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Teachers' occupational attributes and their psychological wellbeing, job satisfaction, occupational self-concept and quitting intentions

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HIGHLIGHTS

- Teachers' occupational attributes related to various relevant outcomes.
- Positive associations were found for psychological wellbeing.
- Positive associations were found for job satisfaction and occupational self-concept.
- Negative associations were found for quitting intentions.

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ABSTRACT

Little is known about the determinants of teachers' psychological wellbeing, job satisfaction, occupational self-concept and quitting intentions. In this paper, teachers' occupational attributes (i.e. professional and personal characteristics) were investigated as determinants. Henceforth, the Educator Motivation and Attribute Profile (EdMAP) scales were used to describe the nature of 1109 Hong Kong primary and secondary school teachers' occupational attributes. Furthermore, the relationships with the teacher outcomes were investigated. Construct validity and reliabilities of the EdMAP scales were satisfactory. The results showed positive associations between teachers' occupational attributes and their wellbeing, job satisfaction, and self-concept, and negative associations with quitting intentions.

1. Introduction

1.1. Background

The teaching profession is generally seen and experienced as demanding and stressful (Hakanen, Bakker, & Schaufeli, 2006; Johnson et al., 2005; Kyriacou, 2001; Liu & Onwuegbuzie, 2012; Stoeber & Rennert, 2008). Unsatisfactory levels of psychological wellbeing in the workplace increase teacher stress, and may lead to feelings of burnout and increased quitting intentions (Chan, 2006; Høigaard, Giske, & Sundsli, 2012; Skaalvik & Skaalvik, 2016). A teacher must be a jack-of-all-trades to be able to perform well in various domains. Not only is the primary process of daily classroom practices highly demanding, the workload outside the school is also substantial (Mattern & Bauer, 2014; OECD., 2012). The occupational attributes of teachers entail a broad range of professional attributes (e.g. organizational and interpersonal competencies) and desirable personal attributes (e.g. enthusiasm, devotion, passion, positive affect; e.g., Moè, Pazzaglia, & Ronconi, 2010) that are needed to fulfil their teaching duties. It is a reasonable proposition, therefore, that teachers, as in other professions, need to present a set of professional attributes to perform well. However, the nature of these attributes and their relation to a range of psychological variables is an understudied phenomenon. The present study addresses this topic in more detail and aims to contribute to the

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current body-of-knowledge on teachers' occupational attributes and the relationships with various relevant teacher outcomes.

Although sufficient numbers of students enter teacher training institutes and many of them subsequently become teachers, substantial numbers drop-out from the teaching profession within a few years (Goldring, Taie, & Riddles, 2014; see also; Guarino, Santibanez, & Daley, 2006; Ingersoll, 2001, 2003; Weiss, 1999). For example, in the U.S., Ingersoll (2003) reported teacher attrition rates up to almost 50% within 5 years after graduation. That is, 14% left the teaching profession after one year of teaching, which increased to 46% after five years. More recent figures on U.S. data also show a teacher attrition rate of about 8% per year (Goldring et al., 2014). While the attrition rates in primary and secondary education in Hong Kong are relatively low (4.4% in primary education; 5.0% in secondary education in 2015/2016; Education Bureau, 2016), teacher job dissatisfaction (as discussed later on) and job drop-out remain a major concern (e.g. Cheng, 2009). To identify why teaching attrition occurs, Borman and Dowling (2008) conducted a narrative review on teacher career trajectories and attrition moderators. As it turns out, both personal and professional attributes are important predictors of teacher attrition. Professional attributes, for example, include monetary and material resources, organizational characteristics (e.g. working environment, level of administrative support, school size), but also student body composition (e.g. high percentages of students from disadvantaged socioeconomic backgrounds). Unfavourable working conditions and personal dissatisfaction may lead to substantial attrition rates, particularly among early career teachers (Borman & Dowling, 2008).

Often drop-out from the teaching profession is explained by job dissatisfaction (e.g., Heikonen, Pietarinen, Pyhältö, Toom, & Soini, 2016; Wong & Li, 1995) and a diminution in psychological wellbeing as a teacher (e.g., Hong, 2012; Høigaard et al., 2012). The most central component among teachers is their affective wellbeing, including a diverse set of aspects such as their mood, job satisfaction, organizational commitment, and reduced emotional exhaustion (Van Horn, Taris, Schaufeli, & Schreurs, 2004). Teacher wellbeing also has an effect on their students. Students of satisfied teachers and of teachers who are psychologically well are more likely to attain than students whose teachers are dissatisfied or emotionally exhausted (Arens & Morin, 2016; Day, 2008; Park, 2005).

