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The Influence of After-School Activity Participation and Social-Emotional Skills on Psychological Well-Being Among Adolescents: Findings from Three Cities Participating in the OECD SSES 2019

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ABSTRACT

Psychological well-being (PWB) in adolescents is a crucial factor in predicting long-term mental health and academic achievement. Adolescents with high PWB exhibit positive emotions and stress resilience during their learning journey. This boosts their self-confidence and helps them achieve their life goals. Although school-based curricula are known to foster PWB, less attention has been directed toward understanding the combined influence of after-school activities and social-emotional skills in shaping adolescents' PWB. There are many types of after-school activities ranging from solo activities to socially engaging activities. Socially engaging after-school activities provide opportunities for family communication, social participation, as well as collaborations among families, peer groups, and communities within diverse cultural and social environments. Social-emotional skills are competencies that form foundations of interpersonal communication and relationship building. These skills help foster family interactions and social connections, which may be associated with better PWB. This study examines the multivariate relationships among social-emotional skills, time spent in after-school activities, and PWB using 2019 OECD Survey on Social and Emotional Skills (SSES) dataset from three participating cities, namely Daegu (South Korea), Istanbul (Turkey), and Suzhou (China). The inclusion of feedback from adolescents from selected cities provides diverse sociocultural contexts for examining the associations among adolescents' social-emotional skills, activity participation, and PWB. Specifically, Ordinal Logistic Regression (OLR) is first used to investigate the relation between social-emotional skills and after-school activities. Correlational analysis was used to examine the relationship between after-school activities and adolescents' PWB. Building on these analyses, Generalized Additive Models (GAMs) are then employed to investigate the association between social-emotional skills and time spent in after-school activities in predicting adolescents' PWB. Findings reveal that Energy, Sociability, Curiosity, and Empathy are the primary influences on participation in after-school activities. Furthermore, physical and family-based after-school activities correlated positively with PWB. Importantly, the GAM combining social-emotional skills and after-school activities best predicts PWB, with an Adjusted R^2 of 0.506. These findings contribute to the adolescent development literature by highlighting how social-emotional skills and after-school activities jointly support PWB within diverse sociocultural contexts.

Keywords: Psychological well-being, social-emotional skills, after-school activities, adolescents

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1.0 Introduction

According to the World Health Organization (WHO), the age range for adolescents is 10 to 19 years. Adolescence is a period in which young people experience rapid physical growth, brain development, and changes in how they interact with others. During this stage of life, adolescents encounter increased academic pressures, changes in interpersonal relationships, gradually gain autonomy in making decisions, and engage in more complex forms of interpersonal communication and social interaction. These factors experienced by adolescents at this period of life can have a lasting impact on their current and future well-being (WHO, 2020). Therefore, understanding psychological well-being (PWB) in adolescence is essential, as it is associated with adolescents' long-term mental health and resilience at various life transitions later in life. Ryff (1989) defined PWB as a multidimensional construct that extends beyond simple happiness. At this age, adolescents are in their schooling years, during which their social-emotional skills are cultivated through participation in school-based and after-school activities. Organisation for Economic Co-operation and Development (OECD) mentions that stress resistance and sociability are examples of adolescents' social-emotional skills. Their communication skills and social connections may be enhanced through active participation in these settings.

Beyond school hours, adolescents also participate in various structured and unstructured after-school activities such as sports, arts, academic clubs, and leisure activities. Apart from interest, social-emotional skills may possibly determine the choice of after-school activities. In several studies (Gil de Zúñiga et al., 2017; Gjermunds et al., 2020), personality predicts the types of activities that individuals choose to engage in. Moreover, individuals tend to engage in situations that allow them to express their traits (Gjermunds et al., 2020). These findings underscore the importance of social-emotional skills, which have been associated with personality, in affecting engagement in after-school activities and PWB. Understanding how various types of after-school activities interact with social-emotional skills to influence the development of PWB among adolescents is essential, as they represent the next generation of the workforce.

The Teen National Health Interview Survey (NHIS-Teen) revealed that approximately one out of five adolescents reported symptoms of anxiety (21%) or symptoms of depression (17%) in 2021 and 2022 (Panchal, 2024). These findings suggest that psychological distress and PWB among adolescents are important areas to be understood and addressed in future studies. While previous research has recognized the benefits of organized activities for educational achievement and psychological adjustment (Feldman & Matjasko, 2005), the impact of unstructured, non-academic after-school activities on adolescents' PWB remains unclear. In addition, there is limited research examining how social-emotional skills contribute to adolescents' choices of after-school activities and their combined association with PWB. This is especially true for large-scale, cross-national datasets such as the OECD Survey on Social and Emotional Skills (SSES) 2019, which will be utilised in this study.

The research study aims to fill these gaps by investigating how after-school activities and social-emotional skills interact to associate with adolescents' PWB. This study uses data from the OECD SSES 2019, which evaluates the practices and factors that are associated with the development of social-emotional skills among students aged 10 and 15 in Daegu (South Korea), Istanbul (Turkey), and Suzhou (China). As for Istanbul (Turkey), it is in Turkey, a country where 97% of the area falls under Asia and 3% under Europe, as stated by the Worldmark Encyclopedia of Nations (Worldmark Encyclopedia of Nations, 2018). The inclusion of these cities ensures representation of diverse social and cultural contexts. It allows investigation of the associations among adolescents' social-emotional skills, activity participation, and PWB within diverse sociocultural contexts. Thus, the research study aims to achieve the following three objectives:

Objective 1: To examine the relationship between adolescents' social-emotional skills and their frequency of participation in after-school activities.

Objective 2: To explore the relationship between the adolescents' frequency of participation in after-school activities and their psychological well-being.

Objective 3: To examine the extent to which adolescents' social-emotional skills and their frequency of participation in after-school activities jointly predict students' psychological well-being.

2.0 Literature Review

2.1 Theoretical Framework

This section outlines the theoretical frameworks underpinning this study. It focuses on the relationship between social-emotional skills, after-school activities, and adolescents' PWB. The Big Five personality traits model serves as a foundational framework for conceptualizing social-emotional skills, while the OECD SSES framework provides a specialized application in measuring malleable facets within an educational and developmental context.

2.1.1 The Big Five Model

The Big Five personality traits model, which has been extensively researched and supported by robust empirical evidence (John et al., 2008), serves as the theoretical basis for this study. In the Big Five model, five major dimensions are identified: Conscientiousness, Emotional Stability (or Neuroticism), Agreeableness, Openness to Experience, and Extraversion. These dimensions represent a distinctive set of thoughts, emotions, and behaviours that are interconnected. It provides a concise yet comprehensive way of understanding individual personality differences across cultures and life stages (Borkenau & Ostendorf, 1990; Digman, 1990; Goldberg, 1990; McCrae & Costa, 1987; Tupes & Christal, 1992). Furthermore, a study by Roberts et al. (2007) suggested that the personality traits in the Big Five can be assessed and used to predict a range of major life outcomes, including academic achievements, health, well-being, and job performance.

