Marks—Maths = What were the last marks you received for Mathematics in the November/December exams?; Language = Home language (English/African or Afrikaans); Having own room = Do you have a room of your own?; Focus schoolwork = Can you focus on your schoolwork at home?; No desk/chair = Do you have a desk and chair at which to do homework?; Like teacher = Do you like your Mathematics teacher?; Maths interesting = Do you find Mathematics interesting?; Marks—English = What were the last marks you received for English in the November/December exams?; Like teacher = Do you like your English teacher?; English interesting = Do you find English interesting?

In the healthy engaged profile, female learners ($p = 0.032$) in the English/African language group ($p = 0.008$) who could not focus on their schoolwork at home ($p = 0.053$) experienced statistically significantly higher levels of academic boredom in Mathematics. In this profile, for English boredom, statistically significant differences were found for female learners ($p = 0.006$), in the English/African language group ($p = 0.001$), having a room to study at home ($p = 0.019$), disliking their English teacher ($p = 0.006$), and having a low interest in English ($p = 0.054$). In the slightly disengaged profile, learners' Mathematics boredom was predicted by their interest in Mathematics ($p = 0.001$). Three variables associated with boredom in English in this profile were home language—English/African ($p = 0.002$), not liking the English teacher ($p < 0.001$), and finding English uninteresting ($p = 0.035$). In the moderately balanced profile, learners who had a desk and chair at home ($p = 0.020$), liked their Mathematics teacher ($p = 0.001$), and found Mathematics interesting ($p = 0.032$) showed statistically significantly lower academic boredom in Mathematics. In this profile, only liking their teacher ($p = 0.001$) and English interest ($p = 0.003$) predicted academic boredom in English.

In the moderately burned-out profile, learners who disliked their teachers showed a statistically significantly ($p = 0.001$) higher score on academic boredom in Mathematics. In this profile, learners who did not have a desk and chair at home ($p = 0.044$), who did not like their English teacher ($p = 0.032$), and who found English uninteresting ($p = 0.002$) showed statistically significantly higher academic boredom in English. Finally, in the burned-out profile, learners who had a desk and chair at home ($p = 0.004$) and who found Mathematics uninteresting ($p = 0.013$) showed statistically significantly higher scores on academic boredom in Mathematics, whereas learners who did not like their English teacher

($p = 0.028$) and who found English uninteresting ($p = 0.021$) showed statistically significantly higher academic boredom in English.

It should be noted that marks in both subjects did not predict boredom. Gender and home language mattered only in the healthy engaged profile. Liking English teachers and interest in English were significant predictors for English boredom in all profiles. These were also important predictors for Mathematics boredom but were not as consistent across the profiles. Therefore, Hypothesis 2b was accepted because profiles with high(er) levels of burnout and low(er) levels of engagement and low(er) levels of burnout and high(er) levels of engagement were associated with demographic and contextual variables.

Appendix A shows the statistically significant differences between demographic groups regarding membership of the burnout and engagement profiles (see Table A1). Afrikaans-speaking students who could focus on their studies at home and demonstrated an interest in Mathematics and English were more likely to be classified as 'healthy engaged' rather than 'burned-out.' Conversely, male students with less interest in Mathematics and English tended to fall into the 'slightly disengaged' category rather than the 'healthy engaged' one. English- or African language-speaking students who liked their English teacher, but did not enjoy English as a subject, were more likely to be in the 'moderately balanced' group rather than the 'healthy engaged' group. Students who found English uninteresting were more likely to be classified as 'moderately burned-out' compared to those with a 'healthy engaged' profile. Additionally, Afrikaans learners who could focus on their work at home and had an interest in Mathematics were more likely to be 'slightly disengaged' rather than 'burned-out'.

Afrikaans-speaking female learners who reported high performance in English, could focus on their work at home, had a dedicated study space with a desk and chair, liked their English teacher, and were interested in Mathematics were more likely to be classified in the 'moderately balanced' profile rather than the 'slightly disengaged' profile. Additionally, Afrikaans-speaking learners who excelled in English, concentrated on their studies at home, and had a proper study environment were more likely to be in the 'moderately balanced' category compared to the 'moderately burned-out' category. Learners who spoke English or African languages, focused on their studies at home, liked their English teacher, and found Mathematics interesting were also more likely to be 'moderately balanced' rather than 'burned-out'. Finally, Afrikaans-speaking learners who were interested in Mathematics were more likely to be 'moderately burned-out' rather than 'burned-out'.

