Chue, K. L., Yeo, A., Nie, Y. Y., & Chang, C. L. (2026). A longitudinal study of student wellbeing in Singapore secondary schools using the PERMA framework. *International Journal of Wellbeing*, *16*(1), 5319, 1-23. https://doi.org/10.5502/ijw.v16i1.5319

ARTICLE

A longitudinal study of student wellbeing in Singapore secondary schools using the PERMA framework

Kah Loong Chue · Amelia Yeo · Youyan Nie · Christel Lynne Chang

Abstract: Student wellbeing has gained prominence in recent educational policy discourse. Thus, conducting an examination of wellbeing trends across the schooling years is vital as it can inform educators on the effectiveness of current programs and to pinpoint specific timeframes for targeted interventions. To make meaningful global statements about the patterns of student wellbeing, it is essential to consider the findings arising from different cultural contexts and wellbeing metrics. Singapore offers a compelling case for such an investigation given its educational landscape that combines high-stakes national examinations with a focus on holistic student development. The current study uses the PERMA framework to analyse student wellbeing trends and gender differences in secondary schools in Singapore, therefore offering a comparative account to studies conducted in other countries. The sample consisted of 2,881 students in 11 government schools. The m-PERMA-Profiler was administered to the students over three years. The findings indicate a decline across all PERMA elements from secondary one to secondary two, while most of the PERMA elements remained relatively stable from secondary two to secondary three. There was an increase in the level of positive emotions and positive relationships for boys during this period. However, the level of all the PERMA elements at secondary three were still statistically lower than in secondary one. There were no gender differences across most PERMA elements at most time points, with the exception of boys exhibiting higher levels of positive emotions and engagement at the beginning of secondary three. The findings indicate that wellbeing during the adolescent years is heavily dependent on context and cultural factors, hence specific milestones faced by students in different countries and educational systems need to be accounted for in assessing student wellbeing.

Keywords: student wellbeing; PERMA; longitudinal study; wellbeing trends; gender differences

1. Introduction

This study aims to investigate student wellbeing trends in Singapore schools with an additional focus on gender differences. Student wellbeing has increasingly become a prominent feature of policy discourse as governments recognize its influence on successful academic and non-academic outcomes (Marquez & Long, 2021). However, prior to discussions on the enactment of wellbeing programs in schools, it is paramount to examine wellbeing trends across the schooling years. Conducting such an investigation serves the dual purpose of examining the effectiveness of current programs and processes, and pinpointing specific timeframes for targeted interventions. To that end, several studies have examined these trends over the adolescence period and emerged with findings that suggest a general decline in student wellbeing over the

Kah Loong Chue
Nanyang Technological University, Singapore
Kahloong.chue@nie.edu.sg

Copyright belongs to the author(s)
www.internationaljournalofwellbeing.org

years (González-Carrasco & Casas, 2024). Furthermore, this decline has been shown to be more noticeable and longer lasting among girls in a Spanish education context (González-Carrasco et al., 2017). To that end, gender differences may suggest a need for targeted interventions in schools. Nevertheless, different cultural and social contexts should not be ignored in wellbeing research (McLellan et al., 2022). In Singapore, the education system paradoxically focuses on holistic education in a high-pressured environment (Ng, 2020) and it is unclear whether Eurocentric patterns are congruent to this context. Thus, the current study focuses exclusively on the Singapore context. We conclude by applying the results of this synthesis to the PERMA multidimensional wellbeing framework of Seligman (2011) to allow the translation of our findings into practice and present a new model to guide OAE program design to impact adolescent wellbeing.

1.1 Longitudinal changes in wellbeing

Almost all longitudinal studies that have explicitly examined wellbeing trends in primary or secondary school students suggested a pattern of declining wellbeing during adolescence (See Table 1). To explain these results, several studies suggested that this decline reflects a natural developmental phenomenon, when adolescents navigate identity development, transitions, and new social roles on the path to adulthood (Casas & González-Carrasco, 2019; Branje et al., 2021). Other studies attributed the decline to a mismatch between school environments and students' developmental needs, especially during the transition from primary to secondary education where academic and social adjustments prove challenging (Kleinkorres et al., 2023; Jindal-Snape et al., 2020).

In addition to the overall decline in wellbeing, studies reported variations in trend patterns across groups and wellbeing indicators. For instance, some studies found a steeper decrease in wellbeing among girls compared to boys (González-Carrasco et al., 2017, 2020; Shek & Liang, 2018; Yoon et al., 2023). Other studies noted a quadratic trend in the decline rather than a linear trend (Casas & González-Carrasco, 2019; Morinaj & Hascher, 2022; Shek & Liang, 2018; Wu & Becker, 2023). Interestingly, some countries showed an upward trend in wellbeing of primary school students before the start of secondary school and this was attributed to the influence of different contexts (Casas & González-Carrasco, 2019). Notably, some studies specifically examined school-related wellbeing (e.g. attitudes towards school – Morinaj & Hascher, 2022), while other studies assessed general wellbeing of students (e.g. life satisfaction – González-Carrasco & Casas, 2024).

At the same time, researchers also noted that discrepancies across studies may also be caused by the use of different psychometric scales (Casas & González-Carrasco, 2019). As shown from the various studies in Table 1, student wellbeing lacks a single unified indicator, with different studies using diverse measures to assess it. Although the studies measure various aspects of wellbeing, there were no studies that had examined longitudinal changes using the PERMA framework. As PERMA offers a widely validated and systematic approach towards understanding wellbeing, it was thus selected as the framework for this study. Moreover, given these inconsistencies, particularly across contexts and measures, examining Singapore's system offers timely insights. Singapore's emphasis on holistic education also aligns well with PERMA's comprehensive approach to wellbeing, which offers a structured way to assess and support multiple dimensions of student flourishing beyond traditional academic metrics.

Table 1. Longitudinal studies on wellbeing

No.	Author	Country	Sample	Wellbeing indicators	Measures	Change over time
1.	Casas & González-Carrasco (2019)	Across 15 countries	48,040 students over three age groups (primary and secondary level)	• Life satisfaction • Personal wellbeing	• OLS (Campbell et al., 1976) • SLSS (Huebner, 1991) • BMSLSS (Seligson et al., 2003) • PWI-SC (Cummins & Lau, 2005)	• An increase in all indicators from 8- to 10-year-old and a decrease from 10- to 12- year-old
2.	González-Carrasco et al. (2017)	Spain	940 students over two years (primary and secondary level)	• Life satisfaction • Happiness • Personal wellbeing	• OLS (Campbell et al., 1976) • BMSLSS (Seligson et al., 2003) • HOL (Campbell et al., 1976) • PWI-SC (Cummins & Lau, 2005) • PWI-A (Casas et al., 2012)	• A decrease in all indicators and is more pronounced for girls than boys
3.	González-Carrasco et al. (2020)	Catalan	2180 students over five years (primary and secondary level)	• Life satisfaction • Happiness • Personal wellbeing	• OLS (Campbell et al., 1976) • SWLS (Diener et al., 1985) • SLSS (Huebner, 1991) • BMSLSS (Seligson et al., 2003) • HOL (Campbell et al., 1976) • PWI-SC (Cummins & Lau, 2005) • PWI-A (Casas et al., 2012)	• A decrease in all indicators and is more pronounced for girls than boys
4.	González-Carrasco & Casas (2024)	Catalan	994 students over two years (primary and secondary level)	• Life satisfaction • Positive affect • Negative affect • Psychological wellbeing	• OLS (Campbell et al., 1976) • BMSLSS (Seligson et al., 2003) • Core affect scale (Russell, 2003) • CW-PSWBS (Nakhur & Casas, 2021)	• Downward trend in positive indicators and upward trend in negative indicators • No gender differences detected