Similarly, John and De Fruyt (2015) determined that the Big Five model is appropriate as the foundation for developing a more comprehensive framework to assess social-emotional skills for the OECD SSES 2019. Specifically, the domains and sub-domains of Big Five provide strong predictive power while capturing the complexity of these skills more effectively.

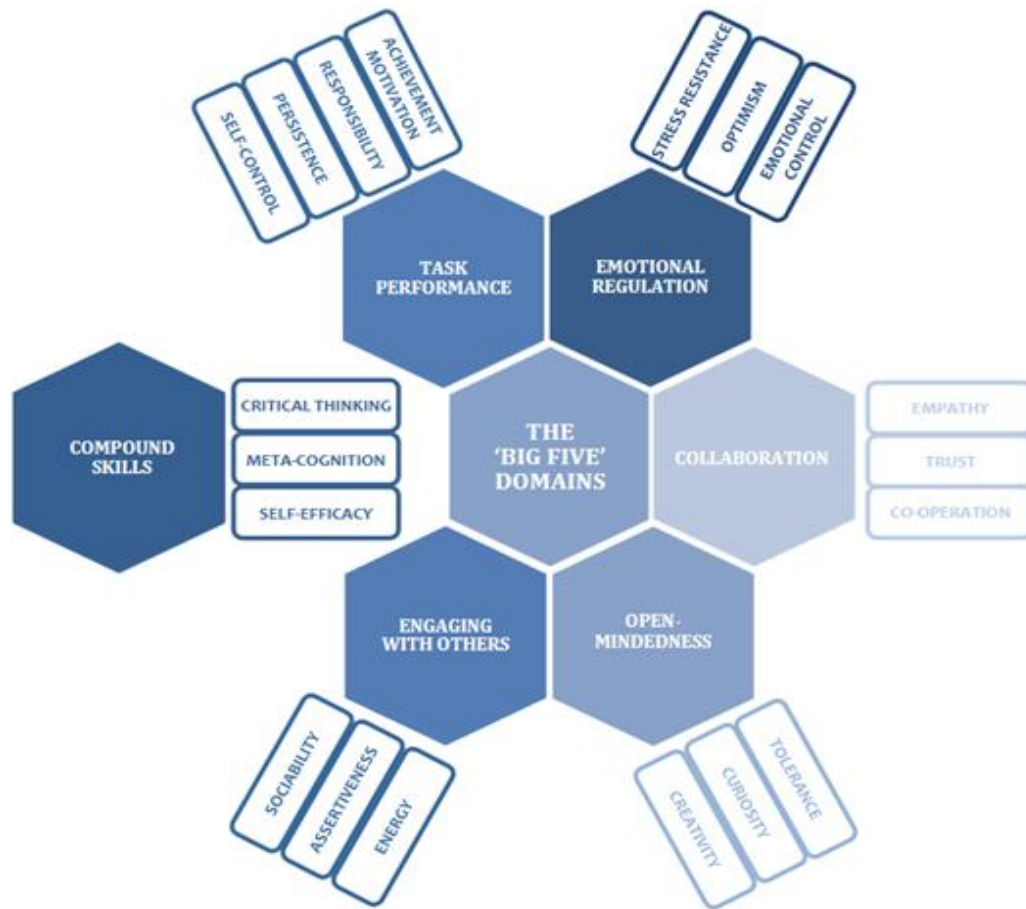
2.1.2 OECD SSES Framework

While the Big Five provides a stable taxonomy, the OECD's SSES framework extends this model by concentrating on specific facets of social-emotional skills. Assessing social-emotional skills on specific facets rather than the broad personality dimensions has proven more beneficial (Briggs, 1989; Saucier & Ostendorf, 1999; John & De Fruyt, 2015). Furthermore, facets have been shown to better predict future outcomes than the broader Big Five dimensions in many studies. For instance, Paunonen (1998) discovered that grouping personality characteristics into broad Big Five factors can reduce the predictive accuracy due to the loss of important skill-specific details. In addition to the study by Paunonen (1998), similar conclusions have been reported in other studies, including Ashton (1998), Mershon and Gorsuch (1988), Paunonen and Ashton (2001), as well as Roberts et al. (2005).

Additionally, Chernyshenko et al. (2018) concluded that analysing facets allows for effective interventions to be developed, since it is easier to align support strategies with specific individuals' needs. For example, assessing the overall Conscientiousness scores of a student might prompt educators and parents to ask which specific traits contributed to a certain outcome. On the contrary, evaluating facets provides detailed insights that allow teachers and parents to recognize areas for improvement and develop more tailored support strategies. Based on the empirical findings of Chernyshenko et al. (2018), OECD's assessments of social-emotional skills following various guiding principles (John & De Fruyt, 2015; OECD, 2015), and some adjustments made in efforts to reduce respondents' burden (Eva, 2021), a total of 15 social and emotional skills (sub-domains) were selected in the final SSES framework. These skills were then further organized into five domains that mirror the Big Five model: Task Performance (Conscientiousness), Emotional Regulation (Emotional Stability), Collaboration (Agreeableness), Engagement with Others (Extraversion), and Open-Mindedness (Openness to Experience). Figure 1 outlines the domains and sub-domains of social and emotional skills selected for SSES.

Figure 1

Selected Social and Emotional Skills for SSES (Chernyshenko et al., 2018)



2.1.3 Theoretical Framework of Psychological Well-Being

In the context of SSES, the OECD (2021) provides three distinct but interrelated aspects of psychological well-being: life satisfaction, current psychological well-being, and test anxiety. This study specifically focuses on current psychological well-being, which is conceptualized as a condition of good mental health, encompassing both individuals' positive and negative assessments of their lives and their affective responses to various experiences (OECD, 2013; OECD 2021). As the OECD (2021) states, the WHO-5 Well-Being Index is one of the most widely used questionnaires for assessing subjective psychological well-being. The index was published in 1998 by the WHO Regional Office in Europe as part of the DEPCARE project to measure well-being in primary health care, and it was subsequently translated into more than 30 languages. It has also been widely used in health research, particularly in studies investigating depressive symptoms (Topp et al., 2015). Owing to its simple structure and brevity, it remains an effective tool for rapid, reliable screening of PWB in large-scale investigations. As adolescents experience significant academic and interpersonal transitions, these social-emotional skills are competencies that may contribute to higher PWB as well as encouraging interpersonal communication and relationship building in everyday contexts. By grounding the analysis in the OECD's specific PWB measures, this study evaluates how after-school activities provide environmental contexts for the development of such skills, which may foster resilience, social connectedness, and a positive internal state among adolescents.

