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Well-being Profiles of Pre-service Teachers in Hong Kong: Associations with Teachers'

Self-efficacy during the COVID-19 Pandemic

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Abstract

The present study aims to 1) identify the profiles of subjective well-being (SWB) and psychological well-being (PWB) in a sample of pre-service teachers during the second wave of the COVID-19 pandemic in Hong Kong, and 2) explore how different profiles are linked with teachers' self-efficacy. Participants were 291 pre-service teachers (M_{age} = 21.295, SD = 2.812, female = 89.903%) who were invited to complete self-report measures of SWB, PWB, and teachers' self-efficacy. Latent profile analysis with maximum likelihood estimation was conducted to identify well-being profiles that emerged in this sample. The results suggested a 3-class model with a high, moderate, and low well-being group. The findings also revealed that the pre-service teachers' well-being profiles as reflected by SWB and PWB indicators were consistent. Moreover, the pre-service teachers in the higher well-being group reported higher teaching self-efficacy than those in the lower well-being group. Findings highlighted the benefits of supporting pre-service teachers' well-being (i.e., SWB and PWB) to maintain their teachers' self-efficacy during the COVID-19 pandemic when teacher education and practicum are significantly disrupted. Interventions targeting various positive psychological skills (e.g., mindfulness, self-compassion, and positive reappraisal) are warranted. Future investigation is needed to examine the longitudinal relationship between pre-service teachers' well-being and self-efficacy.

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Introduction

Teachers' working environment is often identified as challenging and demanding (Grant et al., 2019). Teachers are expected to deliver quality teaching, support students' holistic development, and develop harmonious student-parent-school relationships. The heavy workload and expectation often cause burnout among teachers, translating into a high turnover rate in this profession (Grant et al., 2019). To address the high turnover rate among teaching professionals and its corresponding negative impacts on education quality (Grant et al., 2019), studies have investigated the approaches to promote teachers' well-being. Teachers' well-being, defined as the "optimal psychological experience and functioning"(Deci & Ryan, 2008, p. 1), is a vital indicator of their mental health, and it is positively associated with their behavioural outcomes and self-esteem (Deci & Ryan, 2008). Previous research has approached teachers' well-being by using the hedonic (Diener et al., 1999) and the eudaimonic perspectives (Ryff & Keyes, 1995), but the results were inconclusive. Moreover, the consistency of teachers' well-being as reflected by the hedonic and eudaimonic indicators remains unknown, especially in non-western countries (Hendriks et al., 2019) and during difficult times (e.g., COVID-19 pandemic)(O'Connor et al., 2020). Given the multidimensional nature of teachers' well-being (Kern et al., 2015) and the possible cultural differences in its association with teachers' self-efficacy (Kwan et al., 1997; Suh & Koo, 2008), the identification and comparison of well-being profiles grounded on multiple well-being perspectives among teachers in a collectivist culture such as the Chinese culture are particularly important.

The primary objective of the present research is to bridge these gaps by identifying the well-being profiles in a sample of Hong Kong pre-service teachers using the hedonic and the eudaimonic approaches. The secondary aim investigates how these well-being profiles were

associated with teachers' self-efficacy during the COVID-19 pandemic. The findings will shed light on the understanding diverse teachers' well-being profiles and their association with teacher's self-efficacy during challenging times.

Teachers' Well-Being

Research has adopted the hedonic (Diener et al., 1999) and eudaimonic perspectives (Ryff, 1989; Waterman, 1993) in conceptualising an individual's well-being. According to the hedonic perspective, well-being represents an affective self-appraisal of one's life as a whole, and therefore, it is also known as subjective well-being (SWB; Diener et al., 1999). Fundamentally, Diener (2009) proposed that SWB encompasses three key elements: life satisfaction, positive affect, and negative affect (Anglim et al., 2020; Diener et al., 1999). Life satisfaction is considered as the cognitive component of SWB. In contrast, the affective components of SWB refer to the presence of positive affect (e.g., happy, and excited) and the absence of negative affect (e.g., scared and ashamed; Deci & Ryan, 2008; Schimmack, 2008; Watson et al., 1988). Researchers have argued that the SWB, which involves self-evaluation of emotional states, positive feeling, and life satisfaction, cannot capture one's well-being adequately because this approach does not tap into the idea of "striving toward excellence based on one's unique potential" (Ryff & Singer, 2008, p. 14). The eudaimonic perspective, which focuses on one's optimal psychological functioning, is an alternative approach in defining well-being (i.e., psychological well-being; PWB) (Ryff & Keyes, 1995). The eudaimonic perspective emphasises that positive functioning, such as mastery, flourishing, personal growth (e.g., accomplishment), the meaning of life (e.g., presence), autonomy, work engagement (e.g., dedication), positive relationship with others, and self-acceptance (Koydemir et al., 2020; Ryff & Keyes, 1995), should be considered in of the conceptualisation of well-being construct. For example,

individuals with a clear purpose in life, positive relationships with others, and better fulfilment of personal potential or aspirations are considered to have higher PWB (Ryff & Keyes, 1995).