No.	Author	Country	Sample	Wellbeing indicators	Measures	Change over time
5.	Kleinkorres et al. (2020)	Germany	2,902 students over five years and three time points (primary and secondary level)	• Self-rated health • Number of days of absence from school • Life satisfaction • Helplessness	• Scale developed for the National Educational Panel Study (NEPS)	• Decrease in life satisfaction and school satisfaction
6.	Kleinkorres et al. (2023)	Germany	3446 students over five years (primary and secondary level)	• Satisfaction with school • Enjoyment of school • Self-rated health • Social integration	• Scale developed for the National Educational Panel Study (NEPS)	• Decrease in school satisfaction and enjoyment • No change in health for boys but a decrease for girls • No change in social integration
7.	Morinaj & Hascher (2022)	Switzerland	809 students over three years (primary and secondary level)	• Attitudes towards school • Enjoyment in school • Academic self-concept • Worries in school • Physical complaints in school • Social problems in school	• SWB questionnaire (Hascher, 2007)	• Primary schools: Decrease in attitudes, enjoyment, self-concept. Increase in worries and physical and social problems • Secondary school: Decrease in enjoyment, no change for attitudes and self-concept. Worries increased, then decreased.
8.	Parviainen et al. (2021)	Finland	1544 students over five years and four time points (primary and secondary level)	• School burnout	• SBI (Salmela-Aro et al., 2009a)	• Increase in burnout

No.	Author	Country	Sample	Wellbeing indicators	Measures	Change over time
9.	Shek & Liang (2018)	Hong Kong	3328 students over two years and six time points (secondary level)	• Satisfaction with life • Hopelessness	• SWLS (Diener et al., 1985) • Hopelessness scale (Beck et al., 1974)	• Decrease in life satisfaction and is steeper for boys • Increase in hopelessness but rate slowed
10.	Wu & Becker (2023)	Germany	1841 students over five years and four time points (primary and secondary level)	• Satisfaction with life • School satisfaction	• Temporal satisfaction with life (Trautwein, 2004) • School satisfaction (Bos & Pietsch, 2006; Kelly, 2003)	• Linear decrease in life satisfaction • Non-linear decrease in school satisfaction
11.	Xiang et al. (2019)	China	248 students over one semester and three time points (secondary level)	• Academic stress • Psychological wellbeing	• Academic stress scale (Kohn & Frazer, 1986) • Chinese version of Scales of Psychological Wellbeing (Ryff, 1989; Cheng and Chan, 2005)	• Decrease in stress and psychological wellbeing
12.	Yoon et al. (2023)	England	8,612 pupils over three years (primary and secondary)	• Mental wellbeing	• SWEMWBS	• Decrease in mental wellbeing and driven mainly by girls

1.2 PERMA model of wellbeing

Presently, there is a lack of consensus on what constitutes wellbeing although two perspectives have dominated historically, namely hedonism which is the state of feeling good, and eudaimonism which is the state of functioning well (Hossain et al., 2023). The PERMA model of wellbeing aims to integrate both perspectives by identifying five core elements that contribute to a good and fulfilling life, namely Positive emotions, Engagement, positive Relationships, a sense of Meaning, and a sense of Accomplishment (Seligman, 2011). Positive emotions refer to pleasant sensations that individuals experience from their interactions with the environment, and includes feelings of happiness, contentment, and hope. Beyond genetic dispositions, control-related and value-related appraisals can be considered as the main determinants of positive emotions in the academic context (Pekrun et al., 2002). Students tend to enjoy learning when they expect to be able to master the materials and is sufficiently convinced of the intrinsic/extrinsic value of the subject (Pekrun et al., 2002). Engagement involves a deep investment in tasks, where individuals feel absorbed in activities and fully present in the moment. To be fully engaged, students will need a clear set of goals to channel their behaviour, a match between perceived challenges and perceived skills, and clear and immediate feedback to navigate the continually changing demands of the environment (Csikszentmihalyi et al., 2014).

Positive relationships refer to the feelings of being loved, valued or supported through interactions with other individuals or within a community. In schools, these are manifested through teacher-student and peer interactions, policies and practices that develop positive relationships, and school culture and expectations (Roffey, 2011). Positive relationships are positively correlated to both positive emotions (Chue & Yeo, 2023) and engagement (Mertika et al., 2020). A sense of meaning reflects an individual's perception of purpose and direction in life. Students typically indicate school-related goals such as academic achievement as a key purpose (Koshy & Mariano, 2011). A sense of accomplishment is the feeling of satisfaction and achievement experienced when individuals work toward and attain their goals. This is usually viewed as students' academic efficacy or their perceived sense of competence (Hossain et al., 2023).

The PERMA elements are measurable, parsimonious, mutually exclusive, and have a high potential for specific interventions (Seligman, 2018). As such, the PERMA model is often used in schools as a measure of student wellbeing (Waters, 2011). For example, Burke and Minton (2019) used the model to conduct a cross-sectional wellbeing assessment across 13 schools in Ireland. The researchers found that there was a significant decrease in the PERMA elements across the different age groups, with older students reporting a lower level than younger students. Al-Hendawi et al. (2024) applied the PERMA model to measure wellbeing across four single-sex secondary schools in Qatar and found that age had no impact on the level of wellbeing. Given its parsimonious structure and prior applications, this article adopts the PERMA model as the guiding framework for this study.

1.3 Gender differences in wellbeing

A substantial amount of research has examined gender differences in adolescents' subjective wellbeing (Chen et al., 2020). The results are generally inconsistent with a number of cross-sectional studies indicating that boys reported a higher level of positive affect and a lower level of negative affect (Blanchflower & Bryson, 2024) or that there are no significant differences in life satisfaction between genders (Chen et al., 2020). Cross-sectional studies that applied the PERMA model explicitly also had mixed findings. Al-Hendawi et al. (2024) found no significant differences in the PERMA elements between genders whereas Smith (2018) found that boys had

higher levels of positive emotions and engagement than girls but similar levels of positive relationships and accomplishment. Burke and Minton (2019) found that boys scored higher than girls in all PERMA elements except for positive relationships, where no significant differences were found.

Several key ideas have emerged in literature to explain potential gender gaps in wellbeing. These include structural factors, socio-cultural factors, and biological differences (Smith, 2018). Structural factors pertain to differences in institutional arrangements and opportunities afforded to boys and girls, such as access to resources and extracurricular activities. Socio-cultural factors relate to societal expectations and norms, which often dictate the different roles and behaviours for boys and girls. Biological differences refer to inherent physical and physiological differences between genders. Moreover, gender gaps in wellbeing may also reflect differences in how wellbeing is conceptualized and measured. Blanchflower and Bryson (2024) suggested that cognitive evaluations, such as life satisfaction, differ conceptually from emotive evaluations, such as positive affect. Thus, no gender differences were seldom observed when individuals reported their wellbeing based on their cognitive states, whereas females tended to report lower wellbeing when reflecting on their emotional states.

In summary, to make any meaningful global statements about the patterns of student wellbeing, researchers must consider the findings arising from different countries (e.g. culture, education systems), different contexts (e.g. school, general) and different wellbeing metrics. The current study thus contributes to this body of literature by using the PERMA model of wellbeing to analyse student wellbeing trends and gender differences within the Singapore school context. Singapore offers a particularly compelling case for such an investigation given its educational landscape that combines high-stakes national examinations with a holistic student development, providing a distinct context for studying student wellbeing in a unique environment. Moreover, to our knowledge, there are no existing studies on primary and secondary students' wellbeing in Singapore. Thus, our research is guided by the following questions:

1. What are the longitudinal changes in student wellbeing across secondary school, and do these trajectories differ by gender?
2. Are there gender differences in student wellbeing at each level?