2.2 Social-Emotional Skills and After-School Activities Participation

Finnerty et al. (2021) used a cross-sectional survey to investigate the impact of extracurricular activities, well-being, and personality traits during the COVID-19 pandemic lockdown among full-time undergraduate students at a university. The researchers employed linear regression models. The findings revealed that outdoor exercise was most strongly associated with students' well-being, followed by online socializing and listening to music. Furthermore, the study revealed that personality traits influence activity choices. Specifically, individuals higher in openness to experience prefer songwriting, journaling, and playing an instrument or singing; conscientious individuals favour indoor exercise and social media while avoiding video games; extraverts tend to participate in indoor exercises, outdoor exercise, and social media; emotionally stable individuals favour outdoor exercise; and those with high agreeableness are less inclined to play video games. A study by Belaire et al. (2024) examined the individual and combined influence of the psychosocial factors on children's participation in physical activity (PA) with particular focus on analysing gender differences. The findings revealed that both PWB and resilience are positively associated with PA among boys. For girls, only PWB had a significant effect. Furthermore, social-emotional learning and depressive symptoms do not separately predict PA but contributed to the overall model. This underscores the importance of promoting PWB and resilience among school-aged children to encourage participation in PA. PA such as exercise and hobbies may provide interaction contexts that contribute to social connectedness and development of communication skills.

Although previous research highlights the importance of personality characteristics and activity preferences, there is a need for a detailed understanding of the role of social-emotional skills as competencies within the context of after-school activities, and their relation to PWB. Social-emotional skills such as Sociability, Empathy, Curiosity, and Energy influence the types of after-school activities that adolescents participate in and how adolescents interact and build relationships while participating in those activities. Specifically, Sociability is associated with adolescents' preference toward peer-oriented activities that facilitate interpersonal communication and social bonding. Empathy allows adolescents to understand and respond to the emotional states of others by promoting prosocial behaviour (Li et al., 2024). Moreover, Curiosity motivates adolescents to explore and seek knowledge, while Energy provides the social drive to initiate peer interaction. After-school activities, as a whole, can serve as interaction contexts that allow these competencies to be expressed and further developed. Participating in after-school activities can therefore provide ways for adolescents to practice and develop their social-emotional skills, which may be associated with higher PWB.

2.3 After-School Activities and PWB

After-school or out-of-school activities take a significant portion of adolescents' weekday lives, where it presents opportunities or potential risks for development and personal growth beyond the classroom. Out-of-school activities can be broadly categorized into two categories: unstructured and structured. Unstructured activities refer to activities often participated in the presence of peers, typically lack any forms of adult supervision, and are less goal-oriented (Svensson et al., 2023). Conversely, structured activities refer to activities often supervised by adults, organized, and emphasised on certain goals or rules. From structured programs in schools such as sports, arts, and academic clubs to unstructured leisure pursuits like going to parties with friends, these activities play a crucial role in shaping adolescents' PWB.

Recent research has consistently highlighted the benefits of structured activities for adolescents' well-being. Kennewell et al. (2022) examined the links among the frequency of participation in activities, socioeconomic status, and overall well-being. Their findings reveal that students in the high socioeconomic status (SES) group are more involved in organized activities, whereas students in the low SES group are inclined to socialize with friends and participate in screen-based activities. Further, for students in the low SES group, participating frequently in sports, homework, reading, and spending time with friends is associated with better well-being. Pan et al. (2022) examined the association between time spent on various extracurricular activities during weekdays and weekends and depressive symptoms. In addition, the study explores gender and the family's SES as potential moderators. The results revealed that physical exercise was negatively related to depressive symptoms, whereas other

activities demonstrated weak positive associations. Additionally, moderate-to-high SES students showed a stronger positive association between depressive symptoms, time spent on weekday and weekend homework completion, as well as weekend internet use and online gaming. Fa'im Rosli and Mohd Mahudin (2024) analysed the relation between binge-watching and social interaction anxiety among undergraduate students. The results reveal that social interaction anxiety impacted the behaviour of binge-watching.

Ditzel et al. (2022) compared children participating in a structured after-school program with those not participating by employing confirmatory factorial analysis (CFA), multi-group structural equation modelling, and regression analysis. The purpose of their study is to examine the association between subjective well-being (SWB), satisfaction with free-time use, and program impacts. The results reveal that children who attend the after-school program report higher levels of happiness, greater satisfaction with their free-time use, and engage more in diverse activities including relaxing and spending time with family. In contrast, non-participants report higher usage of social networks. Caldwell et al. (2022) studied how the Build Our Kids Success (BOKS) program affects children's physical activity and well-being in an after-school setting during the COVID-19 pandemic. The results reveal that the BOKS program influences children's physical activity levels and well-being positively, as participants report moderate levels of physical activity, moderate physical activity enjoyment, and moderate-to-high perceived physical literacy. In addition, the qualitative findings reveal that BOKS programming enhances children's confidence level, emotional well-being, and PWB.

O'Donnell et al. (2024) investigated the longitudinal effects of extracurricular activity participation on school belonging and depressed mood. The study considers structural inequalities, community SES, family financial hardship, remoteness, and activity participation as moderators. By employing a random intercept cross-lagged panel model (RI-CLPM), the researchers found that engaging in a broader range of activities predicts higher school belonging two years later. Specifically, it is associated with a decrease in depressed mood, though with a small effect size. Notably, adolescents from low SES communities benefit the most, whereby it reduces depressed mood four years later significantly. Perez et al. (2025) evaluated the effectiveness of a strengths-based after-school program, Art in Mind (AIM). The study reveals that the AIM program improves depressive mood, general self-efficacy, social functioning, and positive self-esteem significantly as compared to the waitlist group.

The reviewed studies collectively highlight the impact of after-school activities in cultivating students' PWB. Structured activities often promote positive outcomes such as emotional regulation and life satisfaction, whereas excessive engagement in unstructured activities may pose risks. Notably, screen-based activities are often associated with mixed outcomes, depending on the frequency and context of engagement. The domain of Conscientiousness, described in the SSES as Task Performance, is arguably the most closely linked with participation in structured activities, as it often requires students to manage their time and set goals. On the other hand, unstructured activities relate mostly to the SSES Open-Mindedness domain, as they allow children to explore their environments, make independent decisions, and use their imagination without the constraints of specific learning outcomes. In general, the association of unstructured activities with PWB of adolescents across selected OECD SSES 2019 cities remains underexplored.

2.4 Social-Emotional Skills and PWB

Social-emotional skills do not develop or operate in isolation from the cultural environments that adolescents live in. While their structure may be common, their expression and subsequent impact on PWB can be shaped by the cultural values and communicative norms of the societies in which adolescents grow up. Niu et al. (2023) conducted a multi-group analysis and employed structural equation modelling (SEM) to investigate the association between social-emotional skills and mental well-being, mediated by friendship quality among Chinese and Canadian adolescents aged 15 years old. Using the OECD SSES 2019 dataset, the findings reveal that interpersonal trust and empathy influence mental well-being directly and indirectly through friendship quality, while self-control is mainly associated with mental well-being directly. Furthermore, cultural differences exist where empathy demonstrates stronger associations with friendship quality and mental well-being in Chinese adolescents, while interpersonal trust more strongly influences friendship quality among Canadian

adolescents. This suggests that interpersonal communication may play an important role in fostering friendship quality, which in turn supports adolescents' mental well-being.