Although the classification of SWB and PWB has been applied in previous well-being research (Deci & Ryan, 2008), there is a theoretical debate on whether SWB and PWB are distinct constructs (Coyne, 2013; Kashdan et al., 2008). Statistically, it is suggested that SWB and PWB are similar constructs (Goodman et al., 2018) that are highly correlated with little discriminant validity (Kashdan et al., 2008). Theoretically, however, SWB and PWB are "related but distinct" (Keyes et al., 2002, p. 1009) conceptualisations of well-being that are not interchangeable (e.g., people can show high SWB but, at the same time, low PWB) (Ring et al., 2007). To better understand the consistency (or inconsistency) between these two perspectives, it would be important to identify teachers' well-being profiles by using both SWB and PWB indicators. Investigations of the beneficial outcomes from different well-being profiles would also be salient. Particularly, evidence suggests that teachers' SWB and PWB are negatively associated with their stress, anxiety, and burnout in relation to teaching duties (Chan, 2013; Zee & Koomen, 2016). Higher levels of SWB and PWB not only promote teachers' physical and mental health but also facilitate their students' educational outcomes, including better academic performance, engagement, and creativity (Kwon et al., 2021; Wolf & Peele, 2019). Further, recent research has revealed the positive association between teachers' well-being and teaching-related self-efficacy (Granziera & Perera, 2019), which is another essential determinate of quality education that predicts students' academic performance, motivation, well-being, and learning outcomes (Tschannen-Moran & Hoy, 2001; Zee & Koomen, 2016).

Teachers' Self-Efficacy

Teachers' self-efficacy is a multidimensional construct reflecting one's belief in three task-specific competencies, namely student engagement (e.g., motivating students to do well in schools), instructional strategies (e.g., using a variety of assessments strategies), and classroom management (e.g., getting children to follow classroom rules) (Tschannen-Moran & Hoy, 2001). Teachers with higher levels of well-being, especially for the PWB (e.g., positive relationships with peers and students, personal accomplishment), tend to have more resources to deal with stressors, which improve their self-efficacy (Zee & Koomen, 2016). Apart from a unidirectional link, the relationship between teachers' well-being and self-efficacy may also be bidirectional (Zee & Koomen, 2016). Teachers with higher self-efficacy would be more capable of handling their teaching duties; hence, they would suffer less stress than those with lower self-efficacy (Zee & Koomen, 2016). Consistently, research has demonstrated that teachers with higher self-efficacy tended to show more positive well-being in terms of job satisfaction, commitment, retention, and lower levels of stress and burnout (Granziera & Perera, 2019). Taken together, there is interconnectedness between teachers' well-being and teachers' self-efficacy, and both appear to be vital indicators of quality education. The present study extended to examine the association between teachers' well-being and self-efficacy comprehensively by including both hedonic and eudaimonic indicators.

Hong Kong Teachers' Well-Being and Self-Efficacy

Individuals from different cultural backgrounds may have different perceptions of well-being (Hitoko & Uchida, 2015; Suh & Koo, 2008). People from individualistic cultures generally report higher levels of SWB than those from collectivistic cultures (Suh & Koo, 2008; Uchida & Ogihara, 2012). In contrast, individuals with strong collectivistic values tend more to be concern

with cultivating harmonious relationships compared to those with strong individualist values, while positive interpersonal relationships are the foundation of PWB, especially in collectivist cultures (Tov & Diener, 2013). Therefore, people who endorse collectivist or individualistic cultural values may have distinctive well-being profiles. Existing research, however, seldom investigated the well-being profiles in collectivist cultures, and even less has considered both SWB and PWB indicators.

Apart from the possible cultural differences, Hong Kong teachers' well-being and self-efficacy are particularly worth examining because their working environment is exceptionally intense (Huang et al., 2019). Teachers in Hong Kong are expected to develop a large number of teaching materials (e.g., teach 30 sessions per week), manage classrooms with a relatively high teacher-student ratio (e.g., 27.4 students per class), support students' holistic development, and handle students with special needs (Huang et al., 2019). Teachers in Hong Kong are more prone to ill-being, anxiety or even burnout than their Western counterparts (Grant et al., 2019). Previous work has mainly examined teachers' well-being in the West (Hendriks et al., 2019), while only a handful of studies have investigated the SWB of Hong Kong teachers (Chan, 2013). Comprehensive investigations of Hong Kong teachers' SWB and PWB and their relationships with teachers' self-efficacy are very limited.

Further complicating the situation, the COVID-19 pandemic has unprecedented effects on teacher education and teachers' well-being and self-efficacy. Hong Kong pre-service teachers would usually complete a teaching practicum allowing them to apply their knowledge and develop their teaching skills before getting their educational license (Kim, 2020). It has been suggested that, in teaching practicum, pre-service teachers can gain more mastery experience, which is the strongest predictor of teachers' self-efficacy (Tschannen-Moran & Hoy, 2001).