2. Methodology

2.1 Context

Structural features of Singapore's education system may significantly influence students' wellbeing trajectories across their secondary school years. In Singapore, almost all schools are government schools and each school year runs from January to November. Most primary schools are not affiliated with secondary schools, so student placement in secondary schools is centrally coordinated after primary six. This placement is largely dependent on students' personal choices as well as their academic performance in a national examination that is administered at the end of their primary education. In the secondary education system, students typically study a minimum of seven subjects through four years. At the end of secondary two, students will choose specific subject combinations based on their interests and academic results at the end of year exams (e.g. they can choose either more science-focused or humanities-focused subjects). This streaming allows for further subject specialization that will prepare students for post-secondary education. At the end of secondary education, students take another national examination that will determine their progression into post-secondary education (Ministry of Education, 2025).

2.2 Sample

The data for this study were drawn from a larger study that examined student wellbeing in Singapore. The larger study had also focused on student wellbeing trends but had comprised of single-sex schools. Noting that student wellbeing are likely to differ between single-sex and co-educational schools, only the co-educational schools were selected from the dataset as the present study focused on gender differences across time. Single-sex schools were excluded from the analysis. The total sample consisted of 2,881 students (1,501 boys, 1,374 girls, 6 missing) across 11 regular government schools. Students were matched by an identifier across all time points. Due to missing data, the sample size varied over time. At Time 1, data were collected from 2,221 secondary one students (M_{age} = 12.4 years, SD_{age} = .57). At Time 2, data were collected from 2,266 secondary two students, of which 1,845 were matched with Time 1 data, resulting in a 16.9% attrition rate. At Time 3, data were collected from 2,405 secondary three students, with 1,929 matched to Time 2, resulting in a 14.9% attrition rate.

2.3 Instruments

The m-PERMA profiler (Chue et al., 2024) was used to assess student wellbeing across the PERMA domains. The five elements of PERMA (i.e. positive emotions, engagement, positive relationships, sense of meaning, sense of accomplishment) were measured with three items each. Each item was measured on a 11-point scale with higher scores indicating a higher level of the construct. The scale was adapted from the original PERMA Profiler (Butler & Kern, 2015) to student wellbeing in Singapore and has been shown to be a valid and reliable instrument, demonstrating full invariance across gender (Chue et al., 2024). In the current analysis, the subscales showed good to excellent reliability indices with omega values ranging from .79 to .93 for all the PERMA elements across all three years. The instrument also showed good model fit across all three years (.975 < CFI < .981, .967 < TLI < .974, .056 < RMSEA < 0.57).

2.4 Procedure

Clearance was sought and approved by the university's ethics board. Parental consent was sought through an app developed by the Ministry of Education for all schools. All the questionnaires were administered online using the Qualtrics survey platform from 2022 to 2024. Student assent was obtained through the survey platform prior to the data collection. Teachers facilitated the survey by allocating time for students to complete the survey within school hours. Each year, the questionnaire was conducted between January and March (Term 1 of the school year), ensuring a similar interval between the different time points.

2.5 Data analysis

The statistical analysis was carried out using JAMOVI ver 2.4.5. As there was missing data, a linear mixed model using a restricted maximum likelihood approach was used (Brysbaert & Debeer, 2025). As multiple pairwise comparisons were conducted post hoc, a Bonferroni correction was used to analyse the differences in the PERMA elements across time as well as the interaction effects between gender and time. For all pairwise comparisons, a positive *t*-value indicates that the mean at the first time point is higher than at the second (a decrease over time), whereas a negative *t*-value indicates the mean at the first time point is lower than at the second (an increase over time). When the increase or decrease is statistically significant, the conditional and marginal r^2 were also computed as estimates of effect size (Nakagawa & Schielzeth, 2013). For linear mixed models, the marginal r^2 is an indicator of fixed effects size whereas the

conditional r^2 is an indicator of both fixed and random effects size. Large, medium, and small effects are characterised by values of .14, .06, and .01 (Fritz et al., 2012; Nakagawa & Schielzeth, 2013). However, the marginal r^2 is typically lower than η^2 in repeated measures design because the differences between the measurements are added to the total variability in the dataset (Brysbaert & Debeer, 2025). Lastly, post hoc gender differences were also analysed at the three time points for the PERMA elements.

3. Results

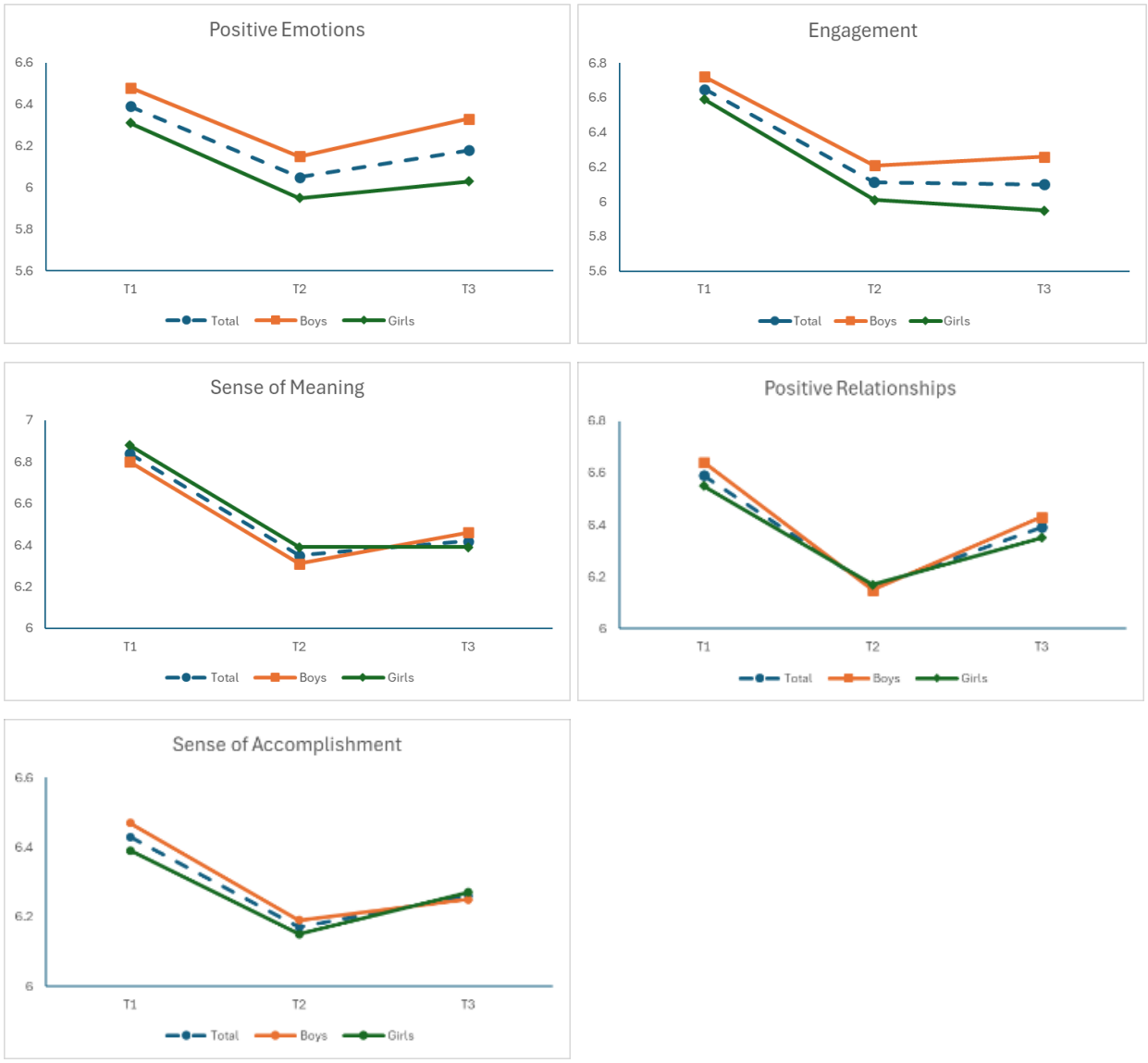
There was a significant decrease across all elements from secondary one (T1) to secondary two (T2) for the entire sample with small fixed effect sizes. This pattern was consistent when the sample was broken down by gender. The marginal r^2 ranged from .005 to .026 and the conditional r^2 ranged from .356 to .512, suggesting that the fixed effect size was small and that there was high variability across individuals. However, from secondary two (T2) to secondary three (T3), there were significant increases only in positive emotions and positive relationships. When broken down by gender, these increases were significant solely among boys. No significant changes were observed in the other elements from T2 to T3, either for the total sample or when disaggregated by gender. Although there were slight increases in the various elements from T2 to T3, most remained significantly lower at T3 compared to T1. The exceptions were positive emotions for boys and a sense of accomplishment for girls, which showed a non-significant difference. The marginal r^2 ranged from .002 to .034 and the conditional r^2 ranged from .301 to .365, suggesting that the fixed effect size was small and that there was high variability across individuals. Table 2 (below) presents the differences in the PERMA elements over time for the overall sample and by gender. To aid in visualisation, the trend of the PERMA elements over the three years is illustrated in Figure 1 (below).