Niu (2024) analysed the OECD SSES 2019 dataset to examine the impact of social-emotional skills on mental well-being among underprivileged students (the lowest 25% socioeconomic status) in Suzhou, China. Using OLS regression and quantile regression (QR) analyses, the study examines fifteen social-emotional skills' impact across different mental well-being levels. The findings reveal that self-control, energy, stress resilience, trust, optimism, curiosity, and sociability are significantly and positively associated with students' mental well-being. Interestingly, tolerance has a significant negative impact on mental well-being within this group. Moreover, QR reveals that skills such as self-control, trust, curiosity, stress resilience, sociability, and tolerance demonstrate a stronger effect at moderate mental well-being levels, except for optimism and energy, which show consistently positive effects across all well-being levels.

Akram and Oteir (2025) investigated the effects of a three-month running program on emotional regulation behaviours among students majoring in the Arabic language with little or no exposure to English except for mandatory basic courses (L1) and students majoring in English as a foreign language (L2). A quasi-experimental research design is employed, involving second-year cohorts aged 18 to 22 years, selected through convenience sampling. The findings reveal that regular running significantly improved cognitive appraisal (CR) in both L1 and L2 groups, with L2 students experiencing a greater increase in their post-test scores. Further, regular running lowered expressive suppression (ES) more significantly than in L2 students. These results indicate that physical exercise contributes significantly to better emotional regulation. Despite these insights, gaps exist in understanding how specific social-emotional skills, especially those recorded in the OECD SSES 2019 dataset, influence adolescents' PWB.

3.0 Methods

3.1 Data Source

The OECD SSES 2019 dataset is used in this study. It is an international survey conducted between the years 2018 and 2020 to gather feedback on adolescents' social and emotional skills as well as various contextual factors from students in 10 cities across 9 countries. The OECD's SSES 2019 focuses particularly on examining personal traits, interpersonal relationships, psychological characteristics, and cognitive abilities of students in the two age cohorts, namely 10-year-olds and 15-year-olds. For the participants in the survey, the younger cohort includes students aged 10 years and 3 months to 11 years and 2 months, whereas the older cohort consists of those aged from 15 years and 3 months to 16 years and 2 months (Eva, 2021). A two-stage stratified probability sampling approach is implemented to ensure that the data accurately represent the target population in each participating country. The analysis focuses only on student questionnaire responses or data from three of the participating cities, including Suzhou, Daegu, and Istanbul. Table 1 and Table 2 list the attributes that are considered in this study. Table 1 lists the attributes relevant to students' frequency of participating in after-school activities, while Table 2 lists the attributes related to social and emotional skills that are considered for measuring adolescents' social and emotional skills.

For the social-emotional skills listed in Table 2, various steps of calibration have been applied to the raw scores for each of the skills. Firstly, the Generalized Partial Credit Model (GPCM) within the framework of Item Response Theory (IRT) has been employed to calibrate the student assessment scales in the SSES 2019 and compute the Weighted Likelihood Estimates (WLE) (Warm, 1989). Next, the scores have been corrected for Acquiescence Response Style (ARS) to reduce response bias. Finally, these WLEs are standardized to a mean score of 500 and a standard deviation of 100. These transformations ensured that participants who consistently selected neutral responses ("neither agree nor disagree") to the items would get an average score of 500. In this study, the variables labelled as <Scale>_WLE_ADJ was used for measuring adolescents' social and emotional skills. These variables represent 15 different social and emotional skills that have been adjusted for acquiescence and, according to OECD (2021), are the recommended measures for analysis.

Table 1

List of Relevant Attributes to Participation in After-school Activities

Attributes	Description
CohortID	Younger cohort (10 years old) and older Cohort (15 years old)
SiteID	Site numeric code (e.g: 08 – Istanbul)
Gender_Std	Gender of the students
SES	Socioeconomic status
st_wellbeing	WHO-5 Well-Being Index
STQM03601	Time spent to do homework
STQM03602	Time spent to watch TV programs
STQM03603	Time spent to read a book/newspaper/magazine
STQM03604	Time spent to talk to parents
STQM03605	Time spent to work in the household or take care of family members
STQM03606	Time spent on playing online games
STQM03607	Time spent on chatting online
STQM03608	Time spent on participating in social networks
STQM03609	Time spent on browsing the internet for fun
STQM03610	Time spent on browsing the internet for information
STQM03611	Time spent to exercise or practice sports outside of school
STQM03612	Time spent to meet with or talk to friends outside school

3.2 Data Pre-processing

Data preprocessing is a crucial phase that involves cleaning, transforming, and integrating data to ensure the dataset is in a suitable format for high-quality analysis and deriving actionable insights. Various steps of calibration are applied to Table 2 (OECD, 2021). Rows with missing values are removed to avoid potential biases. Duplicate checking is conducted. The initial dataset has 61,010 records, and the data preprocessing has further reduced the dimension of the dataset. The resulting dataset after processing has 54,415 records and 32 attributes. Despite this reduction, the pre-processed dataset retains its substantial sample size, which is sufficient for conducting reliable and robust analysis. The pre-processed dataset contains feedback from 26,291 participants from the younger cohort and 28,124

from the older cohort. Additionally, it consists of 27,597 pieces of feedback from females and 26,818 pieces of feedback from males.

Table 2

List of Relevant Attributes to Adolescents' Social and Emotional Skills

Attributes	Description
ASS_WLE_ADJ	Assertiveness Adjusted WLE
COO_WLE_ADJ	Cooperation Adjusted WLE
CRE_WLE_ADJ	Creativity Adjusted WLE
CUR_WLE_ADJ	Curiosity Adjusted WLE
EMO_WLE_ADJ	Emotional Control Adjusted WLE
EMP_WLE_ADJ	Empathy Adjusted WLE
ENE_WLE_ADJ	Energy Adjusted WLE
OPT_WLE_ADJ	Optimism Adjusted WLE
PER_WLE_ADJ	Persistence Adjusted WLE
RES_WLE_ADJ	Responsibility Adjusted WLE
SEL_WLE_ADJ	Self-control Adjusted WLE
SOC_WLE_ADJ	Sociability Adjusted WLE
STR_WLE_ADJ	Stress Resistance Adjusted WLE
TOL_WLE_ADJ	Tolerance Adjusted WLE
TRU_WLE_ADJ	Trust Adjusted WLE

3.3 Statistical Visual and Data Modelling

Different approaches are applied to achieve the three objectives of this study. To derive insights for the first objective, a regression-based analysis using Ordinal Logistic Regression (OLR) is applied. OLR, otherwise known as Ordinal Regression or Ordered Regression, is employed to examine the relationship between students' social-emotional skills and their frequency of participation in after-school activities. This method tests the theoretical assumption that specific facets of social-emotional skills influence the frequency of engagement in specific after-school activities. In this study, a separate multiple OLR model is estimated for each of the twelve after-school activities. Specifically, each activity is treated as its own ordinal dependent variable and modelled individually. Odds Ratio (OR) was utilised as the primary metric for interpreting the results of OLR. Specifically, an OR of 0 suggests no association, an OR greater than 1 indicates increased odds of being in a higher category, and OR less than 1 indicates decreased odds. The p-values were interpreted to test whether each predictor is statistically significant.