However, face-to-face classes were suspended due to the COVID-19 pandemic, and the practicum schedule was seriously interrupted (Kim, 2020). School attachments were suspended, and pre-service teachers were required to adopt online teaching during the COVID-19 pandemic (Kim, 2020). Pre-service teachers were required to deal with additional workloads (e.g., transform class materials into online versions), technical issues, and remotely support students. These new arrangements are suspected of having negative impacts on pre-service teachers' well-being and self-efficacy. The connection between teachers' well-being and self-efficacy during the COVID-19 pandemic has not yet been investigated thus far. It will be interesting to find out the specific well-being profiles that could act as protective factors in maintaining teachers' self-efficacy (Gibbs & Miller, 2014). This study examined the profiles of SWB and PWB and their associations with teachers' self-efficacy in a sample of pre-service teachers in Hong Kong, where collectivistic values pervade (Hofstede Insights, 2022).

The Present Study

The present study identifies the SWB and PWB profiles in a sample of pre-service teachers from a collectivistic cultural background (i.e., Hong Kong) during the second wave of the COVID-19 pandemic (from July 2020 to October 2020). Pre-service teachers are those student teachers who are receiving teacher education and training before they obtain appropriate teaching qualifications. In Hong Kong, multiple university programmes or qualifications can lead to a teaching certificate, including higher diploma, bachelor's, and master's degrees. Higher diploma and master's degrees of education would normally take 2 years to complete, whereas a bachelor's degree takes 4-6 years. For SWB, we particularly focused on participants' affective well-being because recent evidence has indicated that the COVID-19 pandemic would have more impact on one's emotional states than life satisfaction (Genç & Arslan, 2021). In evaluating life

satisfaction, participants typically referred to global life circumstances (Luhmann et al., 2012). In contrast, the measurement of emotion often refers to more specific time frames or events (e.g., in the last week or during COVID-19) (Luhmann et al., 2012); hence the fluctuation in emotions may be captured more readily. Secondly, we examined the links of various teachers' well-being profiles with teachers' self-efficacy with the consideration of both SWB and PWB indicators. Latent profile analysis was conducted to answer the following two research questions:

1) What are the profiles of SWB and PWB for pre-service teachers in Hong Kong during the COVID-19 pandemic?

2) How do the profiles of SWB and PWB differ in terms of the teachers' self-efficacy?

Method

Participants and procedure

Ethical approval was obtained from the last author's institution [approval number = Blinded]. An email invitation was sent to 665 pre-service teachers from a public university in Hong Kong. This public university was chosen because it is the major provider of teacher training in Hong Kong, training approximately 1,000 preschool, primary, and secondary teachers every year. All participants were recruited via a convenience sampling approach. Pre-service teachers were eligible for inclusion in the study if they were studying in teacher education programmes. Pre-service teachers were excluded from the study if they did not provide proof of their studentships and informed consent. The required sample size was calculated by using the number of pre-service teachers graduated each year (n ≈ 1000), a confidential level of 95% with 5% margin of error (Abbott et al., 2022; Ferguson et al., 2020). We determined to recruit at least 278 participants. Finally, 291 pre-service teachers (with M_{age} = 21.295, SD = 2.812, female = 89.903%) signed the informed consent and agreed to participate in the current study. Participants

were studying in the following teacher education programmes: higher diploma (n = 80),

bachelor's (n = 147) and master's degrees (n = 64). Given that this study involved no

intervention and participants were asked to complete a survey package that comprised the

measures of SWB, PWB, and teachers' self-efficacy, the participants were exposed to minimal

risks. Participants received a supermarket coupon (HKD 50) as a token of compensation for

participation in this study.

Measures

SWB. The 20-item Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) was

adopted to measure participants' positive and negative affect, and this measure has been widely

adopted to assess SWB in recent research (Di et al., 2021; Pérez-Garín et al., 2017; Vally &

D'Souza, 2019; Wang et al., 2020). The Chinese version of the PANAS was previously

employed in local research that demonstrated good reliability (Cronbach's alpha = .82) (Chan,

2013). Participants were asked to indicate the extent to which they had a specific positive (10-

item) or negative (10-item) feeling (e.g., "Proud", "Distressed") over the past week, and they

responded on a five-point scale (1 = *Not at all*; 5 = *Extremely*). The average scores of the

positive and negative feelings represented the positive affect and negative affect aspects of SWB,

respectively. In this study, the Cronbach's alphas of positive affect and negative affect are .87

and .90, respectively.