Hypothesis 3 is partially accepted. Profiles with high(er) levels of burnout and low(er) levels of engagement and profiles with low(er) levels of burnout and high(er) levels of engagement are related to specific demographic and contextual variables.

4. Discussion

This study aimed to identify latent profiles of learner burnout and engagement using a person-centered approach in a sample of secondary school students from the Sedibeng District, South Africa. The study also examined the associations among demographic and contextual variables, learners' profile membership, boredom in Mathematics, and boredom in English (see Table 4).

Table 4. A summary of the meaningful correlations between academic boredom in mathematics and English of demographic variables in different profiles.

Boredom—Mathematics	Gender, Home language, Focus schoolwork, No desk/chair, Like teacher, and Maths interesting.
Boredom—English	Gender, Home language, Having own room, No desk/chair, Like teacher, and English interesting.

Notes: Home language (English/African or Afrikaans); Having own room = Do you have a room of your own?; Focus schoolwork = Can you focus on your schoolwork at home?; No desk/chair = Do you have a desk and chair at which to do homework?; Like teacher = Do you like your Mathematics teacher?; Maths interesting = Do you find Mathematics interesting?; Like teacher = Do you like your English teacher?; English interesting = Do you find English interesting?

The results showed that five latent profiles of burnout and engagement existed within the sample: healthy engaged (10.66%), slightly disengaged (30.7%), burned-out (10.66%), moderately balanced (27.57%), and moderately burned-out (20.4%). These profiles were aligned with the profiles identified by Tuominen-Soini and Salmela-Aro [21], but also showed some uniqueness. A moderately balanced group was identified, and more burned-out profiles were acknowledged. There were also apparent similarities between the healthy engaged and the moderately balanced profiles and between the slightly disengaged and moderately burned-out profiles. Virtanen [64] identified three profiles in Finnish lower-secondary schools, e.g., high-engagement/low-burnout, average-engagement/average-burnout, and low-engagement/high-burnout. In this study, the role of the teacher as a mechanism of support was also highlighted. However, they also found academic performance to be a contributor, which this current study did not.

The findings of this study regarding burnout and engagement profiles of school learners presented a detailed picture of how different factors contributed to academic boredom across various learner profiles. Learner burnout and engagement were significantly related to academic boredom. Academic boredom is a negative, deactivating emotion that forms part of a larger group of achievement emotions depicted by the control-value theory [23]. In this study, control appraisal could be linked to a learner feeling out of control, not being able to control their environment at school or home, or being unable to do well and, therefore, the experience of boredom (among other negative-related achievement emotions). In terms of value appraisal, it became clear that the more bored learners became, the more disengaged they became. This led to lower performance efficiency, sometimes due to inadequate or disturbed sleep caused by electronic devices, especially social media use [12]. A recent study involving a Finnish sample indicated that learners' engagement in learning activities would increase if they were permitted to utilize technology [14,66]. Over time, sustained disengagement will significantly increase school dropout rates among learners [1].

Concerning focus and academic boredom in the healthy engaged profile, female learners in the English/African language group who could not focus on their schoolwork at home experienced significantly higher levels of academic boredom in Mathematics. This indicated that distractions or a lack of a conducive study environment at home could have a negative impact on their engagement with Mathematics. Regarding the study environment and teacher relationships in the healthy engaged profile, the results showed that, for those who did have a room to study at home, but did not like their teacher, there were significant differences, pointing to the possible effect of teacher-student relationships on study engagement. A negative perception of the teacher might overshadow the benefits of having a dedicated study space.

Various demographic and contextual variables were associated with the slightly disengaged profile. Learners in this profile showed a higher lack of interest in Mathematics, suggesting that disengagement might be subject-specific and related to their overall attitude towards Mathematics. Three variables—namely, their home language being English or African, dislike of the English teacher, and finding English an uninteresting subject—were associated with boredom in English. Daniels et al. [67] and Xie [68]. found that learners who experienced a lack of interest in activities experienced boredom. Weybright et al. [1] state that higher levels of boredom are associated with disengagement. Therefore, the linguistic context, teacher-student dynamics, and intrinsic interest in the subject all played critical roles in engagement levels for slightly disengaged learners.

