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Giving every student a chance to excel in life: construction and application of the HOPE model in China's secondary vocational schools

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Grounded in multiple theoretical frameworks, this study develops and empirically validates the HOPE Model, a comprehensive intervention framework designed to enhance the over-all wellbeing among secondary vocational school students in China. A quasi-experimental design was implemented with 207 students to assess the model's impact across multiple domains, including psychological well-being, academic performance, interpersonal relationships. Findings indicate that students who participated in the HOPE Model intervention exhibited significant improvements in hope levels, happiness, goal-oriented motivation, academic performance, and interpersonal relationships compared to the control group. The results highlight the HOPE Model's efficacy in shifting from a deficit-focused educational approach to a strengths-based model for secondary vocational students. This study contributes to the field of positive psychology-based educational interventions, offering a structured and scalable framework for enhancing vocational students' holistic development.

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Introduction

In China, secondary vocational students are typically those who, due to lower academic performance in junior high school or challenging family economic circumstances, are channeled into vocational education as a pathway for early entry into the workforce (Wang and Zhang, 2023). Such students are often labeled as "underachievers" (Dong et al. 2020; Ling, 2015) and face social stereotypes that further marginalize them within the educational hierarchy (Wang, 2021). These cumulative setbacks—including academic struggles, economic hardships, and negative social perceptions—can foster a sense of learned helplessness and low self-esteem (Spruyt et al. 2015). As a result, many vocational students exhibit a lack of goals (Wei and Wei, 2018), a lack of hope (Luo et al. 2016), and a lack of motivation (Tao and Zhang, 2011). Not only do they exhibit declines in academic performance (Zhang and Zhu, 2016) but also increase in psychological distress, including symptoms of anxiety, confusion about the future (Zhao et al. 2023), poor interpersonal relationships (Romadlan et al. 2023), and even alarming attitudes toward suicide, with one study reporting that about 70% of vocational students expressed affirmative attitudes toward suicide, and over 60% approved of suicidal behavior in others (Li et al. 2015). These concerns underscore the urgent need for targeted interventions.

Although extensive research has been conducted on enhancing the academic performance and mental health of secondary vocational students (Abela et al. 2024; Tan et al. 2024), several critical gaps remain. Current intervention models largely fail to effectively address the issues due to a pervasive cultural emphasis on correcting weaknesses (Lin, 2020). This deficit-focused mindset reinforces negative self-concepts, leading to a more vicious cycle of diminished motivation, inadequate goal setting, and a weakened sense of hope (van de Weerd, 2022). This kind of deficit-oriented intervention can cause students to experience academic decline (Zhao, 2016), psychological issues (Smit, 2012), and interpersonal problems. Therefore, new methods and frameworks are needed to develop more effective perspectives and interventions to better help these students.

In contrast to approaches that focus solely on deficits, Seligman's theory of positive psychology (2006) posits that redirecting attention toward positive experiences, such as happiness and gratification could activate neural pathways that enhance resilience and well-being. In accordance with Seligman, Fredrickson's broaden and build theory (2001) suggests that in contrast to negative emotions that narrow focus to immediate survival (e.g., fear triggers fight-or-flight responses), positive emotions such as happiness could expand cognitive and behavioral repertoires. This broadening leads individuals to become more flexible, open-minded, and adaptive. Over time, these broadened states accumulate into enduring personal resources, including greater resilience, feelings of hope, better interpersonal relationships, etc. Previous studies have shown that happiness leads to improved academic performance (Hochschild Ovalleet al. 2024), mental health (Mijgee et al. 2024), and interpersonal relationships (Grossmeier et al. 2019). Therefore, fostering positive emotions might play a big role in improving students' overall wellbeing.

As individuals build personal resources through positive experiences, they are more likely to experience further positive emotions, which continue to broaden and build their resources in an ongoing cycle of growth (Fredrickson, 2001). Based on Snyder et al.'s (1991) hope theory, fostering positive emotions such as hope could help students to believe that they can set clear and meaningful goals (goal setting), create multiple pathways to reach those goals (pathways thinking), and stay motivated to achieve those goals (agency Thinking). This is important for occupational planning, which refers to the systematic process through which individuals assess their skills, interests, values, and goals to identify, pursue, and manage career paths aligned with their personal and professional aspirations. Not only does it play a crucial role in motivating individuals but also helps them to find strength and build a positive personality on their professional path, overcome obstacles, and achieve success in academics, mental health, overall well-being, and future career. Evidence has shown that occupational planning is linked to improved academic performance (Zhang and Perey, 2024), psychological well-being (Arceño, 2024), and interpersonal relationships (Basit et al. 2015). Therefore, good occupational planning might play a pivotal role to help secondary vocational students build goals and motivation, not only improving academic performances but also psychological wellbeing.