PWB. We capture pre-service teachers' PWB by measuring their personal accomplishment,

presence, dedication, and relationship with peers (Koydemir et al., 2020). These PWB variables

were selected because we would like to assess participants' PWB at teachers' work instead of

general PWB. There was no comprehensive scale dedicated to this purpose, so we selected

multiple scales to measure PWB at teachers' work. We adopted the 8-item subscale from

Maslach Burnout Inventory (Poghosyan et al., 2009) to measure participants' personal

accomplishment. The Chinese version of the scale has been found to be reliable (Watson et al.,

2008). Items (e.g., "Can easily understand students' feelings") were rated using a seven-point

scale (1 = *Never*; 7 = *Always*), and the average score represented the personal accomplishment

aspect of PWB. Participants' sense of presence was assessed by using the 5-item presence

subscale from the Chinese version of the Meaning in Life Questionnaire (MLQ; Steger et al.,

2006), which showed good internal consistency (i.e., Cronbach's alpha = .85) and validity (Chan,

2017). Participants rated each item (e.g., "I have a good sense of what makes my life

meaningful") on a seven-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*), and the average

score represented the presence aspect of PWB. Dedication was assessed using the 5-item

dedication subscale from the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2006).

Fong and Ng (2012) validated the Chinese version of UWES, which demonstrated acceptable

reliability (i.e., Cronbach's alpha = .77). Participants rated the items (e.g., "I am enthusiastic

about my job") on a seven-point scale (1 = *Never*; 7 = *Always*), and the average score

represented the dedication aspect of PWB. Finally, 7 items from the Teacher Collegiality Scale's

mutual support and trust subscale were used to measure teachers' relationships with their peers

(Shah, 2011). Participants rated each item (e.g., "Teachers provide strong social support for

colleagues") on a seven-point scale (1= *Strongly disagree*; 7 = *Strongly agree*), and the average

score represented the relationship aspect of PWB. Shah and Abualrob (2012) pointed out that the

Teacher Collegiality Scale has acceptable internal consistency (i.e., Cronbach's alpha = .85). In

the present study, the Cronbach's alphas of personal accomplishment, presence, dedication, and

relationship are .86, .84, .91, and .96, respectively.

Teachers' self-efficacy. Teachers' self-efficacy was measured using the Chinese version of the Teachers' Sense of Efficacy Scale (C-TSE; Tschannen-Moran & Hoy, 2001). The scale comprised 12 items under three sub-scales, namely efficacy in student engagement (e.g., "How much can you do to help your students value learning"), instructional strategies (e.g., "To what extent can you craft good questions for your students"), and classroom management (e.g., "How well can you establish a classroom management system with each group of students"). Participants rated the items on a five-point scale (1 = *Never*; 5 = *Always*), the average scores represented the corresponding aspects of teachers' self-efficacy. The Cronbach's alphas of student engagement, instructional strategies, and classroom management are .83, .86, and .87, respectively.

Data Analysis Plan

For the preliminary analyses, we examined the reliabilities (i.e., Cronbach's alphas), means, standard deviations, skewness, and kurtosis of and correlation among the variables: SWB (positive affect, negative affect), PWB (accomplishment, presence, dedication, relationship), and teachers' self-efficacy in student engagement, instructional strategies, and classroom management.

To address research question 1, we conducted the latent profile analysis to extract latent profiles of pre-service teachers' SWB and PWB by using Mplus version 8.4. The mixture models use automated random start values, which ensures that the model parameter values are reflecting a global solution instead of a local solution (Nylund-Gibson & Choi, 2018). The latent profile analysis can identify homogenous subpopulations (profiles) within the sample, including heterogeneous groups of individuals who have different response patterns towards well-being (Jung & Wickrama, 2008; Muthén & Muthén, 2015). For example, it is possible to extract a

profile of individuals who are low in SWB but high in PWB (Ring et al., 2007). For the class-selection, we considered the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size-adjusted BIC (SABIC), bootstrapped likelihood ratio test (BLRT), Vuong-Lo-Mendell-Rubin adjusted likelihood ratio test (VLMR-LRT), class size and entropy (Jung & Wickrama, 2008; Nylund et al., 2007). In our latent profile analysis, we determined the number of profiles in a group (i.e., class solutions) by selecting the model that revealed lower information criteria, the insignificant p-value for k (profile)+1 class solution from the likelihood ratio test, the smallest class size being at least 10% of the group population, and higher entropy (Nylund et al., 2007). If the information criteria continues to decrease for each additional class added, elbow plots would be used to determine the point of "diminishing return", where the decreases become smaller for each additional class (Nylund-Gibson & Choi, 2018). We adopted one-way analyses of variance (ANOVAs) with post hoc comparisons (i.e., Bonferroni correction) to detect differences between the latent groups on the demographic information as well as the SWB and PWB indicators.

For research question 2, teachers' self-efficacy from different profiles was contrasted using the Mplus AUXILIARY function with a 3-step procedure (DU3STEP), which relies on the Wald chi-square test of statistical significance based on pseudo-class draws and tests the equality of means across profiles (Nylund-Gibson & Choi, 2018).

Regarding the treatment of missing data, the latent profile analyses were conducted with robust maximum likelihood (MLR) estimation. MLR estimation, which adjusts the likelihood function such that each case contributes information to the observed variables (Muthén & Muthén, 2015), has been considered a methodologically acceptable method in handling datasets

with missing responses and possible violations of multivariate normality (Muthén & Muthén, 2015).