Table 2. Gender differences across time

		Estimated marginal means			T1 → T2				T2 → T3				T1 → T3			
		T1	T2	T3	*t*	*p*	r_c^2	r_m^2	*t*	*p*	r_c^2	r_m^2	*t*	*p*	r_c^2	r_m^2
Positive emotions	Total	6.39	6.05	6.18	7.97	<.001	.479	.008	-3.12	.006	.520	.001	4.96	<.001	.350	.003
	Boys	6.48	6.15	6.33	5.31	<.001	.455	.006	-3.13	.027	.500	.003	2.32	ns		
	Girls	6.31	5.95	6.03	5.97	<.001	.501	.009	-1.29	ns			4.69	<.001	.330	.006
Engagement	Total	6.65	6.11	6.10	13.2	<.001	.474	.022	.148	ns			13.5	<.001	.353	.023
	Boys	6.72	6.21	6.26	8.69	<.001	.444	.018	-.84	ns			8.01	<.001	.340	.016
	Girls	6.59	6.01	5.95	10.00	<.001	.502	.026	1.05	ns			11.0	<.001	.364	.034
Positive	Total	6.59	6.16	6.39	9.28	<.001	.411	.011	-4.98	<.001	.482	.003	4.43	<.001	.308	.003
relationships	Boys	6.64	6.15	6.43	7.34	<.001	.356	.014	-4.36	<.001	.447	.005	3.17	.02	.315	.003
	Girls	6.55	6.17	6.35	5.77	<.001	.462	.009	-2.68	ns			3.10	.03	.300	.002
Sense of meaning	Total	6.84	6.35	6.42	10.71	<.001	.497	.014	-1.61	ns			9.21	<.001	.340	.012
	Boys	6.8	6.31	6.46	7.50	<.001	.499	.013	-2.29	ns			5.39	<.001	.365	.008
	Girls	6.88	6.39	6.39	7.65	<.001	.491	.016	.01	ns			7.64	<.001	.312	.017
Sense of	Total	6.43	6.17	6.26	6.45	<.001	.480	.005	-2.37	ns			4.16	<.001	.346	.002
accomplishment	Boys	6.47	6.19	6.25	4.89	<.001	.445	.006	-1.20	ns			3.80	.002	.301	.004
	Girls	6.39	6.15	6.27	4.22	<.001	.512	.005	-2.14	ns			2.09	ns		

Note. T1 = Secondary 1, T2 = Secondary 2, T3 = Secondary 3, r_c^2 = conditional r^2, r_m^2 = marginal r^2

Figure 1. PERMA trends over time



No significant gender differences were found for any of the constructs, except for positive emotions and engagement at secondary three (T3). In particular, this reflects the trend in positive emotions, in which boys appear to revert to their earlier level at secondary 1 (T1), whereas girls do not. Table 3 (below) presents the gender differences in the PERMA constructs at the three time points.

Table 3. Gender differences at T1, T2 and T3

	Time point	Estimated marginal means		SE	*t*	*p*
		(Boys)	(Girls)			
Positive emotions	1	6.48	6.31	.078	2.11	ns
	2	6.15	5.95	.077	2.56	ns
	3	6.33	6.03	.076	4.07	<.001
Engagement	1	6.72	6.59	.074	1.76	ns
	2	6.21	6.01	.073	2.67	ns
	3	6.26	5.95	.072	4.24	<.001
Positive relationships	1	6.64	6.55	.081	1.07	ns
	2	6.15	6.17	.080	-.31	ns
	3	6.43	6.35	.078	1.05	ns
Sense of meaning	1	6.80	6.88	.083	-.90	ns
	2	6.31	6.39	.082	-.93	ns
	3	6.46	6.39	.080	.88	ns
Sense of accomplishment	1	6.47	6.39	.074	1.09	ns
	2	6.19	6.15	.074	.49	ns
	3	6.25	6.27	.072	-.25	ns

4. Discussion

Regardless of gender, a decline across all PERMA elements was observed from the beginning of secondary one to the start of secondary two. This decline may be related to the transition from primary to secondary school as this period is associated with students adjusting to secondary school life and undergoing significant developmental changes (Evans et al., 2018; Jindal-Snape, 2020). On the other hand, most of the PERMA elements remained relatively stable from secondary two to secondary three, potentially signalling that majority of the students had acclimatized to secondary school education. Even so, there was an increase in the level of positive emotions and positive relationships for boys during this period. The level of all the PERMA elements at secondary three were still statistically lower than in secondary one, indicating the existence of a downward trend that is aligned with literature (e.g. Casas & González-Carrasco, 2019). Notably, most of the fixed effect sizes were small, however the results suggested that there was high variability across students. When it comes to gender contrasts, there were no significant differences across most of the PERMA elements at all the time points, with the exception of boys exhibiting higher levels of positive emotions and engagement at the beginning of secondary three.

4.1 Positive emotions

There was a statistically significant decrease in positive emotions from secondary one to secondary two for both genders. From a cognitive perspective, this may be a result of a loss of perceived control in the environment, leading to heightened levels of anxiety (Evans et al., 2018). In the local context, students typically spend six years in the same primary school before transitioning to secondary education. Hence, students may feel confident in navigating a similar school environment when transiting from primary six to secondary one. However, throughout the year, the stress of adapting to unfamiliar circumstances, such as managing greater academic independence, forming new peer relationships, coping with a stronger emphasis on performance,

and even adjusting to new transportation routines to get to school, may have reduced their sense of control.

In totality, there was a statistically significant increase in positive emotions from secondary two to secondary three that was driven mainly by boys. Several plausible explanations may account for this pattern, though these remain hypotheses requiring further investigation. One possibility is that opportunities provided by schools at secondary three may tend to favour boys' interests and developmental needs. At this stage, subject specialization selection in math and science could potentially align more with boys' preferences, as students transition from a general science subject in secondary two to specialized combinations of physics, chemistry, and/or biology in secondary three. Research has indicated that gender stereotypes in these subjects persist to some extent and may be communicated sub-consciously to students, potentially contributing to gender differences in academic interests (Trusz, 2020). Additionally, it is possible that boys at this developmental stage experience increased cognitive and emotional maturity (Lenroot & Giedd, 2010), leading to a better appreciation of education's relevance. Conversely, girls may have matured at an earlier stage, with fewer developmental changes occurring at secondary three. These factors, combined with the subject selection process, could hypothetically foster greater positive emotions specifically among boys through an increased sense of perceived value in their academic subjects.

There were no statistical differences in positive emotions between genders at secondary one and secondary two, but boys exhibited a higher level of positive emotions than girls at secondary three. Whilst this partially supports the findings from previous studies (Burke & Minton, 2019; Smith, 2018), it should be noted that the present study is focused on differences within the school environment. Indeed, these discrepancies between the school years appear to lend credence to the structural and socio-cultural factors described above as most changes occurred at the beginning of secondary three.