According to the social support theory (House et al. 1988), a nurturing social environment that consists of emotional support (e.g., empathy and encouragement), instrumental support (e.g., material assistance), informational support (e.g., advice and guidance), and appraisal support (e.g., positive feedback), could not only offer positive, direct impact on mental health and well-being but also buffer against negative effects from stress. Evidence has shown that a supportive social environment is linked to improved academic performance (Wentzel, 1998), enhanced psychological well-being (Taylor, 2011), and stronger interpersonal relationships (Xu, 2024). Therefore, fostering a supportive social environment might be very important in helping secondary vocational students enhance their learning outcomes and promote personal development.

Previous studies have developed relevant interventions for fostering positivity among students. For example, Marques et al. (2011) developed an intervention program that successfully improved middle school students' levels of hope and life satisfaction, while another study generated similar findings (Alam and Mohanty, 2024). However, these interventions do have some limitations. First, these studies focused on a limited number of factors as the outcome of interventions, while more aspects are needed to offer a bigger picture of what a good intervention could bring to individuals. Moreover, these intervention programs were conducted in a short time span, while it is meaningful to conduct longer-term ones to see whether they can pose persistent effects on students. Furthermore, existing interventions are often fragmented, lacking a systematic framework that coherently integrates diverse approaches (Miao et al. 2020). Considering the uniqueness and intensity of secondary vocational students' lack of motivation, goals, difficulties in academic and interpersonal relationships, plus psychological problems, more comprehensive and holistic intervention should be discussed. Therefore, the current study combined all the prominent factors contributing to positively helping students and proposes a comprehensive HOPE model that intends to improve vocational students' academic performances, interpersonal relationships, and psychological wellbeing, helping them to build a brighter future.

Components of the HOPE model

H—Happiness: cultivating positive emotions for a hopeful future. Fostering positive emotional experiences is essential in guiding students toward a better future. Emotions such as happiness, gratitude, excitement, and delight play a crucial role in career exploration, enabling individuals to conserve and utilize personal resources for future growth (Starodub, 2022). It is vital for students to recognize that happiness is attainable through intentional actions. The HOPE model integrates structured interventions to enhance positive emotions among secondary vocational school students in China.

O—Occupational planning: conducting effective career planning education enables students to learn how to plan through

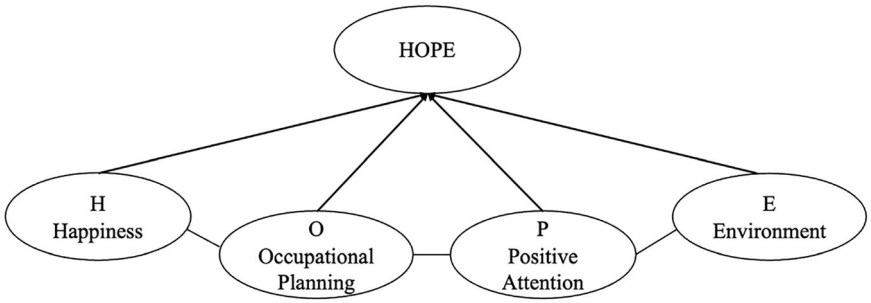

Fig. 1 Hope career education model. The HOPE career education model comprises four key components: Happiness (H), Occupational Planning (O), Positive Personality (P), and Supportive Educational Environment (E).

professional guidance. Effective occupational planning education empowers students to navigate their professional paths with confidence and clarity. When students understand that happiness is achievable in their career development, career planning serves as the bridge between aspiration and realization (Kim and Kim, 2024), reinforcing the importance of making informed and strategic choices.

Positive personality: cultivating strengths to foster a hopeful future through positive attention. A successful career path hinges on identifying and effectively leveraging one's inherent strengths, underscoring the need to uncover and harness latent positive personality (Sanderson, 2017). The model engages students in volunteer activities that integrate professional expertise with practical service. This initiative establishes a three-dimensional framework that combines professionalism, voluntary service, and occupational experience, to enable each student to demonstrate their strengths and talents, fostering a sense of professional identity, enhancing occupational satisfaction, and nurturing a feeling of social responsibility (Syed Mustafa et al. 2020).

E—Environment: cultivating a supportive educational ecosystem. Effective education is contingent upon a supportive environment that integrates contributions from schools, families, and society. Positive social structures and collaborative networks create an educational atmosphere that not only facilitates the acquisition of positive experiences but also promotes the development of beneficial traits (Zhang, 2024), thereby playing a protective role in adolescents' development (Fig. 1).

Current study

Based on multiple theories, the current study proposed the HOPE model, a comprehensive framework comprised of four key components: H—Happiness, O—Occupational Planning, P—Positive Personality, and E—Environment, to offer a more holistic picture of positive-oriented interventions to fill the gaps of previous studies and mitigate deficiencies in goal setting, hope, motivation, interpersonal relationships, academic achievement and overall well-being among secondary vocational students.