Results

Preliminary analyses

Descriptive statistics (mean, standard deviation, skewness, kurtosis, and internal consistencies) of and correlations among the study variables are presented in Table 1.

Latent class enumeration and description

Table 2 revealed that the AIC and BIC continually decreased for each additional class added to the model. Still, the decline was getting smaller once the number of classes exceeded three, indicating the phenomenon of "diminishing return" (Nylund-Gibson & Choi, 2018). The VLMR-LRT indicated that the 4-class model did not significantly improve the fit of the 3-class model. The 3-class model also showed the highest entropy and the smallest class size that exceeded 10% of the group population. Thus, we chose the 3-class model as our final model (Nylund et al., 2007).

The characteristics of the model are presented in Table 3. We labelled the three groups as high, moderate, and low well-being groups based on the latent profile indicators. In relation to demographic information, there was no significant difference in age and sex across the well-being groups: $F(2,283) = 0.520$ to 1.884, $p = .154$ to $.595$. Significant difference was found in student programme $F(2,283) = 3.229$, $p = .041$. Specifically, there were differences between low and high well-being groups, $p = .034$. Almost half of the participants (i.e., 11 out of 24) from the low well-being group were studying higher diploma programme, whereas nearly half of the participants (i.e., 39 out of 76) from the high well-being group were studying bachelor's degree. Regarding the latent profile indicators, the results revealed that there were distinctive differences

in all SWB and PWB variables, $F(2,283) = 9.237$ to 156.958, $p < .001$, except the negative affect between the low and moderate well-being groups ($p = .753$). These results generally supported the distinctive features of and the consistency between the well-being profiles as reflected by SWB and PWB indicators. The standardised means of each SWB and PWB indicator across the three latent profiles are presented in Figure 1.

Comparisons among the latent classes on teachers' self-efficacy

According to the Wald chi-square test in Table 4, we found significant differences in all three indicators of teachers' self-efficacy, across the low, moderate and high well-being groups. In particular, the test of mean differences with pair-wise contrasts showed that the low well-being group had significantly lower scores in teachers' self-efficacy than the moderate and high well-being groups ($p < .01$). Moreover, teachers in the moderate well-being group had significantly lower self-efficacy scores than those in the high well-being group ($p < .001$).

Discussion

The primary aim of the study was to identify the SWB and PWB profile in a sample of Hong Kong pre-service teachers during the second wave of the COVID-19 pandemic. The latent class analysis revealed that a 3-class solution showed the best fit for the data. The class members' well-being levels formed the high, moderate, and low well-being groups. Secondly, this study also aimed to examine whether pre-service teachers having different profiles of SWB and PWB would differ in terms of their teachers' self-efficacy. The results highlighted that pre-service teachers from the high well-being group had better self-efficacy than those from the moderate and low well-being groups. The present findings extended previous work (e.g., Chan, 2013; Goodman et al., 2018) by showing the well-being profiles in a sample of pre-service teachers

from a collectivist culture and how these profiles are related to teachers' self-efficacy, with the consideration of both SWB and PWB indicators.

Well-being profiles of pre-service teachers in Hong Kong

Findings from this study demonstrated that pre-service teachers from the high well-being group displayed significantly higher scores on all well-being indicators than those from the moderate and low well-being groups. These findings support the consistency between the hedonic and eudaimonic perspectives in conceptualizing well-being among the present sample of Hong Kong pre-service teachers in a collectivistic cultural background. The results also suggested that different SWB and PWB indicators were associated. Consistently, previous studies in the West also revealed the positive associations between SWB (e.g., negative affect) and PWB (e.g., autonomy) indicators among university students (Goodman et al., 2018). Accumulating research has also synthesised conventional indicators from SWB (e.g., positive affect and negative affect) and PWB (e.g., relationship and meaning of life) perspectives into one positive psychological framework (Noble & McGrath, 2015; Seligman, 2012). For example, Seligman (2012) introduced the PERMA model, which consists of positivity, engagement, relationship, meaning, and accomplishment. Likewise, Noble and McGrath (2015) proposed the PROSPER framework for positive education, which includes positivity, relationship, outcome, strength, purpose, engagement, and resilience. The PERMA and PROSPER frameworks extracted multiple central ideas from SWB and PWB, and these frameworks have been adopted to investigate individuals' well-being, especially the PERMA model (Goodman et al., 2018; Kern et al., 2015). However, a recent study revealed that the SWB and PERMA latent factors had a strong correlation ($r = .98$) and may converge onto a single well-being factor (Goodman et al., 2018). Nevertheless, future cross-cultural studies are encouraged to further explore well-being in different contexts (e.g.,

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financial, physical and work) by using theoretically justified indicators (e.g., adaption) in order to advance our understanding of well-being (Diener et al., 2009; Goodman et al., 2018).