4.2 Engagement

There was a statistically significant decrease in engagement from secondary one to secondary two for both genders. Much of this can be attributed to the stress of adapting to greater academic demands (Jindal-Snape, 2020). At the beginning of secondary one, students may have had a higher self-efficacy, perceiving themselves as capable of coping with the academic rigour. However, students at the secondary level typically would have to contend with an expanded number of subjects compared to primary school. Furthermore, each subject involves more advanced content and greater complexity. This may have also resulted in a increased volume of homework, which can make it challenging for students. Many students may find themselves overwhelmed as the challenge-skill balance is disrupted.

There were no statistically significant changes in engagement from secondary two to secondary three for both genders. By secondary 3, students often adjust to the academic rigor, experiencing a realignment between challenge and skill. Despite the adjustment, engagement did not increase to its initial level. One possible reason is that the intensity of academic demands may have increased accordingly. Schools may have prioritized outcomes, such as preparation for examinations, over learning and there would be fewer opportunities for students to experience flow (Shernoff et al., 2014). For example, after adapting to the academic rigour of various subjects in secondary one, students would then be pressured to excel in the end-of-year school examinations as their secondary two academic achievement would determine the subjects that they are eligible to pursue in secondary three.

There were no statistical differences in engagement between genders at secondary one and secondary two, but boys exhibited a higher level of engagement than girls at secondary three. Whilst findings from previous studies were similar (Burke & Minton, 2019; Smith, 2018), no attempts were made to explain the reasons behind the discrepancies. In this study, we speculate that the structural and socio-cultural factors described above are the main causes for this difference. Boys tend to have a higher self-concept in maths and science (Chan, 2022; Mejía-Rodríguez et al., 2021). Hence, subject specializations in math and science are more likely to establish a challenge-skill equilibrium for boys.

4.3 Positive relationships

There was a statistically significant decrease in positive relationships from secondary one to secondary two for both genders. The decline is almost certainly the result of challenges that students face in a new social environment. In the local context, the centralized allocation system for secondary schools often disrupts established friendships formed during primary school. In secondary one, students must thus invest significant effort to gain a renewed acceptance among peers. Building a meaningful network of relationships takes time and one year may be insufficient for many students to achieve that. Teachers may also be perceived as more distant in a secondary setting (Jindal-Snape, 2020) as they may expect students to demonstrate greater maturity and independence. These expectations are often subtly communicated to students through statements that emphasize the transition to secondary school as a stage requiring greater independence and more responsible behaviour. As transition to secondary school is a continuous process, adjustment to these higher behavioural standards may be a challenge for students, thus contributing to a decrease in the perceived quality of relationships.

In totality, there was a statistically significant increase in positive relationships from secondary two to secondary three that was driven mainly by boys. This indicated that boys experienced more feelings of being valued in that period as compared to girls. At this stage, boys may begin to exhibit greater maturity, which enhances their ability to form and sustain meaningful relationships. Concurrently, these increased feelings for boys may be a consequence of structural factors in school practices that drive social behaviours. Boys typically socialize through competitive contexts whilst girls tend be more pro-social in cooperative environments (Leaper, 2015). This stage in their school years is often marked by competitive activities, providing boys with more opportunities to strengthen their peer relationships. For example, students compete academically to perform well in the end-of-year placement examinations. They also compete in co-curricular activities such as sports events, and they may also compete for opportunities such as leadership positions within clubs. At the same time, these activities may simultaneously hinder girls' relationship building.

Surprisingly, there were no statistical differences in positive relationships between genders across the years. Girls are usually perceived as more social as they often display more empathy and are more likely to seek support through family, school, and/or friends when coping with school stressors (Wilhsson et al., 2017). In this instance, it seems that other factors, such as social problem-solving skills or family connections (Yoon et al., 2023), play a larger role in how positive relationships are developed.

4.4 Sense of meaning

There was a statistically significant decrease in a sense of meaning from secondary one to secondary two for both genders. School-related goals, especially academic performance, are a key purpose for students during this developmental stage (Koshy & Mariano, 2011), and the nature

of these goals may have undergone a notable shift. At the secondary level, teachers may place a greater emphasis on academic performance as compared to primary education (Ratnam-Lim & Tan, 2015), thereby reducing students' perception of personal relevance and meaning in their studies. Moreover, the focus of assessments may also have changed, shifting from the goal of fostering learning and mastery to one of prioritizing performance and achievement. This increased emphasis on grades and competitive outcomes may cause students to view their studies as a means to an end rather than a meaningful journey of personal development.

There were no statistically significant changes in a sense of meaning from secondary two to secondary three for both genders. This suggests that students have adjusted to the academic goals set by their teachers. This adjustment usually involves aligning their efforts with performance-oriented objectives, such as preparing for national examinations. Despite this, students' perceptions of meaning did not recover to its initial level observed in secondary one. This may be attributed to the continued emphasis on academic achievement, which can overshadow the intrinsic value of learning (Weinstein et al., 2013). Furthermore, as subjects increase in complexity, students may begin to question their relevance to real-life applications, leading to a disconnect between what they are learning and how it applies to their future. For example, students may struggle to see the practical significance of topics in advanced mathematics (e.g. trigonometry) beyond the classroom. This sense of irrelevance, together with a focus on achievement, can dampen the restoration of their sense of purpose in academic subjects.

There were no statistical differences in a sense of meaning between genders across the years. This suggested that the shift of the nature of goals had a comparable impact on both boys and girls. It appears that regardless of coping mechanisms, subjects, or teachers, the broader school context of goal transition may influence the sense of meaning for boys and girls in similar ways. In other words, there were no gender differences in the impact of intrinsic/extrinsic goals on meaning (Weinstein et al., 2013). For instance, when the emphasis is on results rather than learning, girls who study English literature may encounter the same challenge of finding personal relevance in the subject as boys who study mathematics.

4.5 Sense of accomplishment

There was a statistically significant decrease in a sense of accomplishment from secondary one to secondary two for both genders. As a sense of accomplishment is related to feelings experienced by students when they work towards their goals, it is possible that this decline is similarly caused by a shift in the nature of goals. In primary school, students often work with clear learning goals, where progress can be compared against fixed objectives. This approach allows students (and their parents) to monitor their learning and feel a sense of accomplishment at achieving definite milestones. In contrast, it is possible that secondary school culture may inadvertently focus on comparisons with peers rather than individual progress. This creates a moving target, making it more challenging to experience a sustained sense of accomplishment. However, more research is required to examine the impact of goal orientations on a sense of accomplishment.

There were no statistically significant changes in a sense of accomplishment from secondary two to secondary three for both genders. This stability suggests that students have adjusted their expectations to align with the school environment. By secondary three, students have a choice of subjects that are more aligned with their interests or strengths, thus helping to foster a sense of competence in specific areas. However, this specialization may be counter-balanced by a continual emphasis on academic outcomes, thus explaining why students' sense of accomplishment does not significantly increase during this period. Furthermore, there were no statistical differences in a sense of accomplishment between genders across the years, suggesting

that the potential antecedents leading to a sense of accomplishment and the impact of the school environment had a comparable impact on both boys and girls. Another potential reason for the lack of statistical difference is that limitations in the data could hide small but meaningful gender effects.

4.6 Implications to education

4.6.1 Transition support

The significant decline across all PERMA elements from secondary one to secondary two highlights the need for interventions during this important transition. As schools in Singapore are usually pressed for time (Lee & Poon, 2014), a range of relatively simple approaches may be integrated within normal practices to support students in the adjustment process (Beatson et al., 2023). For example, expressive writing to future students about the challenges faced and ways to overcome them may instil a perception of control in students, lowering anxiety and increasing positive emotions. Alternatively, schools may arrange for senior students to share advice with transiting students on integration within the school. In addition, activities can be planned within the curriculum that aims to develop strong peer networks. This may take the form of collaborative tasks, or setting aside time for peer activities that include sharing good news or encouragement or personal information (Mertika et al., 2020).