The specific hypotheses were proposed as follows:

H1: The implementation of the HOPE model would significantly enhance secondary vocational students' overall well-being.

H2: The implementation of the HOPE model would significantly improve secondary vocational students' academic performance.

H3: The implementation of the HOPE model would significantly improve secondary vocational students' interpersonal relationships and their parents' satisfaction and involvement.

Methods

Participants. After obtaining approval from the Research Ethics Committee of Hangzhou Normal University, the current study reached out to the directors of the local Education Bureau to explain its objectives and methods. With the support of school principals, a vocational high school in Zhejiang Province was selected for the research. Before deciding the final sample size, a priori power analysis was conducted using G*Power, with parameters set to an alpha level of 0.05, a statistical power of 0.90 ($1-\beta$), and an expected effect size of 0.15. The results indicated that a minimum sample size of 180 participants (90 in each) was required to achieve sufficient power to detect any significant effects for the current study. Next, a baseline test was conducted to ensure no significant differences in scores among classes before the experiment. Based on the baseline test results, 207 students in total from grade 10 were selected as the final sample group of the current study, which exceeded the minimum requirement.

This study employed a quasi-experimental design, in which classes, rather than individual students, were randomly assigned to the experimental and control groups. Specifically, six classes from a secondary vocational school were selected for participation, with 207 students in total. Three classes (104 students, 22 males, 82 females, $M_{age} = 15.68$, SD = 0.61) were assigned to the experimental group, while three classes (103 students, 22 males, 81 females, $M_{age} = 15.27$, SD = 0.73) were assigned to the control group. Participants were first provided with written informed consent and were free to withdraw from the study at any time point. Throughout the study, we maintained a consistent cohort of 207 participants, with no recorded dropouts. Each class was supervised by a designated teacher, ensuring participants' engagement with intervention activities and homework compliance. Additionally, each group of three classes was supported by a dedicated psychologist, who provided guidance and addressed concerns.

Experimental design and procedures. The current study employed a pretest-posttest control group design. 6 classes were randomly assigned to either the experiment group or the control group, 3 classes in each group. Both groups completed baseline (O1/O3) and post-intervention (O2/O4) assessments, shown in Table 1. Participants in the experimental group would go through the HOPE model intervention, while those in the control group would undergo typical mental health courses.

The current study began on the first day of the winter semester (February 2023). After being signed with inform contents, students were asked to fill out the questionnaires, while their academic performances were recorded at the same time. Regular mental health curriculum was conducted in the control group throughout the whole year, while students in the experimental group received the "Happiness Diary" notebook each. They were

Table 1 Experimental design.

Groups	Pre-test	HOPE Model	Post-test
Experimental Group	O1	X	O2
Control Group	O3	-	O4

"X" indicates the HOPE model intervention, while "-" denotes typical mental health courses. "O1, O2" refer to pre-test and post-test scores for the experimental group, and "O3, O4" for the control group.

asked to write down any event that made them happy each day and tell what they did about it. Each page of the "Happiness Diary" notebook consisted of a self-assessment column for the happiness index for each day of the week, along with an interactive comment section for sharing happiness records with parents every weekend. Every Wednesday, teachers and students in the experimental group exchanged their content in the notebooks for 20 min during their weekly meetings throughout the academic year. Also, on the same Wednesdays, teachers guided students to play Career Exploration Cards for 20 min throughout the whole academic year.

Meanwhile, the career planning courses were conducted at the beginning of the same semester. It covered topics regarding career goal setting, pathway thinking, and motivational thinking, conducted by professional teachers, who also provided career counseling services. This course consisted of 10 sessions, each lasting 40 min, once per week. After each class, participants in the experimental group with different majors were assigned to volunteer different activities that could let them use their professional knowledge in practice.

Besides students, six-session training for parents was also conducted to further validate the efficiency of the HOPE model, based on the concept of positive psychology and how to help their children in a positive perspective. The session was conducted once a week, throughout the semester, constructing a harmonious home-school cooperative relationship. Before starting and after 3 sessions, parents were asked to fill out the questionnaires.

Last but not least, a post-test was conducted with the same measures and similar exams one week after the intervention was conducted among students. Afterward, the data were analyzed and organized.

Measures

Sense of Hope. The current study employed the Middle School Students Hope Scale to measure students' sense of hope, developed by Huang (2013), based on Snyder et al.'s (1991) hope theory, with 11 items in total. The scale consists of three subscales: Goals, Pathway Thinking, and Agency Thinking. Responses are scored on a 4-point Likert scale, from 1 ("Completely Disagree ") to 5 ("Completely Agree "), with higher scores indicating a greater sense of hope. In the current study, the scale exhibited good reliability with a Cronbach's alpha coefficient of 0.93 for the entire scale and coefficients of 0.80, 0.84, and 0.86 for each subscale, which demonstrates strong reliability and validity (Seirup and Rose, 2011).