For this study, a p-value of less than 0.05, common in the field of statistics, is considered significant. In addition, the Variance Inflation Factor (VIF) test is conducted to diagnose multi-collinearity, while the proportional odds assumption is verified to ensure consistency across response categories with the Brant-Wald test. To ensure the statistical validity and robustness of the twelve OLR models, the Likelihood Ratio Chi-Square Test (χ^2) and Nagelkerke R^2 are employed. Specifically, the Likelihood Ratio Test evaluates whether the inclusion of 15 social-emotional skills significantly improves the predictive power of the OLR model compared to a null model with no predictors (Ailobhio & Ikughur, 2024). A statistically significant χ^2 value ($p < 0.05$) indicates that the model with predictors provides a better fit than a null model. Furthermore, Nagelkerke R^2 (a pseudo- R^2) is utilised to assess the strength of the association between the predictor variables and the dependent variable (Hua et al., 2021), as standard R^2 values cannot be directly calculated for ordinal outcomes. This metric allows for a standardized assessment of the effect size across the different after-school activities.

For the second objective, a correlation heatmap is plotted to gain an overview of how each after-school activity is linearly associated with students' PWB. Following the plot of the correlation heatmap, a series of boxplots is generated to visualize the distribution of PWB scores across different frequency levels of after-school activity. This design investigates how engagement in after-school activities aligns with the OECD SSES framework, particularly the domains of social and emotional skills.

For the third objective, a regression-based analysis using Generalized Additive Models (GAMs) is used. GAMs are adopted as a more flexible and appropriate alternative to examine the extent to which students' social-emotional skills and their frequency of participation in after-school activities jointly predict students' PWB. This approach tests the integrated theoretical framework that PWB is a result of the interaction between an adolescent's internal social-emotional assets and their external engagement. According to Wood (2017), GAMs extend the generalized linear model (GLM) framework, making it well-suited to capture complex, non-linear relationships without having to specify their exact form beforehand. Specifically, three GAMs models are fitted: Model 1 includes social-emotional skills only, Model 2 includes after-school activities only (Model 2), and Model 3 includes both social-emotional skills and after-school activities. Moreover, each of the models is fitted with the Restricted Maximum Likelihood (REML) method to ensure optimal smoothing penalty selection. For models produced by GAMs, the models' performances are assessed with a combination of metrics including Adjusted R^2 , Akaike Information Criteria (AIC), Bayesian Information Criterion (BIC), and Deviance Explained. These evaluation metrics are employed to evaluate whether the inclusion of social-emotional skills and/or after-school activity improve (s) the model fit. In general, a lower AIC and BIC represent a better model fit, while a higher Deviance Explained indicates a better model fit.

4.0 Results

4.1 Objective 1: To examine the relationship between students' social-emotional skills and their frequency of participation in after-school activities across selected OECD SSES 2019 cities.

Table 3 shows the top three social-emotional skills that are positively associated with each of the after-school activities. In Table 3, the Confidence Interval (95%) and OR are reported for each of the top 3 social-emotional skills. In total, there are twelve after-school activities. Notably, all twelve OLR models were statistically significant ($p < 0.001$), with Nagelkerke R^2 values indicating the proportion of variance explained by the social-emotional skills.

Based on Table 3, the OLR reveals that Energy ranks as the most consistent positive predictor. It appears in nine of the after-school activities, namely watching TV programs, talking to parents, working in the household or taking care of family members, spending time in online games, chatting and social networking, browsing the internet for fun, exercise, or practicing sports outside schools, as well as meeting or talking with friends outside school. As shown in Table 3, the OR values range from 1.0981 to 1.6789 with $p < 0.001$. The results suggest that students with higher levels of Energy predict a greater frequency of participation in both socially interactive and physically active activities. This relationship reflects a tendency to approach everyday life with energy, excitement, and spontaneity, as conceptualised in the SSES framework (OECD, 2021). Notably, this orientation towards less ordered environments is not necessarily an indicator of a lack of concentration or planning, but rather an

inclination towards more active and engaging experiences that can help to improve interpersonal communication, peer interaction, and social connectedness within diverse sociocultural contexts.

Table 3

Top Three Social-Emotional Skills that Positively Associated with After-school Activities

After-school Activity	Top 3 Social-Emotional Skills	Confidence Interval (95%)	OR	Nagelkerke R ²	χ^2
STQM03601	Responsibility **	[1.2256 to 1.3392]	1.2812	0.0382	1867.3 **
	Tolerance **	[1.1121 to 1.1927]	1.1517		
	Trust **	[1.0814 to 1.1608]	1.1204		
STQM03602	Optimism **	[1.1475 to 1.2508]	1.1980	0.0408	2077.7 **
	Energy **	[1.1314 to 1.2263]	1.1779		
	Sociability **	[1.0280 to 1.1120]	1.0692		
STQM03603	Curiosity **	[1.2355 to 1.3486]	1.2908	0.0870	4416.6 **
	Tolerance **	[1.2024 to 1.2908]	1.2458		
	Creativity **	[1.1704 to 1.2700]	1.2192		
STQM03604	Optimism **	[1.2244 to 1.3399]	1.2808	0.0603	3071.7 **
	Energy **	[1.1144 to 1.2117]	1.1620		
	Curiosity **	[1.1015 to 1.2033]	1.1513		
STQM03605	Cooperation **	[1.1355 to 1.2531]	1.1928	0.0270	1356.7 **
	Curiosity **	[1.0937 to 1.1941]	1.1428		
	Energy **	[1.0890 to 1.1840]	1.1355		
STQM03606	Energy **	[1.1389 to 1.2355]	1.1862	0.0747	3914.8 **
	Stress Resistance / Resilience **	[1.1259 to 1.2100]	1.1672		
	Sociability **	[1.0805 to 1.1698]	1.1243		
STQM03607	Empathy **	[1.1292 to 1.2302]	1.1786	0.0744	3903.2 **
	Sociability **	[1.1056 to 1.1978]	1.1507		
	Energy **	[1.0540 to 1.1441]	1.0981		
STQM03608	Empathy **	[1.2244 to 1.3337]	1.2779	0.0847	4467.6 **
	Energy **	[1.1375 to 1.2353]	1.1854		
	Cooperation **	[1.0929 to 1.2032]	1.1467		
STQM03609	Empathy **	[1.1452 to 1.2452]	1.1942	0.0734	3838.8 **
	Energy **	[1.1421 to 1.2379]	1.1890		
	Self-Control **	[1.0681 to 1.1557]	1.1110		
STQM03610	Curiosity **	[1.1599 to 1.2663]	1.2120	0.0377	1885 **
	Tolerance **	[1.1647 to 1.2506]	1.2069		
	Self-Control **	[1.1480 to 1.2465]	1.1963		
STQM03611	Energy **	[1.6107 to 1.7500]	1.6789	0.1216	6514.8 **
	Sociability **	[1.1341 to 1.2279]	1.1801		
	Trust **	[1.1315 to 1.2131]	1.1716		
STQM03612	Sociability **	[1.3157 to 1.4230]	1.3683	0.0509	2637.6 **
	Energy **	[1.2222 to 1.3244]	1.2723		
	Empathy **	[1.1682 to 1.2707]	1.2184		