In this context, a number of researchers have noted the importance of teaching commitment to enhancing the effectiveness of teachers, teachers' psychological wellbeing, and a diminution in their drop-out intentions (McInerney, Ganotice, King, Morin, & Marsh, 2015a, b; Morin et al., 2017; Morin, Meyer, McInerney, Marsh, & Ganotice, 2015). An examination of the teacher attributes that have high psychological wellbeing, job satisfaction, occupational self-concept, and low intentions of leaving the profession provides a further insight into the teacher characteristics that might result in long-term commitment to the teaching profession. Teachers' commitment to their profession is associated with their self-efficacy beliefs, for example, believing that they could empower their students (Bogler & Somech, 2004). In turn, having strong self-efficacy beliefs may also protect teachers against attrition (Hong, 2012). Other studies found that, the stronger teachers' commitment to their profession, the higher their self-efficacy for classroom management, instructional strategies, and student engagement (Chan, Lau, Nie, Lim, & Hogan, 2008; Klassen & Chiu, 2011). More recent studies identified self-efficacy as the most significant factor in teachers' professional wellbeing, as well as job satisfaction and recognition (Yildirim, 2015). The importance of teaching efficacy has also been highlighted by Renshaw, Long, and Cook (2015), showing that teaching efficacy, joy of teaching, and school connectedness identify the level of teachers' subjective wellbeing. In turn, emotional characteristics such as hope and gratitude to some extent predict teachers' life satisfaction (Chan, 2009, 2011, 2013), showing the complex interrelations among teacher self-efficacy, job/life satisfaction, and feelings of burnout.

Choi and Tang (2009) described the developmental trends in teacher commitment in Hong Kong by studying the interplay between personal, workplace, and education systemic factors throughout teachers' careers. Personal factors, such as teachers' personal value of love for students and sense of purpose (i.e. application, personal accomplishment), were associated with sustained/increased commitment trends among teachers (see also Van Horn et al., 2004). Similarly, Moè (2016) found that a passion for teaching was positively associated with, among other things, job satisfaction and job self-efficacy. Decreased commitment (Choi & Tang, 2009) was often observed when teachers had negative perceptions of education systemic and workplace factors such as unfavourable working conditions (see also Borman & Dowling, 2008). A large-scale study therefore, of the teacher attributes that are related to psychological wellbeing, positive occupational self-concept, and job satisfaction should shed light on the correlates of drop-out intentions, and provide a heuristic for the further study of the nature and development of desirable attributes within the teaching profession. This is particularly the case in Hong Kong where attrition rates from the teaching profession are relatively low. The attributes found to be most salient may be ones that provide a benchmark for examining teacher attrition internationally.

Other important variables that are posited to be associated with teacher retention in the profession are psychological wellbeing, and positive self-concept as a teacher. Many studies have reported that unsatisfactory levels of psychological wellbeing increase teacher stress, and may lead to feelings of burnout and increased quitting intentions (e.g. Høigaard et al., 2012). Work-related psychological wellbeing can be defined by an individual's subjective positive experience at work (Dagenais-Desmarais & Savoie, 2012). It is generally accepted that it comprises multiple dimensions, providing a more nuanced picture of an employees' well-being at the work place. In line with the studies presented by McInerney et al. (2015a, b), the present study focuses on five dimensions of teachers' psychological wellbeing. These dimensions are: *interpersonal fit at work, thriving at work, feeling of competency, perceived recognition at work,* and *desire for involvement at work*, as described in the paper of Dagenais-Desmarais and Savoie (2012). These dimensions are described in more detail in the Method section.

One factor that has not received much attention in the literature on teacher retention in the profession is teachers' occupational self-concept. Although teachers' job satisfaction has received ample attention, showing positive associations between occupational commitment and job satisfaction in meta-analytic reviews (e.g. Lee, Carswell, & Allen, 2000) and in more recent studies (e.g. Skaalvik & Skaalvik, 2011), studies on teachers' occupational self-concept are lacking. This is surprising, because self-concept among students is generally found to be an important factor explaining differences in student performance (Huang, 2011; Marsh & Martin, 2011). Hence, teachers' occupational self-concept should also be seen to be an important focus of attention. Moreover, teachers' self-concept is associated with their valuing of student-centered approaches to learning (Yeung, Craven, & Kaur, 2014).

1.2. The present study

The desired (or expected) professional occupational attributes, and other desirable attributes described in the introduction have not been investigated in a large-scale study in Hong Kong where

attrition from the teaching profession is relatively low. The question that remains is related to the exact nature of these desirable professional attributes, and how do different attributes relate to relevant outcomes such as teachers' psychological wellbeing, occupational self-concept and job-satisfaction? The current study addressed these issues. The nature of teachers' occupational attributes was assessed by using the Educator Motivation and Attribute Profile (EdMAP) scales, a new instrument designed to describe teachers' professional occupational attributes as a multifaceted construct. The EdMAP scales were developed from a set of work-based motivational scales named the Employee Motivation and Attribute Profile (EMAP) (Marsh, McInerney, & McInerney, 1993). While the EdMAP consists of twenty-three hypothesised scales the major focus in our study is on six higher-order factors: Leadership, Goal Orientation, Application, Variety/Innovation, Abstract Thinking, and Interpersonal (see the Method section for more information). The main aim of the current study was to investigate the relationships between teachers' professional occupational attributes and their psychological wellbeing, job satisfaction, occupational self-concept, and intentions to stay in or leave the teaching profession and the current school. The following research questions were addressed:

1. Do the EdMAP scales (Leadership, Goal Orientation, Application, Variety/Innovation, Abstract Thinking, and Interpersonal) validly and reliably represent teachers' occupational attributes among primary and secondary school teachers in Hong Kong?
2. Using a variable-centered approach, what are the most endorsed professional occupational attributes, and what are the least endorsed professional attributes among primary and secondary school teachers in Hong Kong?
3. To what extent are teachers' occupational attributes related to teachers' psychological wellbeing, their intentions to quit their profession, intentions to quit their job at their current school, job satisfaction, and occupational self-concept?