It is worth noting that there was no significant difference in negative affect between the low and moderate well-being groups. Additionally, no significant correlation was found between positive and negative affect according to the preliminary analyses. The results suggested that teachers with varying levels of well-being may experience a similar level of negative affect. A potential methodological reason is the use of PANAS, which mainly taps high-arousal negative emotions (Watson et al., 1988), but might not rigorously capture the low-arousal emotional states that people in collectivist cultures tend to value (Tsai, 2017). In other words, the insensitivity of this measure in assessing low-arousal emotional states might account for the non-significant difference in self-reported negative emotions even for teachers belonging to distinct profiles of well-being dimensions. The findings supported the statement that "positive and negative affect are not necessarily opposite ends of one's continuum, and happiness cannot be expected to arise in the absence of suffering" (Nesse, 2005, p. 5). Negative affect (e.g., anxiety), which is a human natural defensive mechanism, does not necessarily represent ill-being (Nesse, 2005). Previous findings suggested that mild negative affect may benefit health because it drives us to be more cautious and vigilant (e.g., motivate care-seeking and evoke social support) (Forgas, 2013). On the other hand, the intense and frequent negative affect can lead to serious mental health issues, such as depression, paranoia, and anxiety disorder. Perhaps, in this study, a mild level of negative affect enabled some pre-service teachers to achieve a moderate level of well-being.

Notably, the results also revealed the differences between well-being groups in terms of the programmes that the participants were studying. Participants studying in higher diplomas were more vulnerable to fall into the low well-being group than those studying for bachelor's

and master's degrees. We speculated the intense study schedule of higher diploma programmes is the underlying reason for this finding. In particular, the higher diploma programmes normally last for 2 years, and the students are required to acquire the necessary teaching skills within this duration. Compared to the bachelor's degrees which are 4-6 years long, the higher diploma programme schedules are tighter and more intense. Although master's degrees also last for 2 years, the master's students were relatively more experienced in handling academic workload and stress after their undergraduate studies (Bewick et al., 2010). In contrast, the participants who were studying higher diplomas were less experienced in managing the academic stress, and therefore, they might be more prone to psychological distress and display lower levels of well-being (Bewick et al., 2010; Laidlaw et al., 2016). Future work is needed to test this speculation.

Teachers' well-being and self-efficacy

In the present study, pre-service teachers in the higher well-being group showed better teachers' self-efficacy than those in the lower well-being group. These results augmented recent evidence (Granziera & Perera, 2019) by evidencing the positive relationship between teachers' well-being and self-efficacy in a collectivist culture with both SWB and PWB indicators taken into account. Two possible reasons may contribute to the link between teachers' well-being and self-efficacy in Hong Kong during the pandemic. Firstly, the class format in Hong Kong has transformed from face-to-face to remote mode since April 2020, and such a change has continued for nearly a year. Studies have proposed that adverse events (e.g., COVID-19, divorce) have temporary effects on individuals' well-being; however, individuals tend to adapt to the situations and restore their well-being to the pre-event levels (i.e., adaption effect) (Diener et al., 2009). It is possible that pre-service teachers were getting used to the new educational format (Daniel, 2020) and developing increased teachers' self-efficacy that sustained their levels of well-being. Secondly,

individuals with higher levels of well-being tend to have better resilience (Noble & McGrath, 2015). Teachers with high resilience can maintain the quality of the education by adopting positive coping strategies (e.g., stress management and problem-solving skills) when they are faced with adverse conditions (e.g., stress). Teachers' resilience is suggested to be one of the sources for their teaching self-efficacy (Gibbs & Miller, 2014). Future investigation of teachers' well-being and self-efficacy may explore the mediating role of resilience in their positive relationship.

Limitations and future directions

There are at least five methodological limitations that would affect the validity of the present results. First, this study adopted a cross-sectional design; therefore, no causality could be inferred. Future studies are encouraged to adopt the longitudinal design to examine the directional relationship between teachers' well-being and self-efficacy. Second, participants were recruited from a single public university in Hong Kong, and most were female (i.e., 89%). This is partly because this university produces large numbers of qualified preschool teachers, an area of the teaching profession is dominated by females. Future research with a larger sample size recruited from more diverse backgrounds and from different universities is needed to validate the present findings. Third, the current study did not investigate the detailed demographic information of the participants. Demographic characteristics, such as socioeconomic status and academic performance, could be vital determinants of participants' well-being and self-efficacy (Grant et al., 2019). Future investigations may consider including these factors as covariates in the analyses. Fourth, the current study adopted only self-report measures of teachers' well-being and self-efficacy, and the results may be affected by self-serving bias, social desirability, and common method variance (Chan et al., 2020). Future studies may employ additional measures

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(e.g., observation, peer-report measure, and biophysiological measures of emotions) in assessing participants' well-being and self-efficacy. Finally, the current study focused on a number of selected dimensions of SWB and PWB which could be a conceptual limitation. Although life satisfaction was not included as an indicator of SWB in the current study, we would still encourage future works to take the life satisfaction measures into account to provide a more comprehensive view of well-being profiles. In relation to PWB, future studies are suggested to cover more dimensions (e.g., teachers' autonomy) to better illustrate teachers' PWB at work.