Our findings in the moderately balanced profile suggested that the home environment and the teacher relationship played a critical role in academic boredom. Learners who had a desk and chair at home, disliked their Mathematics teacher, and found the subject unengaging experienced greater academic boredom in Mathematics. This suggested that negative feelings towards the teacher and the subject could lead to disengagement, even with a supportive home study environment. Similar patterns were observed in English, where disliking the teacher and finding the subject uninteresting were significantly asso-

ciated with academic boredom. This again pointed to the importance of teacher-learner relationships and intrinsic motivation.

In the moderately burned-out profile, learners who disliked their teachers showed significantly higher academic boredom in Mathematics, emphasizing the crucial impact of teacher-student rapport on learner engagement and burnout. Concerning academic boredom, learners with a desk and chair at home, who disliked their English teacher and found the subject uninteresting, experienced significantly higher academic boredom in English. This indicated that a good study environment was important but could not compensate for poor teacher-student relationships and a lack of interest in the subject.

Regarding the burned-out profile, our results showed that learners without a desk and chair at home, who found Mathematics uninteresting, showed significantly higher scores on academic boredom. This underscored the compounded effect of lacking a proper study environment and having low interest on burnout. Furthermore, learners who did not like their English teacher and found the subject uninteresting exhibited significantly higher academic boredom in English, similar to other profiles. This reinforced the critical role of positive teacher-student interactions and an engaging curriculum in mitigating burnout. Learners were more likely to feel increased boredom in Mathematics due to a lack of a proper desk and chair for homework, difficulty concentrating on schoolwork at home, and a lack of interest in the subject. This meant that learners became disengaged and demotivated because of the boredom they experienced [19]. This was also the case in two separate studies among elementary school learners [68,69], where respectively four and five latent profiles were also linked to autonomy-suppressive strategies that led to lowered engagement when teachers imposed meaningless and uninteresting activities. They stress that teachers should become more aware of autonomy-supportive teaching, which this study also supports and recommends.

This current study implies that the home environment is critical in the profiles. A conducive study environment at home is crucial but insufficient to prevent academic boredom and burnout. Positive relationships with teachers are essential across all profiles to reduce academic boredom and increase engagement. Bekker et al. [70] also noted the importance of promoting learner engagement to enhance learner well-being while highlighting the complex interplay between academic emotions such as boredom, engagement, and well-being in secondary school learners. Teacher training and awareness programs that build supportive and engaging classroom environments can be beneficial. Moreover, making subjects more interesting and relevant to learners through autonomy-supportive strategies can significantly impact their engagement levels, suggesting a need for curriculum reform that prioritizes student interests and real-world applications.

Limitations and Recommendations for Future Research

The study had various limitations that restricted the generalizability and applicability of the results to other districts, other provinces, or the country. The data was collected solely from the Sedibeng District in Gauteng, South Africa, limiting the generalizability of the findings to the broader school system or the entire cohort of Grade 9 and Grade 10 learners in 2021. Employing a cross-sectional design helped the researcher understand how the participants were feeling at one point. As emotions, levels of learner burnout and engagement, and everyday life do not remain constant, future research could benefit from a longitudinal approach to investigate academic emotions, burnout levels, and engagement over a more extended period with learners from Grades 8, 11, and 12. These burnout and engagement profiles were exclusively relevant to Grade 9 and Grade 10 learners in public schools.

Exploring boredom, burnout, and engagement across different language groups, subject areas, or within private school systems could provide intriguing insights. Furthermore, future studies could utilize neuroimaging, physiological assessments, and the analysis of facial expressions and body posture to gain deeper insights into the effects of boredom.

Furthermore, it would be interesting to study the impact of mother-tongue teaching in the coming years to see whether it would make any difference to the positive or negative emotions that learners experienced in the different subject domains. This could also contribute to realizing the UN's SDG Number 4, in terms of establishing better-quality education [31] and making it more sustainable in a country such as South Africa.