Psychological resilience. The Middle School Students' Psychological Resilience Scale, developed by Li (2010), was used to measure student's level of psychological resilience. This scale consists of six subscales: Goal Orientation, Perseverance, Sense of Responsibility, Self-Adjustment, Family Support, and Friend Support. Responses are scored on a five-point Likert scale ranging from 1 (Completely Disagree) to 5 (Completely Agree), with higher scores indicating higher levels of psychological resilience. The scale exhibited strong reliability and validity, demonstrating excellent internal consistency with an overall Cronbach's α of 0.934 and a test–retest reliability coefficient of 0.923. The internal consistency coefficients for the subscales ranged from 0.658 to 0.870, while test–retest reliability coefficients ranged from 0.759 to 0.931, indicating high stability and reliability. The correlation coefficients between the subscales and the total scale ranged from 0.588 to 0.788, demonstrating moderate to strong relationships, which supported the scale's structural validity. Previous research by Wang et al. (2015) reported a test–retest reliability coefficient of 0.8, reinforcing its robustness.

Happiness scale. The current study employed the Index of Well-being, developed by Campbell (1976), which consists of 9 items including two subscales: General Affect Index and Life Satisfaction questionnaire, whereas the General Affect Index comprises eight items, each describing different aspects of emotional experience, and the Life Satisfaction Questionnaire consists of a single-item measure assessing overall life satisfaction. Participants responded using a seven-point rating scale. To calculate the total well-being score, the mean score of the General Affect Index is added to the Life Satisfaction Questionnaire score, with a weight of 1.1. The total score ranges from 2.1 (least happy) to 14.7 (most happy), with higher scores indicating higher levels of well-being and happiness. The scale demonstrated strong reliability and validity, with an overall Cronbach's α of 0.89 for the Emotional Index subscale and a criterion-related validity coefficient of 0.55 for the Life Satisfaction subscale. Additionally, research by Yao et al. (1995) reported a test–retest reliability coefficient of 0.849, further confirming the scale's reliability and validity.

Goal-oriented motivation. The current study employed the self-assessment scale for measuring goal-oriented motivation, which originated from Prestin (2012) and was adopted by Yang (2014). This scale comprises 12 items categorized into three dimensions: Approach Motivation (7 items), Non-Participation Motivation (3 items), and Avoidance Motivation (2 items), using a five-point Likert scale from 1 (Completely Disagree) to 5 (Completely Agree), 60 points in total. The scale demonstrates strong reliability, with Cronbach's alpha coefficients of 0.84 for Approach Motivation, 0.77 for Non-Participation Motivation, and 0.70 for Avoidance Motivation, respectively, indicating good reliability.

Academic performance. Academic performance data were collected both before and after the intervention to evaluate the impact of the HOPE model on students' academic outcomes. Baseline data were obtained from school records, and follow-up data were collected after the intervention. This pre-post design allowed for comparing key academic indicators, such as exam scores and grade point averages, providing insights into how the intervention influenced learning achievements.

Interpersonal relationship. The current study employed the Middle School Students' Interpersonal Relationship Questionnaire, developed by Hongmei Liu (2010), which consists of 22 items in total, including six dimensions: Positive Teacher–Student Relationships, Positive Peer Relationships, Positive Parent–Child Relationships, Negative Teacher–Student Relationships, Negative Peer Relationships, and Negative Parent–Child Relationships. Participants responded on a five-point Likert scale ranging from 1 (Completely Disagree) to 5 (Completely Agree), and higher scores indicate better interpersonal relationships. The questionnaire demonstrated satisfactory reliability, with an overall Cronbach's α of 0.782 and subscale reliability coefficients ranging from 0.637 to 0.735. Correlations between the subscales ranged from 0.1 to 0.6, suggesting moderate associations, while correlations between the subscales and the total score ranged from 0.3 to 0.8, further

supporting the scale's structural validity. Further validation was provided by subsequent research, which reported an internal consistency coefficient (Cronbach's α) of 0.770 (Yang, 2014), reinforcing its reliability.

Parental satisfaction and involvement. The current study utilized a self-developed self-report questionnaire to assess parents' attendance at parent–teacher meetings, participation in school activities, and satisfaction with their child and the school. This questionnaire comprises 6 items and employs a five-point Likert scale ranging from 1 (Completely Disagree) to 5 (Completely Agree), 30 points in total, with higher scores indicating better participation and satisfaction from parents toward their children. The scale demonstrates strong reliability, with Cronbach's alpha coefficients of 0.91.

Apparatus. The apparatus was designed to implement the HOPE Model. It was categorized into course-related activities, extracurricular activities, and family involvement, each of which aimed to enhance students' overall development.