Implications

The results of the current study demonstrated that pre-service teachers in Hong Kong had similar well-being profiles to their western counterparts (Goodman et al., 2018). These findings have the potential to influence pre-service teacher training interventions by supporting their SWB and PWB. This approach may be critical amid difficult times like the COVID-19 pandemic when school operation was suspended, and pre-service teachers could not gain mastery experience through teaching practicum (Tschannen-Moran & Hoy, 2001). Educational psychologists and university administrators can join forces to develop positive psychological interventions to boost pre-service teachers' SWB. Positive psychological skills, including positive reappraisal, self-compassion, and mindfulness, were proven effective in regulating positive and negative affect (Fredrickson, 2001; Robustelli & Whisman, 2018). Similarly, PWB can be promoted by the identification of individual core values (purpose), SMART goals (accomplishment and dedication), and the adoption of reflective listening (positive relationships) (Noble & McGrath, 2015). The findings may also be referred to in the development of screening tools for identifying pre-service teachers with low levels of well-being (Campbell et al., 2019). Concerning demographic information, the findings suggested that pre-service teachers who were from a

higher diploma programme were prone to have lower well-being. The university or teacher educators may need to pay extra attention to the well-being of students from those programmes.

Conclusion

Despite these limitations, the current study identified the distinct profiles of SWB and PWB among Hong Kong pre-service teachers amid the COVID-19 pandemic. The high, moderate, and low well-being groups were extracted from the latent profile analysis, and the results are coherent with previous well-being profile studies conducted in western countries (Goodman et al., 2018). Moreover, pre-service teachers from different well-being groups showed significant differences in terms of their teachers' self-efficacy. The findings suggested that teacher training institutions may support pre-service teachers' well-being (SWB and PWB) to maintain their teachers' self-efficacy during a difficult time like the COVID-19 pandemic.

Conflict of interest

The authors declare that they have no conflict of interest.

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Table 1.
Zero-order correlations, means, and standard deviation of the study variables.

Components	1	2	3	4	5	6	7	8	9
1. Positive affect	1								
2. Negative affect	-.089	1							
3. Accomplishment	.466**	-.235**	1						
4. Presence	.475**	-.287**	.460**	1					
5. Dedication	.561**	-.135*	.559**	.514**	1				
6. Relationship	.450**	-.260**	.447**	.276**	.466**	1			
7. Efficacy-SE	.354**	-.058	.588**	.244**	.543**	.431**	1		
8. Efficacy-IS	.373**	-.050	.630**	.373**	.575**	.362**	.773**	1	
9. Efficacy-CM	.318**	-.101	.529**	.237**	.494**	.441**	.595**	.586**	1
Mean	3.117	2.604	2.946	4.742	4.943	4.699	3.720	3.746	3.580
SD	0.651	0.746	0.403	1.138	0.993	0.871	0.605	0.611	0.646
Cronbach's alpha	.873	.899	.855	.844	.913	.961	.828	.856	.872
Skewness	-.430	.080	.014	-.647	-.445	-.339	-.748	-.925	-.418
Kurtosis	-.252	-.309	1.518	.762	.265	.288	1.856	2.427	.843

Note. SE = Student engagement; IS = Instructional strategies; CM = Classroom management
$* p < .05, ** p < .01$

Table 2.

Model fit indices for classes selection

Number of Classes	AIC	BIC	SABIC	Entropy	BLRT *p*	VLMR-LRT *p*	Smallest Class Size
2	3417.686	3487.15	3426.899	.749	.000	.001	41.259%
3	3284.748	3379.803	3297.355	.806	.000	**.000**	**8.392%**
4	3250.196	**3370.843**	3266.197	.788	.000	.161	6.643%
5	**3228.558**	3374.798	**3247.954**	**.808**	.000	.054	4.545%

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SABIC = Sample-size adjusted BIC; BLRT = bootstrapped likelihood ratio test; VLMR-LRT = Vuong-Lo-Mendell-Rubin adjusted likelihood ratio test; *p* = *p*-value. **Bolded** values indicate "best" fit for each respective statistic

Table 3.

Latent profile analysis solution and significant mean differences in latent profile indicators of subject well-being (SWB) and psychological well-being (PWB).