Monitoring learner burnout and engagement becomes essential to determine who the learners are—who are on their way to success or who might need additional help to succeed. Understanding how learners in each of these profiles function on any given day will help researchers and educators better understand the type of learner they are serving in the 21st century, while also gaining valuable knowledge about the class they teach and the learning activities they design. Based on the results of this study, different intervention programs are recommended for learners, teachers, and/or caregivers. For example, intervention programs to speak to the affective experiences of secondary school learners either have not been developed or have been limited in their success in the South African context. Based on the findings of this study, psychoeducational interventions can be developed and implemented to benefit both learners and teachers. Doing so would enable stakeholders in the educational context to develop, implement, and sustain such interventions and development opportunities to empower teachers and learners, eventually leading to improved health and well-being for both.

5. Conclusions

The findings illustrate the complex interplay between home study environments, teacher-student relationships, and intrinsic interest in subjects that influences academic boredom, burnout, and engagement among school learners. Interventions to improve these areas can help enhance student engagement and reduce burnout. Our study enhances the understanding of burnout and engagement among secondary school learners by identifying five distinct profiles within the data. It also paints a picture of the academic boredom that learners experience in each profile while reporting on demographic and contextual factors that can impact the learner's burnout and engagement experience. While the ambitious vision of achieving the UN SDG Goal 4 by 2030 may appear distant, we must not lose sight of our commitment to education, sustainability, and global citizenship. Challenges persist—access barriers for learners, gender imbalance, and the pressing need for safe school environments—but these obstacles should not deter us.

As policymakers and educational stakeholders, we have a crucial role to play. Let us recognize the diverse learners we serve in well-resourced or underprivileged contexts. Early detection, sustainable interventions, and unwavering support remain within our grasp. Despite inequities and socio-economic hardships, South Africa's resilience can pave the way toward a brighter educational future.

Author Contributions: Conceptualization, C.I.B., S.R. and M.M.K.; methodology, C.I.B. and S.R.; software, S.R.; validation, C.I.B. and S.R.; formal analysis, S.R. and C.I.B.; investigation, C.I.B.; resources, C.I.B., S.R. and M.M.K.; data curation, C.I.B.; writing—original draft preparation, C.I.B., S.R. and M.M.K.; writing—review and editing, C.I.B., S.R., M.M.K. and S.C.; supervision, S.R. and M.M.K.; project administration, C.I.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study obtained ethics approval from the North-West University Health Research Ethics Committee (NWU-HREC) (NWU-00476-19-A1) and the Gauteng Department of Education Research and Knowledge Management Division, South Africa (2019/259A).

Informed Consent Statement: Written informed permission and consent was obtained from all parents/guardians and the adolescent participants involved in the study. They also consented to the publication of the results.

Data Availability Statement: The data is available at Mendeley Data, V1, https://doi.org/10.17632/knhct2kkjr.1 (accessed on 27 September 2024).

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Differences between demographic variables between specific burnout and engagement profiles.

Variable	*p* P1-P5	*p* P2-P5	*p* P3-P5	*p* P4-P5	*p* P2-P1	*p* P3-P1	*p* P4-P1	*p* P3-P2	*p* P4-P2	*p* P3-P4
Gender	0.382	0.291	0.508	0.748	0.026 *	0.732	0.444	0.033 *	0.060	0.629
Marks—English	0.838	0.072	0.596	0.195	0.081	0.320	0.160	0.009 **	0.741	0.018 *
Marks—Maths	0.254	0.987	0.692	0.912	0.151	0.333	0.132	0.623	0.871	0.524
LANG1	0.014 **	0.009 **	0.000 **	0.006 **	0.918	0.002 **	0.774	0.000 **	0.640	0.001 **
Own room	0.596	0.906	0.736	0.806	0.331	0.752	0.651	0.483	0.548	0.873
Focus work	0.004 **	0.047 *	0.001 **	0.080	0.120	0.673	0.094	0.047	0.953	0.025 *
No desk	0.939	0.519	0.473	0.428	0.315	0.324	0.177	0.035 *	0.733	0.008 **
Like M-teacher	0.804	0.624	0.728	0.586	0.840	0.449	0.355	0.301	0.165	0.800
Like E-teacher	0.224	0.211	0.006 **	0.118	0.797	0.046 *	0.787	0.020 *	0.520	0.064
M_INTER	0.000 **	0.019 *	0.000 **	0.005 **	0.000 **	0.169	0.006 **	0.016 *	0.298	0.115
E_INTER	0.001 **	0.619	0.073	0.055	0.001 **	0.054 *	0.046 *	0.084	0.052 *	0.945