Note. *p<0.05, ** p < 0.001

The second-ranked social-emotional skill that is positively associated with after-school activities is Sociability. Sociability is consistently and positively associated with five of the after-school activities, namely watching TV programs, chatting online, exercising or practicing sports, as well as meeting or talking with friends outside school. As presented in Table 3, the OR values range from 1.0692 to 1.3683 with $p < 0.001$. Sociable students are more likely to engage more frequently in peer-oriented or team-based after-school activities such as playing online games and meeting with friends outside school. This alignment reflects the sociable students' need for social connection and collaboration (OECD, 2021). From a social and cultural perspective, such activities allow adolescents to develop social belonging, improve communication skills, and develop better peer relationships through shared experiences and interactions. Although watching TV programs is usually categorized as a passive behaviour, the positive association with sociability suggests it may function as a social tool. Specifically, watching TV allows them to stay abreast of topics discussed among peers, such as the latest TV episodes. This can help to improve peer communication by ensuring that they have common discussion topics and not being isolated from their peers. When watching educational programs, it can also help adolescents learn ways to socialize with people (Christensen & Zinsser, 2014).

Sharing the third rank of social-emotional skills that are positively correlated with after-school activities are Curiosity and Empathy, with both appearing in four of the after-school activities. According to Table 3, the OR values for Curiosity range from 1.1428 to 1.2908, with $p < 0.001$. This suggests that curious students are associated with increased odds of participating more frequently in knowledge-seeking after-school activities. As described by OECD (2021), Curiosity reflects an individual's strong desire to explore new ideas, learn, understand, and acquire new knowledge. Notably, talking to parents is associated with curiosity, as curious students may seek guidance or explore unique life experiences with their parents. Meanwhile, working in the household or taking care of family members may provide students with opportunities to learn practical life skills that can spark a strong desire to understand real-world responsibilities in curious students. Such after-school activities encourage adolescents to exchange opinions and experiences from daily communications with family members. Similarly, empathic students prefer socially immersive activities, such as chatting online or networking, because these activities allow them to express their feelings and opinions and have a network of peer support. This is aligned with OECD (2021) description of Empathy as involving concern for the well-being of others and a value for close relationships. While browsing the internet for fun may appear less related to Empathy, it could still reflect an empathetic student's interest in discovering content that facilitates the sharing of positive experiences with peers.

4.2 Objective 2: To explore the relationship between the students' frequency of participation in after-school activities and their PWB across selected OECD SSES 2019 cities.

A correlation score is used to represent the degree of relationship between the students' frequency of participation in after-school activities and their PWB. The correlation score ranges between -1 and 1. The magnitude of the correlation score indicates the type of relationship, i.e., a positive or a negative relationship. Figure 2 shows the correlation heatmap. The numbers within the correlation heatmap represent the correlation scores. The varying colour intensity and the magnitude of the score indicate the direction of the relationship.

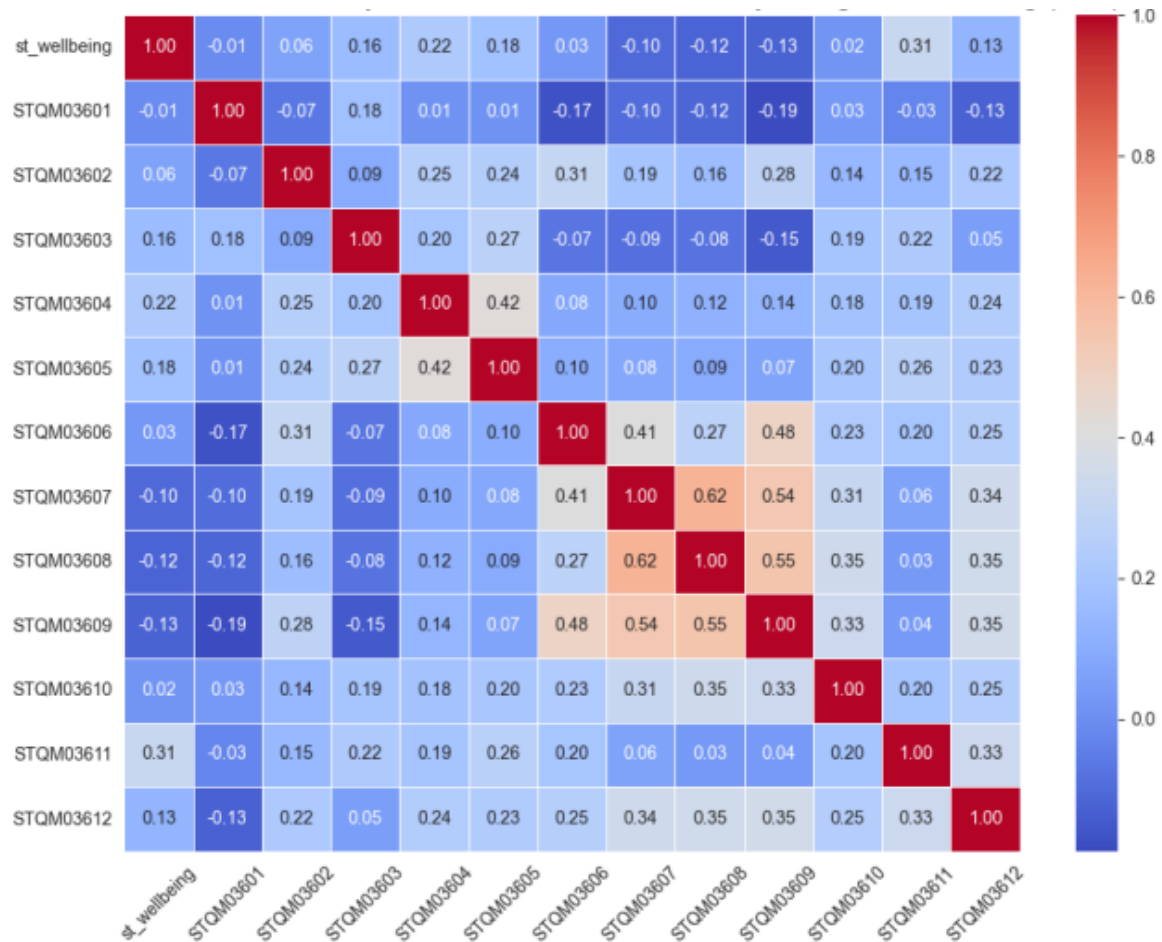
Based on Figure 2, the top three after-school activities that are positively correlated with PWB, sorted by the correlation scores in descending order, are STQM03611, STQM03604 and STQM03605. By referring to earlier Table 1, STQM03611 refers to Time spent exercising or practicing sports outside of school, STQM03604 refers to Time spent talking to parents, and STQM03605 refers to Time spent working in the household or taking care of family members.

Based on the correlation scores in the correlation heatmap in Figure 2, the frequency of exercising or practicing sports outside school has the strongest positive relationship with PWB. The correlation score is $r = 0.31$, and it is the highest correlation score among other correlation scores that are recorded in the correlation heatmap. The relationship between the frequency of talking to parents and PWB is identified to be the second strongest positive relationship. The correlation score is $r = 0.22$. Finally, the relationship between the frequency of working in the household or taking care of family members and PWB is ranked as the third strongest positive relationship with PWB. The correlation score is $r = 0.18$.