Course-related activities
Career Planning Courses: Structured career education courses are highly effective for guiding students through career decision-making. Adapted to the developmental characteristics of secondary vocational students in China, the Hope and Growth courses were designed as a core component of the HOPE Model. This course comprises three chapters—Truth of Hope, Key of Hope, and Action for Hope—focusing on goal setting, pathway thinking, and motivational strategies, spanning 10 sessions (each lasting 40 min, conducted weekly, 10 weeks in total). The curriculum blends practical exercises, group discussions, and reflective sharing sessions to enhance students' understanding of hope and its role in career development. To see more detail, please see the supplementary materials about the specific design and procedures of these courses.

Career exploration cards: Career exploration cards include HOPE Career Values Cards, HOPE Critical Capacity Cards, HOPE Forward Drive Cards, and HOPE Love Vision Cards (as shown in supplementary materials).

Extracurricular activities
Happiness diary: The happiness diary was used to improve the levels of happiness among students in the current study. The diary mainly contains six dimensions: Happiness Moments Snapshot, Praise Yourself, Praise Your Major, Be Thankful, Speak Out of Happiness, and Happiness Approaches. Participants were asked to relate these dimensions based on aspects of their professional skills, interpersonal relationships, campus activities, and social engagement. Moreover, a self-rated happiness index and an interactive reflection section were added for parental engagement. Moreover, students were encouraged to discuss their diaries in classes, reinforcing reflective practice and positive emotional experiences, while they shared their diaries with family members, further consolidating their emotional well-being.

Positive volunteering: The "HOPE" Classroom initiative involves students in volunteer work that combines their professional knowledge with hands-on service. For example, e-commerce students assist local farmers in setting up online stores; early childhood education and art design major students conduct tailored sessions at special needs schools; computer science students provide free technical support to the elderly, and tourism majors serve as school guides.

Family involvement
Parent training: Bi-semester parent training sessions based on positive psychology were conducted to equip parents with strategies to support their children's development. Additionally, teachers maintained close and consistent communication with families, offering personalized guidance to strengthen home-school collaboration.

Data analysis. All statistical analyses were conducted using SPSS 21.0 to ensure the rigor and accuracy of the findings. Prior to the main analyses, preliminary tests were performed to assess whether the assumptions of parametric tests were met. Given that baseline measures (e.g., academic performances, happiness index, etc.) were to influence post-test outcomes, we employed the analysis of covariance (ANCOVA) to adjust and reduce the influences of these baseline results. Prior to conducting the main analyses, we performed several pre-analysis diagnostics. Specifically, we used the Shapiro–Wilk test to assess the normality of the variables (all variables met the normality assumption, with $W > 0.97$, $p > 0.05$) and Levene's test to confirm the homogeneity of variances ($p > 0.05$). Moreover, tests for homogeneity of regression slopes were conducted to p justify the use of ANCOVA.

Given the number of outcome variables and their inherent correlations in our intra- and inter-group comparisons, there was an increased risk of inflated Type I errors due to multiple comparisons. To address this, we used the application of a multiple comparison correction method—the Bonferroni correction—to adjust the significance threshold to mitigate the risk of inflated Type I errors.

Results

Prior to conducting each analysis, the homogeneity tests of regression slopes were performed to ensure that the assumption of parallel regression slopes was met. If no significant interaction was found between the experimental grouping and the baseline levels of the dependent variables (all p-values > 0.05), the assumption was satisfied, and analysis of covariance (ANCOVA) was used to compare the post-test outcomes while controlling for pre-test scores. If the assumption was violated, alternative statistical methods were applied accordingly.

The impact of the HOPE model on the overall well-being of secondary vocational school students

Hope levels. A significant effect of the HOPE model was found on post-test hope levels after adjusting for pre-test scores (F (1206) = 11.518, $p = 0.001$, $\eta^2 = 0.05$). Further analysis revealed that the intervention significantly impacted goal thinking (F (1206) = 8.418, $p = 0.004$, $\eta^2 = 0.04$) and agency thinking (F (1206) = 10.530, $p = 0.001$, $\eta^2 = 0.05$), while no significant effect was observed for pathway thinking (F (1206) = 0.340, $p > 0.05$). After Bonferroni's correction for multiple comparisons, the differences in goal thinking and agency thinking remained statistically significant.

Psychological resilience. ANCOVA showed a significant effect of the HOPE model on post-test psychological resilience scores (F (1206) = 5.142, $p = 0.029$, $\eta^2 = 0.03$). Significant differences were also found in goal sense (F (1206) = 5.707, $p < 0.05$, $\eta^2 = 0.03$), constancy (F (1206) = 4.418, $p < 0.05$, $\eta^2 = 0.02$), and responsibility (F (1206) = 4.349, $p < 0.05$, $\eta^2 = 0.02$) between the experimental and control groups. However, after applying the Bonferroni correction for multiple comparisons, these differences were no longer statistically significant ($\alpha' = 0.0083$), suggesting that while the intervention initially had a positive impact on these aspects of psychological resilience, the effect was reduced after

adjusting for multiple tests. Other dimensions such as family support, friend support, and self-adjustment did not show significant effects ($p > 0.05$), either.