Notes: * $p < 0.05$, ** $p < 0.01$; Marks—English = What were the last marks you received for English in the November/December exams?; Marks—Maths = What were the last marks you received for Mathematics in the November/December exams?; LANG1 = Home language (English/African or Afrikaans); Own room = Do you have a room of your own?; Focus work = Can you focus on your schoolwork at home?; No desk = Do you have a desk and chair at which to do homework?; Like M-teacher = Do you like your Mathematics teacher?; Like E-teacher = Do you like your English teacher?; M_INTER = Do you find Mathematics interesting?; E-INTER = Do you find English interesting?

References

1. Weybright, E.H.; Caldwell, L.L.; Xie, H.; Wegner, L.; Smith, E.A. Predicting secondary school dropout among South African adolescents: A survival analysis approach. *S. Afr. J. Educ.* **2017**, *37*, 1–11. [CrossRef] [PubMed]
2. Kanevsky, L.; Keighley, T. To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Rev.* **2003**, *26*, 20–28. [CrossRef]
3. Ketonen, E.E.; Malmberg, L.-E.; Salmela-Aro, K.; Muukkonen, H.; Tuominen, H.; Lonka, K. The role of study engagement in university students' daily experiences: A multilevel test of moderation. *Learn. Individ. Differ.* **2019**, *69*, 196–205. [CrossRef]
4. Malkovsky, E.; Merrifield, C.; Goldberg, Y.; Danckert, J. Exploring the relationship between boredom and sustained attention. *Exp. Brain Res.* **2012**, *221*, 59–67. [CrossRef]
5. Mann, S.; Robinson, A. Boredom in the lecture theatre: An investigation into the contributors, moderators and outcomes of boredom amongst university students. *Br. Educ. Res. J.* **2009**, *35*, 243–258. [CrossRef]
6. Preckel, F.; Götz, T.; Frenzel, A. Ability grouping of gifted students: Effects on academic self-concept and boredom. *Br. J. Educ. Psychol.* **2010**, *80*, 451–472. [CrossRef]
7. Sharp, J.G.; Hemmings, B.; Kay, R. Towards a model for the assessment of student boredom and boredom proneness in the UK higher education context. *J. Furth. High. Educ.* **2016**, *40*, 649–681. [CrossRef]
8. Wallace, J.C.; Vodanovich, S.J.; Restino, B.M. Predicting cognitive failures from boredom proneness and daytime sleepiness scores: An investigation within military and undergraduate samples. *Personal. Individ. Differ.* **2003**, *34*, 635–644. [CrossRef]
9. Willis, J. Neuroscience reveals that boredom hurts. *Phi Delta Kappan* **2014**, *95*, 28–32. [CrossRef]
10. Maslach, C.; Schaufeli, W.B.; Leiter, M.P. Job burnout. *Annu. Rev. Psychol.* **2001**, *52*, 397–422. [CrossRef]
11. Walburg, V. Burnout among high school students: A literature review. *Child. Youth Serv. Rev.* **2014**, *42*, 28–33. [CrossRef]
12. Evers, K.; Chen, S.; Rothmann, S.; Dhir, A.; Pallesen, S. Investigating the relation among disturbed sleep due to social media use, school burnout, and academic performance. *J. Adolesc.* **2020**, *84*, 156–164. [CrossRef] [PubMed]
13. Lee, M.; Lee, K.-J.; Lee, S.M.; Cho, S. From emotional exhaustion to cynicism in academic burnout among Korean high school students: Focusing on the mediation effects of hatred of academic work. *Stress. Health* **2020**, *36*, 376–383. [CrossRef] [PubMed]
14. Salmela-Aro, K.; Muotka, J.; Alho, K.; Hakkarainen, K.; Lonka, K. School burnout and engagement profiles among digital natives in Finland: A person-oriented approach. *Eur. J. Dev. Psychol.* **2016**, *13*, 704–718. [CrossRef]
15. Van der Vaart, L.; De Beer, L.T. Engaged but exhausted: Work-related wellbeing profiles of South African employees. *Int. J. Wellbeing* **2021**, *11*, 88–105. [CrossRef]
16. Salmela-Aro, K. Dark and bright sides of thriving—School burnout and engagement in the Finnish context. *Eur. J. Dev. Psychol.* **2017**, *14*, 337–349. [CrossRef]