A positive correlation score indicates that the more frequently these after-school activities are conducted, the greater the perceived levels of PWB.

Figure 2

Correlation Matrix of Frequency of Participation in After-school Activities and PWB



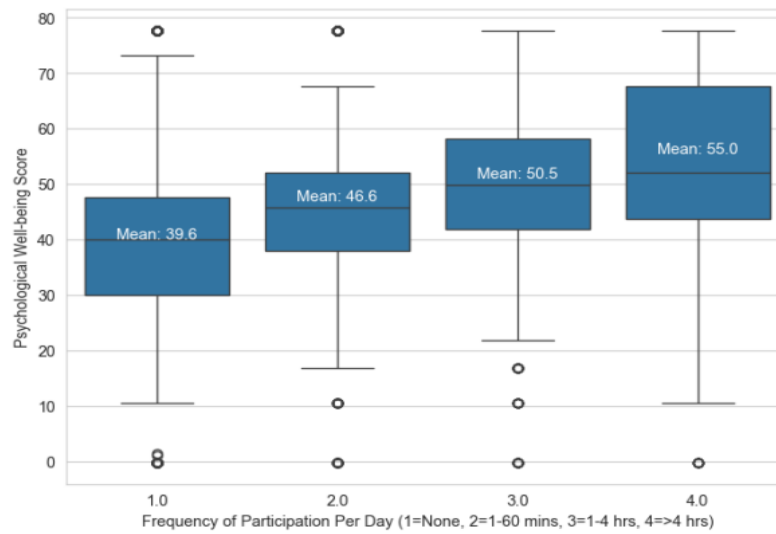
The following three sub-sections will describe each of the top three after-school activities that are positively correlated with PWB. Each visual contains boxplots. The x-axis represents the frequency of after-school activities, while the y-axis represents the PWB scores. There are four boxplots, each representing different frequency levels identified by numeric symbols ranging from *None*, *1 - 60 minutes*, *1 - 4 hours*, and *more than 4 hours*. For Figure 3, Figure 4, and Figure 5, the line within each of the boxplot represents median while the value displayed within each boxplot represents the mean PWB score which is derived using the mean function.

4.2.1 STQM03611: Time spent exercising or practicing sports outside of school

Figure 3 shows boxplots of PWB scores with respect to the different frequencies of exercise or practice sports outside of school. Based on Figure 3, the more frequently students exercise or practice sports outside of school, the higher the mean PWB score. Students who did not exercise or practice sports outside of school reported a mean PWB score of 39.6. As the frequency of exercise or practice sports outside school increases, the mean PWB score increases. This aligns with the findings by Pan et al. (2022), who observed that physical exercise is negatively associated with depressive symptoms. Pan et al. (2022) explain that participating in physical exercise diverts attention, reduces psychological pressure, and regulates emotions, thereby reducing anxiety and irritability.

Figure 3

Boxplots of PWB Across Frequency of Exercising or Practicing Sports Outside School

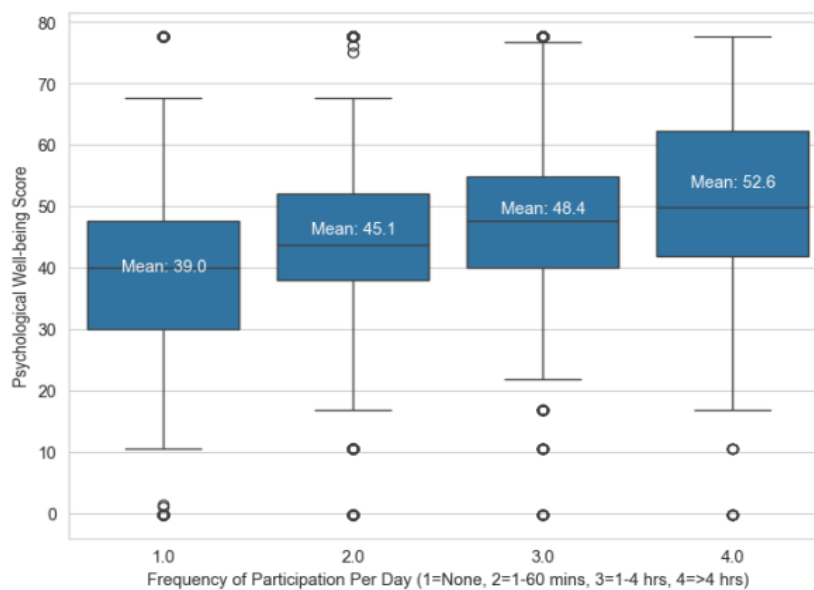


4.2.2 STQM03604: Time spent talking to parents

Figure 4 shows boxplots of PWB scores with respect to the different amounts of time spent talking to parents. Based on Figure 4, students who spend time talking with their parents have shown a gradual increase in the mean of PWB scores. Students who did not spend time talking to their parents recorded a mean PWB score of 39.0, compared with those who talked for more than 4 hours with their parents, who had a mean PWB score of 52.6. This suggests that frequent interactions with parents can contribute positively to adolescents' PWB, potentially through the availability of emotional support. Parent-adolescent communication allows adolescents to raise concerns, share knowledge, and seek support from parents. It is a medium that allows adolescents to express their feelings and worries as well as seek advice and parental support. These findings align with the broader literature highlighting the role of parental support for adolescents' well-being (Levin & Currie, 2010).