4.6.2 Curricular and teaching continuity

Academically, teachers may need to be aware that the transition to secondary one is a continuous process with a relatively little time gap in between. A potential solution is to explore collaborations between primary school and secondary school teachers so that there is pedagogical and curricular continuity (Jindal-Snape, 2020). For example, formative assessments that focus on mastery of learning goals can be implemented to a greater extent. However, we do acknowledge systemic constraints, with different curriculum structures between primary and secondary schools in Singapore. In addition, the quantity of homework may need to be increased gradually so as not to overwhelm students (Liang et al., 2025).

As a number of previous studies had indicated a steady drop in wellbeing across the school years (e.g. Casas & González-Carrasco, 2019), the stability of wellbeing from secondary two to secondary three may be a testament of the sustained efforts by schools to promote wellbeing. Socio-emotional learning has been a compulsory part of the national school curriculum since 2005 (Liem et al., 2017), and schools design programs and processes purposefully to support students' self-awareness and teacher-student relationships (Ng, 2020). An example would be the form teacher guidance period, in which a period is set aside per week for the form teacher to interact with individual students. Schools have also de-emphasized academic grades by removing mid-year examinations and providing opportunities for students to engage in applied learning contexts (Chue & Lin, 2024). However, from the trend results in this study, it appears that these strategies are likely to be effective only after students have acclimatized to the new school environment.

4.6.3 Gender specific considerations

Whilst gender differences were minimal, the few observed differences suggest the need to closely examine girls' wellbeing. It is possible that girls may respond in a different manner to the structural school practices and culture that are already in place. Future research could examine girls' perceptions in more detail to clarify the reasons behind the lower levels of positive

emotions; the research could take the form of interviews or diaries in longitudinal mixed-method studies.

4.7 Limitations

The main limitation in this study pertains to generalizability. The present research uses PERMA as indicators of wellbeing. Whilst PERMA is a widely recognized model of wellbeing, it does exclude other facets of wellbeing. Hence results arising from this study cannot be generalized to other aspects of wellbeing such as self-esteem, optimism, or school satisfaction. For instance, optimism is an important psychological resource that students can tap on in their preparation for school assessments. The sample in this study is also restricted to students attending government co-educational schools. It is unclear if the findings hold for students in single-sex or private schools as school policies and peer dynamics may differ in those schools. For instance, the culture in all-girls schools may foster a less competitive academic environment. Private schools may also offer smaller class sizes and extended learning opportunities that may influence students' experiences. In sum, the cultural context could limit generalisability of findings beyond Singapore. Future research could incorporate other constructs in different contexts so that a broader picture of student wellbeing can be captured. In addition, the methodology might also extend to qualitative methods and/or observations to better understand students' subjective experiences and the underlying mechanisms driving observed changes in PERMA elements.

A secondary limitation lies in the measurement aspect. Inherent in the measurement of wellbeing is the assumption that higher scores necessarily equate to better subjective wellbeing. However, this assumption may not be true (Gruber et al., 2011) as there could be an optimal range for wellbeing. Eastern traditional views of wellbeing tend to emphasize balance and moderation (Joshanloo, 2014), thereby suggesting that individuals should avoid extremes. Wellbeing is thus not about maximizing wellbeing indicators, but achieving a harmonious equilibrium between positive and negative aspects. For example, excessively high engagement might cause students to neglect other important areas in their life. Future research could perhaps explore the concept of optimal scores rather than assuming a linear relationship between scores and wellbeing.

4.8 Conclusion

Examining trends in student wellbeing offer valuable insights. Our findings confirm existing patterns in the adolescent wellbeing literature, showing statistically significant decline in wellbeing from Secondary 1 to Secondary 3, consistent with international studies documenting a decrease in wellbeing during school transitions. This study also broadens current understanding of student wellbeing by providing context-specific insights within Singapore's high-stakes academic environment. The findings also challenge generalized conclusions about gender differences in adolescent wellbeing. Contrary to literature documenting steeper declines among girls, we found no significant gender differences across most PERMA elements at T1 and T2, suggesting that patterns in earlier studies may depend on context.

These patterns in the Singapore context demonstrate that adolescent wellbeing trajectories, while following broad international trends, are significantly shaped by cultural and educational contexts, necessitating localized research to avoid overgeneralization and inform culturally responsive interventions. As students traverse an increasingly uncertain future, it is crucial for educators to prioritize strategies that foster wellbeing within the curriculum. This approach may better position schools to ensure that every student thrives. Future research could examine curvilinear relationships in wellbeing to capture more nuanced developmental patterns. Additionally, attrition concerns could be addressed through comparative analyses of study

completers versus non-completers, or by implementing targeted retention strategies to minimize participant dropout.

Authors

Kah Loong Chue
Psychology and Child & Human Development Department, National Institute of Education, Nanyang Technological University, Singapore
https://orcid.org/0000-0003-0458-7956
Kahloong.chue@nie.edu.sg

Amelia Yeo
Psychology and Child & Human Development Department, National Institute of Education, Nanyang Technological University, Singapore
https://orcid.org/0000-0002-9219-8741

Youyan Nie
Psychology and Child & Human Development Department, National Institute of Education, Nanyang Technological University, Singapore
https://orcid.org/0000-0002-3697-454X

Christel Lynne Chang
Psychology and Child & Human Development Department, National Institute of Education, Nanyang Technological University, Singapore
https://orcid.org/0000-0003-0725-9675

Author contribution statement

KL conceptualised the research design and analysed the data. AY assisted in the acquisition and interpretation of data. YN advised on the research design and analysis of data. CC conducted a review of existing literature. All authors read and approved the final manuscript.

Funding

This study was supported by the Ministry of Education Singapore under Grant OER 06/20 GADL.

Conflict of interest statement

All authors have no conflict of interest to disclose.

Ethical approval

This study was conducted in line with the ethical standards set forth in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Ethical approval was obtained from the Institutional Review Board of Nanyang Technological University.

Consent to Participate

Informed consent was obtained from the parents/guardians of all students who participated in the study; assent was also obtained from all participating students.

AI statement

During the preparation of this work the authors used ChatGPT 4o solely to paraphrase some statements. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgements

The authors would like to acknowledge all those who helped out directly and indirectly in the study and the writing of this manuscript. This includes family members, friends, fellow colleagues, participants in the study, and the reviewers for the manuscript.

Publishing Timeline

Received 22 June 2025
Revised version received 16 October 2025
Accepted 21 October 2025
Published 12 January 2026

References

Al-Hendawi, M., Alodat, A., Al-Zoubi, S., & Bulut, S. (2024). A PERMA model approach to wellbeing: a psychometric properties study. *BMC Psychology*, *12*(1), 414. https://doi.org/10.1186/s40359-024-01909-0

Beatson, R., Quach, J., Canterford, L., Farrow, P., Bagnall, C., Hockey, P., ... & Mundy, L. K. (2023). Improving primary to secondary school transitions: A systematic review of school-based interventions to prepare and support student social-emotional and educational outcomes. *Educational Research Review*, *40*, 100553. https://doi.org/10.1016/j.edurev.2023.100553

Beck, A. T., Weissman, A., Lester, D., & Trexler, L (1974). The measurement of pessimism: the hopelessness scale. *Journal of Consulting and Clinical Psychology*, 42(6), 861-865. https://doi.org/10.1037/h0037562

Blanchflower, D., & Bryson, A. (2024). The gender wellbeing gap. *Social Indicators Research*, 1-45. https://doi.org/10.1007/s11205-024-03334-7

Bos, W., & Pietsch, M. (2006). *KESS 4: Kompetenzen und Ein-stellungen von Schülerinnen und Schülern am Ende der Jahr-gangsstufe 4 in Hamburger Grundschulen* [KESS 7: Scales manual for the documentation of instruments]. Waxmann.