17. Barker, G.G.; Volk, F.; Peters, C. Cultural influences on burnout: A Swedish–American comparison. *Int. J. Workplace Health Manag.* **2021**, *14*, 181–200. [CrossRef]
18. Salmela-Aro, K.; Kiuru, N.; Nurmi, J.-E. The role of educational track in adolescents' school burnout: A longitudinal study. *Br. J. Educ. Psychol.* **2008**, *78*, 663–689. [CrossRef]
19. Salmela-Aro, K.; Upadaya, K. The Schoolwork Engagement Inventory. *Eur. J. Psychol. Assess.* **2012**, *28*, 60–67. [CrossRef]
20. Wang, M.-T.; Peck, S.C. Adolescent educational success and mental health vary across school engagement profiles. *Dev. Psychol.* **2013**, *49*, 1266–1276. [CrossRef]
21. Tuominen-Soini, H.; Salmela-Aro, K. Schoolwork engagement and burnout among Finnish high school students and young adults: Profiles, progressions, and educational outcomes. *Dev. Psychol.* **2014**, *50*, 649–662. [CrossRef] [PubMed]
22. Pekrun, R. The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educ. Psychol. Rev.* **2006**, *18*, 315–341. [CrossRef]
23. Pekrun, R.; Goetz, T.; Titz, W.; Perry, R.P. Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educ. Psychol.* **2002**, *37*, 91–105. [CrossRef]
24. Tze, V.M.C.; Daniels, L.M.; Klassen, R.M.; Li, J.C.-H. Canadian and Chinese university students' approaches to coping with academic boredom. *Learn. Individ. Differ.* **2013**, *23*, 32–43. [CrossRef]
25. Westphal, A.; Kretschmann, J.; Gronostaj, A.; Vock, M. More enjoyment, less anxiety and boredom: How achievement emotions relate to academic self-concept and teachers' diagnostic skills. *Learn. Individ. Differ.* **2018**, *62*, 108–117. [CrossRef]
26. Hiller, S.E.; Kitsantas, A.; Cheema, J.E.; Poulou, M. Mathematics anxiety and self-efficacy as predictors of mathematics literacy. *Int. J. Math. Educ. Sci. Technol.* **2022**, *53*, 2133–2151. [CrossRef]
27. Pekrun, R. The impact of emotions on learning and achievement: Towards a theory of cognitive/motivational mediators. *Appl. Psychol.* **1992**, *41*, 359–376. [CrossRef]
28. Leung, L. Using tablet in solitude for stress reduction: An examination of desire for aloneness, leisure boredom, tablet activities, and location of use. *Comput. Hum. Behav.* **2015**, *48*, 382–391. [CrossRef]
29. Abramson, E.E.; Stinson, S.G. Boredom and eating in obese and non-obese individuals. *Addict. Behav.* **1977**, *2*, 181–185. [CrossRef]
30. Mahler, D.; Großschedl, J.; Harms, U. Does motivation matter?—The relationship between teachers' self-efficacy and enthusiasm and students' performance. *PLoS ONE* **2018**, *13*, e0207252. [CrossRef]
31. United Nations. Progress towards the Sustainable Development gGoals: Report of the Secretary-General Summary. 2024. Available online: https://hlpf.un.org/sites/default/files/2024-05/SG%20SDG%20Progress%20Report%202024.pdf (accessed on 27 September 2024).