	Profiles			One-way ANOVA	
	Low [a] (n = 24)	Mod [b] (n = 186)	High [c] (n = 76)	$F(2,283)$	P
Demographic Information					
Gender				1.884	.154
Male	2 (0.699%)	33 (11.538%)	19 (6.643%)		
Female	22 (7.692%)	153 (53.497%)	57 (19.930%)		
Age				.520	.595
20 or below	14 (4.895%)	101 (35.315%)	37 (12.937%)		
21-25	7 (2.448%)	71 (24.825%)	33 (11.538%)		
26-29	3 (1.049%)	11 (3.846%)	2 (0.699%)		
30 or above	0 (0.000%)	3 (1.049%)	4 (1.399%)		
Programme [ac]				3.229	.041
HD	11 (3.846%)	52 (18.182%)	14 (4.895%)		
BSc	7 (2.448%)	99 (34.615%)	39 (13.636%)		
MSc	6 (2.098%)	34 (11.888%)	23 (8.042%)		
Latent Profile Indicators					
Positive affect	2.075 (0.406) [bc]	3.010 (0.523) [ac]	3.709 (0.391) [ab]	117.693	.000
Negative affect	2.871 (1.049) [c]	2.690 (0.699) [c]	2.308 (0.667) [ab]	9.237	.000
Accomplishment	2.230 (0.366) [bc]	2.872 (0.250) [ac]	3.311 (0.350) [ab]	119.639	.000
Presence	2.760 (1.009) [bc]	4.562 (0.890) [ac]	5.707 (0.643) [ab]	106.562	.000
Dedication	3.031 (0.640) [bc]	4.754 (0.697) [ac]	5.882 (0.582) [ab]	156.958	.000
Relationship	3.490 (0.697) [bc]	4.565 (0.714) [ac]	5.387 (0.717) [ab]	66.181	.000

Note. Mod = Moderate; HD = higher diploma; BSc = bachelor of sciences; MSc = masters of sciences. The letters in superscript after the means indicate significant differences.

Table 4.

Wald chi-square test vales, means and standard deviation of indices of teacher self-efficacy for

each of latent profile

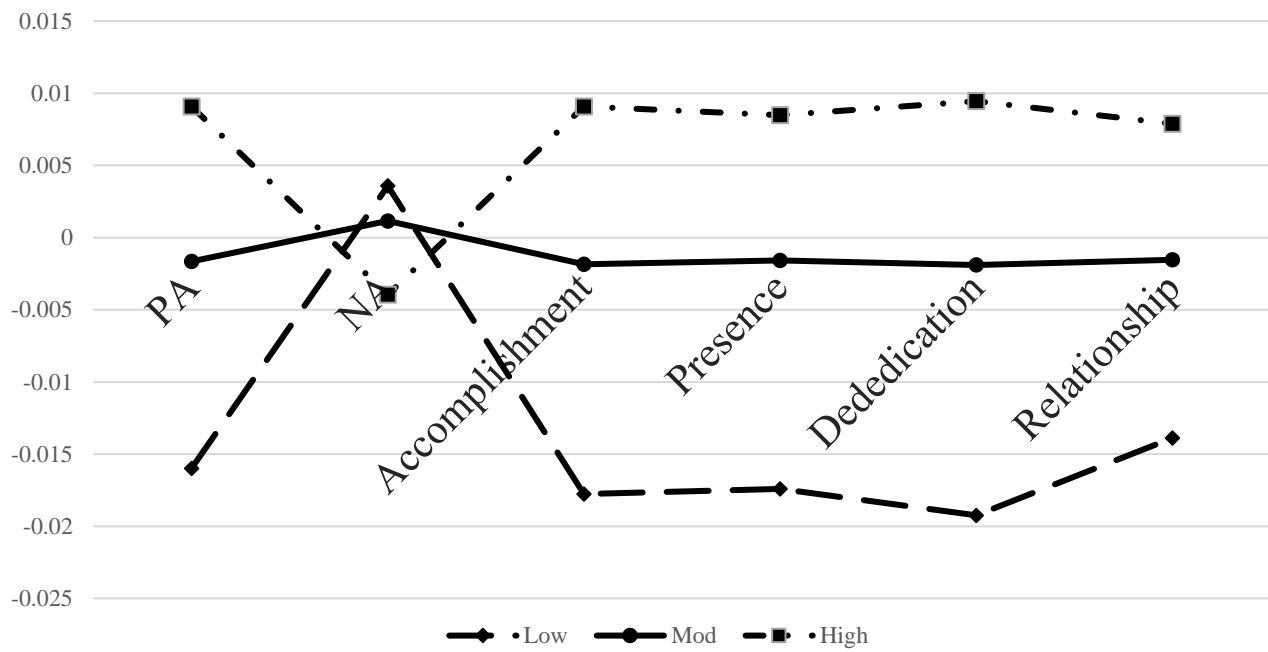| Self-efficacy	Low [a] (n = 24)	Mod [b] (n = 186)	High [c] (n = 76)	Global χ^2	[a] vs [b]	[a] vs [c]	[b] vs [c]
Student engagement	2.861 (.189)	3.609 (.040)	4.178 (.053)	98.754***	14.636***	44.699***	72.417***
Instructional strategies	2.720 (.194)	3.647 (.037)	4.216 (.051)	113.258***	22.132***	55.788***	80.477***
Classroom management	2.613 (.191)	3.493 (.045)	4.004 (.070)	63.797***	19.734***	46.831***	34.033***

Note. Mod = Moderate. *** $p < .001$

Figure 1. Latent profile analysis of SWB and PWB indicators. PA = positive affect; NA =

negative affect