Figure 4

Boxplots of PWB Across Frequency of Talking to Parents

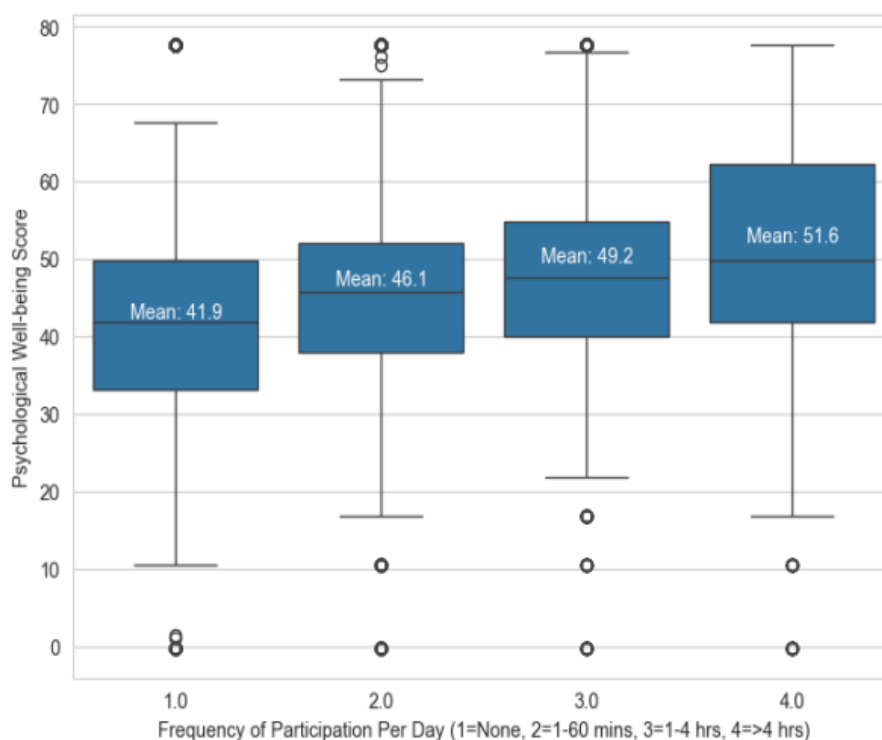


4.2.3 STQM03605: Time spent working in the household or taking care of family members

Figure 5 shows boxplots of PWB scores with respect to the different amounts of time spent working in the household or taking care of family members. Based on Figure 5, the mean PWB scores have increased from 41.9 to 51.6, indicating that as more time is spent performing household responsibilities or taking care of family members, there are more frequent experiences of positive mental states such as feeling purposeful, active, and emotionally connected. These activities allow adolescents to develop family connectedness and understanding of their roles within the family, as well as develop a sense of responsibility for tasks and other family members. Wichmann et al. (2019) further support this, where they have discovered that adolescents with greater household responsibilities often involve themes of family happiness and meaningful aspirations in their life purposes.

Figure 5

Boxplots of PWB Across Frequency of working in the household or taking care of family members



4.3 Objective 3: To examine the extent to which students' social-emotional skills and their frequency of participation in after-school activities jointly predict students' psychological well-being across selected OECD SSES 2019 cities.

Table 4 shows the performance of three GAM models. Based on Table 4, Model 3 is deemed the best model. The adjusted R^2 of 0.506 indicates that the models collectively explain approximately 50.6% of the variance in students' PWB scores, and the adjusted R^2 is the highest among all models. Furthermore, the AIC and BIC scores of Model 3 are lowest, and the Deviance Explained is highest. In short, both social-emotional skills and after-school activities collectively serve as strong predictors of adolescents' PWB.

Table 4

Performance Summary of Three GAMs Models

Model	Adjusted R²	AIC	BIC	Deviance Explained
Model 1 (Social-Emotional Skills only)	0.489	141334.7	141878.9	49%
Model 2 (After-school Activities only)	0.178	150202.2	150500.1	18%
Model 3 (Social-Emotional Skills and After-school Activities)	0.506	140730.4	141529.7	50.8%

Having social-emotional skills to regulate emotions can help adolescents manage stress, which relates to their overall mental well-being. After-school activities are not confined to school grounds, but home can also be an environment for implementing social-emotional learning (SEL) that cultivates or enhances social-emotional skills among adolescents. For example, taking care of family members can help adolescents build or enhance their cooperation skills. When taking care of family members, adolescents may need to share responsibilities and coordinate schedules. The act of compromising or negotiating forms the basis for the skill of cooperation. By participating in caring for family members, adolescents will develop a stronger sense of belonging and better understand the importance of cooperation.

Both social-emotional skills and after-school activities form a dependency relationship; social-emotional skills can be cultivated or enhanced through after-school activities, while after-school activities can be achieved when adolescents apply social-emotional skills to them. The outcome is an increase in life satisfaction or happiness among adolescents, which serves as a predictor of PWB.

5.0 Discussion

The present findings contribute to understanding adolescents' PWB using OECD SSES 2019 data from three participating cities. This study highlights the multi-dimensional relationship between social-emotional skills, after-school activities, and PWB in adolescents. Interventions that aim to promote adolescents' PWB may be tailored based on communication-rich and culturally responsive approaches to increase participation and acceptance of the interventions.

For schools and teachers, physical and face-to-face activities or interactions should be promoted while educating students on moderation in the engagement of digital devices. Furthermore, a balanced after-school routine that prioritizes physical and social activities should be encouraged by schools and teachers to promote peer communication, social-bonding, and a sense of belonging among adolescents. The present findings underscore the importance of cultivating social-emotional skills not merely as psychological traits, but as competencies that allow adolescents to engage meaningfully in interpersonal communication and social interactions. In fact, schools can create structured opportunities, such as group-based activities, peer-oriented after-school activities, and collaborative projects, where these competencies can be actively practiced and developed.

For parents, frequent and meaningful parental engagement or communication is linked to higher PWB among adolescents. Supportive parent-adolescent communication allows adolescents to feel a sense of being valued, express their emotions more freely, and engage meaningfully in family life. However, parents should remain mindful that high parental expectations and comparison with peers may undermine PWB. Instead, promoting a balance between self-regulation and emotional openness may be beneficial for adolescents' long-term PWB.

6.0 Conclusion

In conclusion, this study examined how adolescents' participation in after-school activities and social-emotional competencies are associated with PWB among adolescents from diverse sociocultural contexts. School and home are environments to build and enhance social-emotional skills and PWB among adolescents. However, less study is conducted on how after-school activities and social-emotional skills are associated with PWB among adolescents across selected OECD SSES 2019 cities. The OECD's SSES 2019 dataset is used to analyse the association between adolescents' PWB, as many of the existing works have yet to utilize it for such analytical purposes, as well as to supplement the research pertaining to the association between after-school activities and social-emotional skills and adolescents' PWB. Three objectives were formulated in this study. Firstly, it is to examine the relationship between social-emotional skills and the amount of time spent on after-school activities among adolescents. Secondly, is to explore the relationship between the amount of time spent in after-school activities and their PWB. Finally, it is to examine the relationship between social-emotional skills and/or their time spent in after-school activities in predicting adolescents' PWB.

The findings revealed that Energy, Sociability, Curiosity, and Empathy appear as crucial social-emotional skills that promote participation in a wider range of after-school activities. Physical and family-oriented after-school activities are consistently associated with higher PWB. Specifically, the time spent exercising or practicing sports, talking to parents, as well as working in the household or taking care of family members are the top three after-school activities that link with higher PWB. This highlights that social interactions from daily activities do contribute to adolescents' PWB. Among the three GAMs models constructed, the model that included both social-emotional skills and after-school activities explains the highest proportion of variance in students' PWB, with an Adjusted R^2 of 0.506. For this study, the measurement of social-emotional skills and PWB is based solely on the perception of students. Therefore, future research may consider supporting data from parents and teachers to lower the potential social desirability effect.

Nevertheless, this study has some limitations that can be considered in future studies. The findings are based on data from specific cities, and thus, the results may not be fully generalizable to adolescents in rural areas or other regions within these countries. Also, inclusion of Western countries will be considered in the future to delve into the potential differences in adolescents' PWB.

Conflict of Interest

The author (s) have declared that no competing interests exist.

Author Contribution Statement

KJL - Conceptualization, Data Curation, Methodology, Validation, Writing – Original Draft Preparation. AHLL: Validation, Project Administration, Supervision, Writing – Review & Editing. FFC: Project Administration, Supervision, Writing – Review & Editing.

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Ethics Statement

This research did not require IRB approval because this study uses publicly available data or documents.

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