32. Schwartze, M.M.; Frenzel, A.C.; Goetz, T.; Marx, A.K.G.; Reck, C.; Pekrun, R.; Fiedler, D. Excessive boredom among adolescents: A comparison between low and high achievers. *PLoS ONE* **2020**, *15*, e0241671. [CrossRef] [PubMed]
33. Howie, S.J. Language and other background factors affecting secondary pupils' performance in mathematics in South Africa. *Afr. J. Res. Math. Sci. Technol. Educ.* **2003**, *7*, 1–20. [CrossRef]
34. Upadyaya, K.; Salmela-Aro, K. Development of school engagement in association with academic success and well-being in varying social contexts. *Eur. Psychol.* **2013**, *18*, 136–147. [CrossRef]
35. Hietajärvi, L.; Lonka, K.; Hakkarainen, K.; Alho, K.; Salmela-Aro, K. Are schools alienating digitally engaged students? Longitudinal relations between digital engagement and school engagement. *Frontline Learn. Res.* **2020**, *8*, 33–55. [CrossRef]
36. Spaull, N. Poverty and privilege: Primary school inequality in South Africa. *Int. J. Educ. Dev.* **2013**, *33*, 436–447. [CrossRef]
37. Georgewill, J.W. Causes of poor achievement in West African school certificate mathematics examinations in Rivers State secondary schools, Nigeria. *Int. J. Math. Educ. Sci. Technol.* **1990**, *21*, 379–385. [CrossRef]
38. Sayers, R. Gender differences in mathematics education in Zambia. *Educ. Stud. Math.* **1994**, *26*, 389–403. [CrossRef]
39. Daschmann, E.C.; Goetz, T.; Stupnisky, R.H. Testing the predictors of boredom at school: Development and validation of the precursors to boredom scales. *Br. J. Educ. Psychol.* **2011**, *81*, 421–440. [CrossRef]
40. Erasmus, M.R.; Hall, I. First year students' boredom in applied communiction skills classroom at a South African university of technology. *S. Afr. J. High. Educ.* **2019**, *33*, 94–113. [CrossRef]
41. Bask, M.; Salmela-Aro, K. Burned out to drop out: Exploring the relationship between school burnout and school dropout. *Eur. J. Psychol. Educ.* **2013**, *28*, 511–528. [CrossRef]
42. Salmela-Aro, K.; Tynkkynen, L. Gendered pathways in school burnout among adolescents. *J. Adolesc.* **2012**, *35*, 929–939. [CrossRef] [PubMed]
43. Salmela-Aro, K.; Kiuru, N.; Leskinen, E.; Nurmi, J.E. School Burnout Inventory (SBI): Reliability and validity. *Eur. J. Psychol. Assess.* **2009**, *25*, 48–57. [CrossRef]
44. Salmela-Aro, K.; Read, S. Study engagement and burnout profiles among Finnish higher education students. *Burn. Res.* **2017**, *7*, 21–28. [CrossRef]
45. Schaufeli, W.B.; Bakker, A.B.; Salanova, M. The measurement of work engagement with a short questionnaire: A cross-national study. *Educ. Psychol. Meas.* **2006**, *66*, 701–716. [CrossRef]
46. Goetz, T.; Frenzel, A.C.; Pekrun, R.; Hall, N.C.; Lüdtke, O. Between- and within-domain relations of students' academic emotions. *J. Educ. Psychol.* **2007**, *99*, 715–733. [CrossRef]
47. Pekrun, R.; Goetz, T.; Perry, R.P. *Achievement Emotions Questionnaire: Mathematics (AEQ–M) User's Manual*; University of Munich: Munich, Germany, 2005.