Happiness Index. The ANCOVA revealed a significant effect on the post-test happiness index (F (1206) = 6.739, $p < 0.05$, $\eta^2 = 0.03$). After applying the Bonferroni correction ($\alpha' = 0.025$), the results indicated that the intervention significantly improved the Emotional Index (F (1206) = 7.293, $p < 0.05$, $\eta^2 = 0.04$), but no significant effect was found on life satisfaction (F (1206) = 1.239, $p > 0.05$). These findings indicate that the HOPE model positively impacted emotional well-being, though its effects on life satisfaction were less pronounced.

Goal-oriented motivation. A significant increase in approach motivation was observed in the experimental group (F (1206) = 19.969, $p < 0.001$, $\eta^2 = 0.09$), with the effect remaining significant after Bonferroni correction). However, non-participation motivation showed no significant difference at either pre-test or post-test (F(1206) = 0.13, $p = 0.719 > 0.017$). For avoidance motivation, the initial reduction in the experimental group was not significant after Bonferroni correction (F(1206) = 4.321, $p = 0.038 > 0.0167$, $\eta^2 = 0.02$).

The impact of the HOPE model on the academic performance of secondary vocational school students. The analysis indicated a significant difference in academic performance between the experimental and control groups after adjusting for pre-test scores (F (1,206) = 18.465, $p < 0.001$, $\eta^2 = 0.08$). This demonstrated that the HOPE Model had a positive impact on students' academic performance, with the effect remaining robust after the Bonferroni correction for multiple comparisons ($\alpha' = 0.002$).

The impact of the HOPE model on the interpersonal relationship and parents' satisfaction and involvement of secondary vocational school students

Interpersonal relationships. Significant interaction effects were found between baseline parent–child relationships scores, teacher-student relationships and the experimental grouping ($p < 0.05$), preventing the use of ANCOVA. However, peer relationships showed no significant interaction effect, allowing for ANCOVA analysis. As a result, an independent samples t-test was performed to compare the post-test scores for interpersonal relationships, teacher-student relationships, and parent–child relationships.

The experimental group showed significantly higher post-test scores than the control group for interpersonal relationships ($p < 0.05$) and teacher-student relationships ($p < 0.05$), while no significant difference was found for parent–child relationships. However, after applying the Bonferroni correction ($\alpha' = 0.017$), the differences in teacher-student relationships and interpersonal relationships no longer reached statistical significance ($p > 0.017$), while parent–child relationships remained non-significant throughout ($p > 0.05$).

For peer relationships, the ANCOVA revealed a significant difference between the experimental and control groups (F(1,206) = 4.318, $p = 0.039$, $\eta^2 = 0.02$), suggesting that the HOPE model improved students' interactions with peers.

Parental satisfaction and involvement. Parental satisfaction with the school increased from 40% to 55% by the end of the second semester ($\chi^2 = 8.12$, $p = 0.0172$). However, after Bonferroni correction ($\alpha' = 0.017$), the effect was marginally above the threshold, indicating a borderline significant trend. Parental satisfaction with children's progress and parental involvement also showed significant improvements. Parent attendance rose from 67.3% to 84.6% ($\chi^2 = 9.1$, $p = 0.011$), and parent satisfaction increased from 22% to 42% ($\chi^2 = 14.78$, $p = 0.0052$). After Bonferroni correction ($\alpha' = 0.017$), these improvements remained significant, highlighting the HOPE intervention's positive impact on parental engagement.

Discussion

This study used a quasi-experimental design to examine the effects of a holistic and systematic model HOPE, to see whether such a model could help vocational students in China to develop in a positive way. Results showed that the HOPE model not only helped vocational school students improve their overall well-being and interpersonal relationships but also positively enhanced academic performance. Consistent with previous studies, current results highlighted the role of the four key components of the HOPE model—Happiness (H), Occupational Planning (O), Positive Personality (P), and Environment (E)—in facilitating students' development. Specifically, these elements were associated with improvements in psychological well-being (Yam, 2022), academic achievement (Drier, 2000), and interpersonal relationships (Bester, 2019), reinforcing the model's effectiveness in supporting secondary vocational students. Adding on to that, not only did the current study restate the crucial role of helping students, especially those from secondary schools, but also extended on previous intervention programs (Alam and Mohanty, 2024), synthesized multiple elements and factors that could contribute to positive development among students into one model, developing a more comprehensive and complete perspective on important pathways that could help secondary vocational students improve. Current results offered empirical evidence on the effectiveness and plausibility of the HOPE model.

The relationship between HOPE Model and overall well-being. The findings showed that the HOPE Model significantly enhanced students' overall well-being, in terms of sense of hope, psychological resilience, happiness index, and goal-oriented motivation.