Branje, S., De Moor, E. L., Spitzer, J., & Becht, A. I. (2021). Dynamics of identity development in adolescence: A decade in review. *Journal of Research on Adolescence*, *31*(4), 908-927. https://doi.org/10.1111/jora.12678

Brysbaert, M., & Debeer, D. (2025). How to run linear mixed effects analysis for pairwise comparisons? A tutorial and a proposal for the calculation of standardized effect sizes. *Journal of Cognition*, *8*(1), 5. https://doi.org/10.5334/joc.409

Burke, J., & Minton, S. J. (2019). Wellbeing in post-primary schools in Ireland: the assessment and contribution of character strengths. *Irish Educational Studies*, *38*(2), 177-192. https://doi.org/10.1080/03323315.2018.1512887

Campbell, A., Converse, P. E., & Rogers, W. L. (1976). *The quality of American life: Perceptions, evaluations, and satisfactions*. New York, NY: Russell Sage.

Casas, F., & González-Carrasco, M. (2019). Subjective well-being decreasing with age: New research on children over 8. *Child Development*, *90*(2), 375-394. https://doi.org/10.1111/cdev.13133

Casas, F., Sarriera, J. C., Alfaro, J., González, M., Malo, S., Bertran, I., ... & Valdenegro, B. (2012). Testing the personal wellbeing index on 12–16 year-old adolescents in 3 different countries with 2 new items. *Social Indicators Research*, *105*(3), 461-482. https://doi.org/10.1007/s11205-011-9781-1

Chan, R. C. (2022). A social cognitive perspective on gender disparities in self-efficacy, interest, and aspirations in science, technology, engineering, and mathematics (STEM): The influence of cultural and gender norms. *International Journal of STEM Education*, *9*(1), 1-13. https://doi.org/10.1186/s40594-022-00352-0

Chen, X., Cai, Z., He, J., & Fan, X. (2020). Gender differences in life satisfaction among children and adolescents: A meta-analysis. *Journal of Happiness Studies*, *21*, 2279-2307. https://doi.org/10.1007/s10902-019-00169-9

Cheng, S. T., & Chan, A. C. (2005). Measuring psychological well-being in the Chinese. *Personality and Individual Differences*, *38*(6), 1307-1316. https://doi.org/10.1016/j.paid.2004.08.013

Chue, K. L., & Lin, R. (2024). Enhancing Students' Well-being Through Assessment Practices: A Singapore Perspective. In *Enhancing Holistic Well-Being of Children and Youth: Insights from Singapore for Research, Policy and Practice in Education* (pp. 47-59). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-3515-0_4

Chue, K. L., & Yeo, A. (2023). Exploring associations of positive relationships and adolescent well-being across cultures. *Youth & Society*, 55(5), 873-894. https://doi.org/10.1177/0044118x221109305

Chue, K. L., Yeo, A., Nie, Y., & Chew, L. C. (2024). Modifying the PERMA profiler to assess student well-being. *Current Psychology*, 43(4), 3749-3760. https://doi.org/10.1007/s12144-023-04550-z

Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (2014). Flow. *Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi*, 227-238. https://doi.org/10.1007/978-94-017-9088-8_15

Cummins, R. A., & Lau, A. L. (2005). *Personal Wellbeing Index–School Children*. *Manual* (3rd ed.). Melbourne, Vic: School of Psychology, Deakin University.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71-75. https://doi.org/10.1207/s15327752jpa4901_13

Evans, D., Borriello, G. A., & Field, A. P. (2018). A review of the academic and psychological impact of the transition to secondary education. *Frontiers in Psychology*, *9*, 1482. https://doi.org/10.3389/fpsyg.2018.01482

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: current use, calculations, and interpretation. *Journal of Experimental Psychology: General*, *141*(1), 2. https://doi.org/10.1037/a0024338

González-Carrasco, M., & Casas, F. (2024). Wellbeing in late childhood and early adolescence: evolution and explanatory factors. *Current Psychology*, 1-15. https://doi.org/10.1007/s12144-024-05772-5

González-Carrasco, M., Sáez, M., & Casas, F. (2020). Subjective wellbeing in early adolescence: observations from a five-year longitudinal study. *International Journal of Environmental Research and Public Health*, *17*(21), 8249. https://doi.org/10.3390/ijerph17218249

González-Carrasco, M., Casas, F., Malo, S., Viñas, F., & Dinisman, T. (2017). Changes with age in subjective wellbeing through the adolescent years: Differences by gender. *Journal of Happiness Studies*, *18*, 63-88. https://doi.org/10.1007/s10902-016-9717-1

Gruber, J., Mauss, I. B., & Tamir, M. (2011). A dark side of happiness? How, when, and why happiness is not always good. *Perspectives on Psychological Science*, *6*(3), 222-233. https://doi.org/10.1177/1745691611406927

Hascher, T. (2007). Exploring students' well-being by taking a variety of looks into the classroom. *Hellenic Journal of Psychology*, *4*(3), 331-349.

Hossain, S., O'Neill, S., & Strnadová, I. (2023). What constitutes student wellbeing: a scoping review of students' perspectives. *Child Indicators Research*, *16*(2), 447-483. https://doi.org/10.1007/s12187-022-09990-w

Huebner, E. S. (1991). Initial development of the student's life satisfaction scale. *School Psychology International*, *12*(3), 231-240. https://doi.org/10.1177/0143034391123010

Jindal-Snape, D., Hannah, E. F., Cantali, D., Barlow, W., & MacGillivray, S. (2020). Systematic literature review of primary–secondary transitions: International research. *Review of Education*, *8*(2), 526-566. https://doi.org/10.1002/rev3.3197

Joshanloo, M. (2014). Eastern conceptualizations of happiness: Fundamental differences with western views. *Journal of Happiness Studies*, *15*, 475-493. https://doi.org/10.1007/s10902-013-9431-1

Kelly, D. L. (2003). Developing the PIRLS background ques-tionnaires. In *M. O. Martin, I. V. S. Mullis, & A. M. Kennedy (Eds.), PIRLS 2001 Technical Report* (pp. 29-40). Boston College.

Kleinkorres, R., Stang-Rabrig, J., & McElvany, N. (2023). The longitudinal development of students' well-being in adolescence: The role of perceived teacher autonomy support. *Journal of Research on Adolescence*, *33*(2), 496-513. https://doi.org/10.1111/jora.12821

Kleinkorres, R., Stang, J., & McElvany, N. (2020). A longitudinal analysis of reciprocal relations between students' wellbeing and academic achievement. *Journal for Educational Research Online*, *12*(2), 114-165. https://doi.org/10.25656/01:20975

Kohn, J. P., & Frazer, G. H. (1986). An academic stress scale: Identification and rated importance of academic stressors. *Psychological Reports*, *59*(2), 415-426. https://doi.org/10.2466/pr0.1986.59.2.415

Koshy, S. I., & Mariano, J. M. (2011). Promoting youth purpose: A review of the literature. *New Directions for Youth Development*, *2011*(132), 13-29. https://doi.org/10.1002/yd.425

Leaper, C. (2015). Gender and social-cognitive development. In *R. M. Lerner (Series Ed.), L. S. Leben & U. Muller (Vol. Eds.), Handbook of child psychology and developmental science (7th ed.), Vol. 2: Cognitive processes* (pp. 806-853). New York: Wiley. https://doi.org/10.1002/9781118963418.childpsy219

Lee, Y. J., & Poon, C. L. (2014). The professional work of teachers in Singapore: Findings from a work-shadowing study. *Asia Pacific Education Review*, *15*(4), 525-535. https://doi.org/10.1007/s12564-014-9338-5

Lenroot, R. K., & Giedd, J. N. (2010). Sex differences in the adolescent brain. *Brain and Cognition*, *72*(1), 46-55. https://doi.org/10.1016/j.bandc.2009.10.008