48. Pekrun, R.; Goetz, T.; Frenzel, A.C.; Barchfeld, P.; Perry, R.P. Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemp. Educ. Psychol.* **2011**, *36*, 36–48. [CrossRef]
49. IBM Corp. *IBM SPSS Statistics for Windows*, version 27; IBM Corp: Armonk, NY, USA.
50. Muthén, L.K.; Muthén, B.O. *Mplus User's Guide*, 8th ed.; Muthén & Muthén: Los Angeles, CA, USA, 1998.
51. Morin, A.J.S.; Marsh, H.W.; Nagengast, B. Exploratory structural equation modeling: An introduction. In *Structural Equation Modeling: A Second Course*; Hancock, G.R., Mueller, R.O., Eds.; Information Age Publishing: Charlotte, NC, USA, 2013; pp. 395–436.
52. Kline, R.B. *Principles and Practice of Structural Equation Modelling*, 5th ed.; Guilford Press: New York, NY, USA, 2023.
53. Wang, J.; Wang, X. *Structural Equation Modelling: Applications Using Mplus*, 2nd ed.; Wiley: New York, NY, USA, 2020.
54. Nunnally, J.C.; Bernstein, I.H. *Psychometric Theory*, 3rd ed.; McGraw-Hill: New York, NY, USA, 1994.
55. Clark, S.L. Mixture Modeling with Behavioral Data. Doctoral Dissertation, University of California, Berkeley, CA, USA, 2010. Available online: https://www.statmodel.com/download/Dissertation_v1.pdf?msclkid=ba44673fa7ba11eca232b8baebcfe34f (accessed on 27 September 2024).
56. Geiser, C. *Data Analysis with Mplus*; The Guilford Press: New York, NY, USA, 2010.
57. Nagin, D.S. *Group-Based Modeling of Development*; Harvard University Press: Cambridge, MA, USA, 2009.
58. Lo, Y.; Mendell, N.R.; Rubin, D.B. Testing the number of components in a normal mixture. *Biometrika* **2001**, *88*, 767–778. [CrossRef]
59. Nylund, K.L.; Asparouhov, T.; Muthén, B.O. Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Struct. Equ. Model. Multidiscip. J.* **2007**, *14*, 535–569. [CrossRef]
60. Bakk, Z.; Vermunt, J.K. Robustness of stepwise latent class modeling with continuous distal outcomes. *Struct. Equ. Model. Multidiscip. J.* **2016**, *23*, 20–31. [CrossRef]
61. Asparouhov, T.; Muthén, B. Auxiliary variables in mixture modeling: Three-step approaches using Mplus. *Struct. Equ. Model. Multidiscip. J.* **2014**, *21*, 329–341. [CrossRef]
62. Howard, J.L.; Gagné, M.; Morin, A.J.S.; Forest, J. Using bifactor exploratory structural equation modeling to test for a continuum structure of motivation. *J. Manag.* **2018**, *44*, 2638–2664. [CrossRef]
63. Morin, A.J.S.; Arens, A.K.; Marsh, H.W. A bifactor exploratory structural equation modeling framework for the identification of distinct sources of construct-relevant psychometric multidimensionality. *Struct. Equ. Model. Multidiscip. J.* **2016**, *23*, 116–139. [CrossRef]
64. Virtanen, T.E.; Lerkkanen, M.-K.; Poikkeus, A.-M.; Kuorelahti, M. Student engagement and school burnout in Finnish lower-secondary schools: Latent profile analysis. *Scand. J. Educ. Res.* **2018**, *62*, 519–537. [CrossRef]
65. Halonen, N.; Hietajärvi, L.; Lonka, K.; Salmela-Aro, K. Sixth graders' use of technologies in learning, technology attitudes and school well-being. *Eur. J. Soc. Behav. Sci.* **2017**, *18*, 2307–2324. [CrossRef]
66. Daniels, L.M.; Tze, V.M.C.; Goetz, T. Examining boredom: Different causes for different coping profiles. *Learn. Individ. Differ.* **2015**, *37*, 255–261. [CrossRef]
67. Xie, J. The effects of boredom on EFL learners' engagement. *Front. Psychol.* **2021**, *12*, 743313. [CrossRef]
68. Yang, D.; Cai, Z.; Tan, Y.; Zhang, C.; Li, M.; Fei, C.; Huang, R. The light and dark sides of student engagement: Profiles and their association with perceived autonomy support. *Behav. Sci.* **2022**, *12*, 408. [CrossRef]
69. Yang, D.; Cai, Z.; Wang, C.; Zhang, C.; Chen, P.; Huang, R. Not all engaged students are alike: Patterns of engagement and burnout among elementary students using a person-centered approach. *BMC Psychol.* **2023**, *11*, 38. [CrossRef]
70. Bekker, C.I.; Rothmann, S.; Kloppers, M.M. The happy learner: Effects of academic boredom, burnout, and engagement. *Front. Psychol.* **2023**, *13*, 974486. [CrossRef]