As hypothesized, the intervention led to significant increases in hope, with improvements observed in both goal thinking and agency thinking, reinforcing the role of goal setting and motivational thinking. This is consistent with prior studies (Long et al. 2024; Moss-Pech et al. 2021), which found that increased hope was associated with improved psychological well-being and academic performance. However, different from previous studies, we explore three different components of hope and found that pathway thinking did not show significant improvement, which may be attributed to the context of vocational education in China, where many vocational students enroll after experiencing academic setbacks, which can undermine their confidence in long-term career planning and limit their perceived opportunities (Lin, 2019). Research suggests that individuals with lower academic self-efficacy often struggle to formulate concrete pathways toward their goals, as they may lack exposure to diverse career trajectories and access to resources that facilitate structured planning (Peterson and delMas, 1998). Consequently, targeted interventions addressing career exploration and structured planning support may be necessary to improve pathway thinking in this population (Piland, 1986).

Different from previous studies, psychological resilience in the current study did not reach statistical significance after applying the Bonferroni correction. This suggests that resilience, which is influenced by life experiences and social support (Chang et al. 2023), may require longer-term exposure to resilience-building strategies (Luthar et al. 2015) and personalized interventions (Brinkhof et al. 2023). The limited duration of this intervention likely hindered its ability to produce substantial changes in resilience.

Additionally, the significant improvements in happiness observed in the experimental group highlight the model's

effectiveness in enhancing emotional well-being. The Happiness Diary component, which encouraged daily reflections on positive experiences, likely activated dopamine-driven reward pathways, reinforcing positive emotions (Kringelbach and Berridge, 2017). However, the life satisfaction component showed no significant change, which reflects that a more stable and comprehensive evaluation of overall quality of life, may require longer-term or more systemic interventions to achieve significant changes (Anderson and Ozakinci, 2018).

Concurrently, the HOPE model notably increased approach motivation of goal-oriented motivation, while changes in avoidance and non-participation motivation were no longer significant after correction. This finding is consistent with previous research, which emphasizes the role of motivational strategies in enhancing students' engagement and achievement (Yang, 2014). One possible explanation for these differential effects is that approach motivations are more directly responsive to immediate cognitive and emotional interventions (Sherman et al. 2006), whereas external factors such as the school environment, peer influence, and personal circumstances may also play a larger role in shaping avoidance and non-participation motivations (Blumenthal et al. 2024), thereby attenuating the immediate effects of the intervention on this dimension.

The relationship between HOPE Model and academic performance. The findings supported H2, showing that the HOPE Model positively influenced academic performance. This finding is consistent with previous studies (Hochschild Ovalle et al. 2024; Zhang and Perey, 2024; Wentzel, 1998), which offered another evidence and highlighted the positive impact of the HOPE Model on the academic outcomes of secondary vocational high school students. Several components of the model may drive this effect. For example, the curriculum's strong emphasis on setting academic goals appears to enhance students' learning capabilities. Through structured self-reflection and group discussions, students effectively internalize and apply these strategies, leading to notable improvements in academic performance. In a similar vein, Lim and Park (2023) found that students who combined self-reflection study with group discussions scored significantly higher than those who only reviewed by themselves. Collectively, these findings imply that the multifaceted approach of the HOPE model equips students with the practical skills necessary for sustained academic success.

The relationship between HOPE Model and interpersonal relationships and parents' satisfaction and involvement. The HOPE Model had a notable impact on peer relationships of interpersonal relationships, with students in the experimental group showing significant improvements in their interactions with peers. This finding supported H3 and aligned with previous research suggesting that improvements in happiness, occupational planning, positive personality, and a supportive environment can partially enhance social functioning (Grossmeier et al. 2019; Basit et al., 2015; Xu, 2024). However, the teacher-student and parent–child relationships showed no significant improvement. These findings may be due to the structured nature of teacher-student interactions, which may limit the opportunities for relational exchanges (Beutel, 2010), as well as the limited focus of the intervention on parent–child engagement outside the school context. In China, the academic focus of parents may also restrict opportunities for relationship-building beyond academic concerns (Yan, 2023).

Concurrently, parental involvement showed significant improvement, with parent attendance at meetings increasing across the semester, indicating a growing level of parental engagement. Additionally, parental satisfaction with both the school and their children's progress exhibited a clear upward trend throughout the academic year. The consistent positive trajectory suggests that the HOPE model effectively enhanced parental engagement and contributed to a more supportive school environment.

Despite these promising findings, several limitations must be acknowledged. First, the study relied solely on self-report measures, which may introduce report bias. Future research should incorporate multi-method approaches, such as interviews and observational assessments, to provide a more comprehensive understanding of participants' experiences. Second, the exclusive focus on 10th-grade students limits the generalizability of the findings across different educational stages. Future studies should include a broader age range to enhance external validity. Third, although the sample size of 207 student–parent pairs were adequate, a larger sample would increase the statistical power and robustness of the conclusions.