Liang, K., Qu, D., Zhu, A., & Chi, X. (2025). How much homework is too much? Identifying optimal thresholds for adolescent sleep and mental health by school stage. *Journal of Affective Disorders*, 119636. https://doi.org/10.1016/j.jad.2025.119636

Liem, G. A. D., Chua, B. L., Seng, Y. B., Kamarolzaman, K., & Cai, E. Y. L. (2017). Social and emotional learning in Singapore's schools: Framework, practice, research, and future directions. In *Social and Emotional Learning in Australia and the Asia-Pacific: Perspectives, Programs and Approaches* (pp. 187-203). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-10-3394-0_10

Marquez, J., & Long, E. (2021). A global decline in adolescents' subjective wellbeing: A comparative study exploring patterns of change in the life satisfaction of 15-year-old students in 46 countries. *Child Indicators Research*, 14(3), 1251-1292. https://doi.org/10.1007/s12187-020-09788-8

McLellan, R., Faucher, C., & Simovska, V. (2022). Wellbeing and Schooling: Why Are Cross-Cultural and Cross-Disciplinary Perspectives Needed?. In *Wellbeing and Schooling: Cross Cultural and Cross Disciplinary Perspectives* (pp. 1-17). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-95205-1_1

Mejía-Rodríguez, A. M., Luyten, H., & Meelissen, M. R. (2021). Gender differences in mathematics self-concept across the world: An exploration of student and parent data of TIMSS 2015. *International Journal of Science and Mathematics Education*, *19*(6), 1229-1250. https://doi.org/10.1007/s10763-020-10100-x

Mertika, A., Mitskidou, P., & Stalikas, A. (2020). "Positive Relationships" and their impact on wellbeing: A review of current literature. *Psychology: The Journal of the Hellenic Psychological Society*, 25(1), 115-127. https://doi.org/10.12681/psy_hps.25340

Ministry of Education, Singapore. (n.d.). *Secondary Education*. Singapore Government, Ministry of Education. https://www.moe.gov.sg/secondary

Morinaj, J., & Hascher, T. (2022). Wellbeing of Primary and Secondary School Students in Switzerland: A Longitudinal Perspective. In *Wellbeing and Schooling: Cross Cultural and Cross Disciplinary Perspectives* (pp. 67-85). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-95205-1_5

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133-142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Nahkur, O., & Casas, F. (2021). Fit and cross-country comparability of Children's Worlds Psychological Well-being scale using 12-year-olds samples. *Child Indicators Research*, 14, 2211-2247. https://doi.org/10.1007/s12187-021-09833-0

Ng, P. T. (2020). The paradoxes of student wellbeing in Singapore. *ECNU Review of Education*, *3*(3), 437-451. https://doi.org/10.1177/2096531120935127

Parviainen, M., Aunola, K., Torppa, M., Lerkkanen, M. K., Poikkeus, A. M., & Vasalampi, K. (2021). Early antecedents of school burnout in upper secondary education: A five-year longitudinal study. *Journal of Youth and Adolescence*, *50*, 231-245. https://doi.org/10.1007/s10964-020-01331-w

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Positive emotions in education. *Beyond Coping*, 149-174. https://doi.org/10.1093/med:psych/9780198508144.003.0008

Ratnam-Lim, C. T. L., & Tan, K. H. K. (2015). Large-scale implementation of formative assessment practices in an examination-oriented culture. *Assessment in Education: Principles, Policy & Practice*, *22*(1), 61-78. https://doi.org/10.1080/0969594x.2014.1001319

Roffey, S. (2011). Developing positive relationships in schools. In *Positive Relationships: Evidence Based Practice Across the World* (pp. 145-162). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-007-2147-0_1

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, *110*(1), 145. https://doi.org/10.1037/0033-295X.110.1.145

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069. https://doi.org/10.1037//0022-3514.57.6.1069

Salmela-Aro, K., Kiuru, N., Leskinen, E., & Nurmi, J. E. (2009). School burnout inventory (SBI) reliability and validity. *European Journal of Psychological Assessment*, *25*(1), 48-57. https://doi.org/10.1027/1015-5759.25.1.48

Seligman, M. E. (2011). *Flourish: A visionary new understanding of happiness and wellbeing*. New York, NY: Simon & Schuster.

Seligman, M. E. (2018). PERMA and the building blocks of wellbeing. *The Journal of Positive Psychology*, 13(4), 333-335. https://doi.org/10.1080/17439760.2018.1437466

Seligson, J. L., Huebner, E. S., & Valois, R. F. (2003). Preliminary validation of the brief multidimensional students' life satisfaction scale (BMSLSS). *Social Indicators Research*, *61*(2), 121-145. https://doi.org/10.1007/s11205-005-5395-9

Shek, D. T., & Liang, L. Y. (2018). Psychosocial factors influencing individual wellbeing in Chinese adolescents in Hong Kong: A six-year longitudinal study. *Applied Research in Quality of Life*, *13*, 561-584. https://doi.org/10.1007/s11482-017-9545-4

Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Shernoff, E. S. (2014). Student engagement in high school classrooms from the perspective of flow theory. In *Applications of Flow in Human Development and Education: The Collected Works of Mihaly Csikszentmihalyi* (pp. 475-494). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_24

Smith, K. (2018). Secondary students' self-perceptions of school climate and subjective wellbeing: Invitational education meets positive psychology. *Journal of Invitational Theory and Practice*, *24*, 45-71. https://doi.org/10.26522/jitp.v24i.3488

Trautwein, U. (2004). Die temporalen Facetten der Lebenszu-friedenheit. Eine deutsche Adaption der Skala von Pavot, Diener und Suh (1998) [The temporal facet of life satisfaction. A German adaptation of the scale of Pavot, Diener and Suh (1998)]. *Diagnostica*, 50(4), 182-192. https://doi.org/10.1026/ 0012-1924.50.4.182

Trusz, S. (2020). Why do females choose to study humanities or social sciences, while males prefer technology or science? Some intrapersonal and interpersonal predictors. *Social Psychology of Education*, *23*(3), 615-639. https://doi.org/10.1007/s11218-020-09551-5

Waters, L. (2011). A review of school-based positive psychology interventions. *The Australian Educational and Developmental Psychologist*, *28*(2), 75-90. https://doi.org/10.1375/aedp.28.2.75

Weinstein, N., Ryan, R. M., & Deci, E. L. (2013). Motivation, meaning, and wellness: A self-determination perspective on the creation and internalization of personal meanings and life goals. In *The Human Quest for Meaning* (pp. 81-106). Routledge. https://doi.org/10.4324/9780203146286-13

Wilhsson, M., Svedberg, P., Högdin, S., & Nygren, J. M. (2017). Strategies of adolescent girls and boys for coping with school-related stress. *The Journal of School Nursing*, *33*(5), 374-382. https://doi.org/10.1177/1059840516676875

Wu, Y. J., & Becker, M. (2023). Association between school contexts and the development of subjective wellbeing during adolescence: a context-sensitive longitudinal study of life satisfaction and school satisfaction. *Journal of Youth and Adolescence*, *52*(5), 1039-1057. https://doi.org/10.1007/s10964-022-01727-w

Xiang, Z., Tan, S., Kang, Q., Zhang, B., & Zhu, L. (2019). Longitudinal effects of examination stress on psychological wellbeing and a possible mediating role of self-esteem in Chinese high school students. *Journal of Happiness Studies*, *20*, 283-305. https://doi.org/10.1007/s10902-017-9948-9

Yoon, Y., Eisenstadt, M., Lereya, S. T., & Deighton, J. (2023). Gender difference in the change of adolescents' mental health and subjective wellbeing trajectories. *European Child & Adolescent Psychiatry*, *32*(9), 1569-1578. https://doi.org/10.1007/s00787-022-01961-4