In conclusion, the HOPE model effectively addresses key challenges faced by secondary vocational students by seamlessly integrating these components—Happiness (H), Occupational Planning (O), Positive Personality (P), and Environment (E)—offering a holistic career education framework that goes beyond fragmented interventions. It systematically cultivates positive emotional experiences, reinforces students' intrinsic positive traits, and fosters a supportive learning environment, helps vocational students develop in a positive and healthy way.

Practically, the HOPE model offers a replicable framework for vocational schools seeking to improve student outcomes. This model opens new avenues for enhancing the overall well-being, interpersonal relationships, parents' satisfaction and involvement, and academic performance of secondary vocational students. It is recommended that schools adopt and adapt the HOPE model—integrating it into daily teaching and curriculum—to foster positive life attitudes and unlock their latent potential. As AI and automation replace routine jobs, the demand for specialized skills and creative craftsmanship is rising. Vocational students need unique competencies to stay competitive in this evolving landscape. The HOPE model equips them with the necessary mindset and soft skills—interpersonal relationships, psychological resilience, a sense of hope, and goal-oriented motivation—enhancing their ability to adapt and thrive in a rapidly evolving job market. In essence, the HOPE model creates a sustainable culture of hope and resilience that extends beyond the classroom, offering a comprehensive strategy for both immediate improvement and long-term vocational success, ensuring that every student has the opportunity to excel in life.

Recommendation. The empirical validation of the HOPE model's efficacy in enhancing vocational students' emotional well-being underscores the need for its strategic translation into educational practice.

For practitioners, policymakers should advocate for curricular reforms that embed HOPE principles—happiness, occupational planning, positive personality, and a supportive environment—into vocational education standards, which could integrate the core elements of the HOPE model into the vocational education system through curriculum reform, career development courses, psychological support programs, and skill-based internship initiatives, thereby enhancing vocational students' adaptability and competitiveness at a systemic level. Moreover, vocational school administrators are encouraged to invest in robust teacher training programs that equip educators with strategies for establishing and sustaining supportive, strengths-based learning environments, which could include workshops on positive reinforcement, motivational coaching, and career guidance techniques to help teachers instill a sense of purpose and confidence in students. Finally, teachers themselves should

actively incorporate HOPE principles into daily instruction. This can be achieved by encouraging reflective goal-setting exercises and shifting feedback from deficit-focused to strengths-based assessments. Together, these coordinated efforts provide a comprehensive, multi-level framework for enhancing student' academic and vocational competencies, preparing them for sustained success in both their careers and personal lives.

For researchers, future studies should adopt a longitudinal design that tracks participants' post-graduation trajectories over extended periods. Such studies would not only assess the long-term impact of school-based hope cultivation on career development and psychological well-being. Moreover, to deepen our understanding of the underlying biopsychosocial mechanisms, it is recommended that future research triangulate self-report data with neurobehavioral metrics (e.g., fMRI assessments of reward circuitry activation during goal-setting tasks). This methodological integration could reveal how environmental supports transform abstract concepts into tangible career sustainability. Additionally, further investigations should examine the model's applicability and adaptability across diverse cultural, socio-economic, and educational contexts, thereby determining its generalizability and potential for broader implementation.

Data availability

Due to the nature of this research, partcipants and the school of this study did not agree for their data be shared publicly, so supporting data is not available.

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Author contributions

Y. Xiao designed and conducted the experiments, wrote the main manuscript text, implemented the data collection, prepared all figures, and tables. B. Wang was responsible for contacting the schools, distributing the questionnaires, and collecting the data. K. Bao supervised the project, contributed to the theoretical framework, and revised and edited the manuscript. Z. Liu supervised the project, contributed to the theoretical framework, processed the data, and performed the statistical analyses, revising the whole manuscript, coordinating responses to reviewer comments, and organizing supporting data and documentation. All authors reviewed and approved the final manuscript.

Competing interests

The author declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical approval

This study was approved by the Institutional Review Board (IRB) of the College of Science and Education, Jinghengyi, Hangzhou Normal University (Approval No. 2023008). The approval was granted in February 2023. The study was conducted in full compliance with the ethical principles outlined in the Declaration of Helsinki, and all research procedures adhered to the relevant guidelines and regulations for studies involving human participants.

Informed consent

In February 2023, written informed consent was obtained from all participants involved in this study. The process was carried out by a vocational high school located in Zhejiang Province. A total of 207 students and their parents, who participated in this research, were provided with detailed written consent forms outlining the nature, purpose, and scope of the study. Participants were clearly informed that their involvement was entirely voluntary, and they were free to withdraw from the study at any time without any negative consequences. The scope of the consent included agreement to participate in the study, the use of collected data for academic and research purposes, and consent to publish the results in an anonymized form. All data were handled confidentially and used strictly within the limits outlined in the consent documentation.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-025-05038-w.

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