Generally, positive associations are expected between the EdMAP scales and teachers' psychological wellbeing, job satisfaction, and occupational self-concept. Moreover, negative associations are expected between the EdMAP scales and teachers' quitting intentions.

In summary, the study examines the utility of the EdMAP for assessing teachers' professional attributes among both primary and secondary school teachers. Teachers' occupational attributes may be adaptive or maladaptive, therefore, if the EdMAP scales are proven valid and reliable, the instrument can be used to identify those adaptive factors that could increase teachers' wellbeing, job satisfaction and occupational self-concept and reduce quitting intentions. The study potentially adds to the teacher retention literature by describing a range of attributes that may characterize positive integration to the profession.

As the EdMAP used in this study is in its development stage, and is being used for the first time with an Asian population, we are hesitant to offer specific hypotheses and predictions. The relationship of specific attributes to well-being and retention in the profession is unclear. Our literature review suggests that rather than considering external influences such as material resources and organizational characteristics as important predictors of psychological well-being, and hence continuity in the profession, the attributes which are more endemic to the personal qualities of the teacher should be considered. These attributes relate to qualities such as high personal self-efficacy and teaching self-efficacy; love of students, and a sense of purpose and passion for teaching. Hence, one may anticipate that varied dimensions such as Leadership, Goal Orientation, Application, Variety/Innovation, Abstract Thinking and Interpersonal will have differential relations with *interpersonal fit at work, thriving at work, feeling of competency, perceived recognition at work,* and *desire for involvement at work*, as well as intentions for remaining in the profession of teaching. For example, one could speculate that Abstract Thinking would be less salient owing to its theoretical content, than Interpersonal, while Leadership may be less salient than Goal Orientation as some teachers may not aspire to overt leadership roles. However, which attributes would be the most salient dimensions relating to psychological well-being and intentions to remain in their current school and profession, and their direction of influence, remain at the outset of the research, open questions. The present study sheds light on these important matters, and may lead later studies to propose directional hypotheses.

2. Method

2.1. Procedures

Based on a list provided by the Education Bureau to obtain a representative sample across Hong Kong, a large number of schools in Hong Kong were faxed an invitation to complete a survey in a "cold-call" approach. While the national number of schools contacted by fax was approximately 400 primary and 400 secondary schools, a smaller number were actually reached owing to out-of-date telephone numbers, addresses, and contact personnel. Nevertheless, forty-one schools (21 primary schools; 20 secondary schools) responded positively, which, given the difficulty of contacting the schools and finding schools willing to contribute to research among their busy schedules, was a good response rate of about 5% providing a sufficient sample size (of >1.000 teachers) across a range of school areas in Hong Kong to provide valuable data. Once contact was established the teaching staff at the schools, through their principals or appointed contact teachers, were invited to complete either a hard copy version of a questionnaire, or a copy on-line. Thirty schools requested a hard copy of the form, and 11 elected to complete the form online. A hard copy of the form was hand delivered to each of the schools electing to complete the hard copy with a time-line set for the return of the questionnaire. Instructions were provided to those schools opting to use the on-line version of the questionnaire. Due to heavy workloads of teachers and tight schedules of schools in Hong Kong, schools were provided with flexibility to arrange their own data collection period. For this reason, collection of data took approximately ten months, with completed hard-copy forms being hand collected by the research team. Completion of the survey was voluntary for all teachers at the co-operating schools.

2.2. Participants

The participants in the present study were 1109 teachers from primary (46.4%) and secondary (53.6%) schools in Hong Kong. 966 of the participants did the study in paper format and 143 participants completed the study online. The average age of the participants was 39 years old ($SD = 9.43$). The average length of teaching was 14–41 years ($SD = 8.84$), while the average length of time teaching at a particular school was 10.83 years ($SD = 7.65$). 67.3% of the participants were female. 98.4% of them were Chinese, and their native languages were Cantonese (95.3%), Mandarin (1.8%), or English (1.6%). 97.1% of the participants had a Bachelor's degree (53.7%) or a Master's degree (43.4%) as their highest level of education. 43.6% of the teachers were single, and 56.4% were married. 42.7% of the participants had no children, while 54.7% of them had one or two children. Among all the participants, 66.7% of them were class teachers, 5.1% were form masters/mistress, 29.6% were panel

heads, and 3.9% were assistant principals or principals. Almost all participants were full-time teachers (98.2%) and 77% were permanent employees. These Hong Kong teachers reported that they worked about 42 h per week at school on average, and 9 h at home. Apart from teaching, they also spent on average 7.8 h per week on other academic related duties and 8.4 h on administrative duties. Finally, across this full sample, when asked about whether participants aspired to assume administrative duties in the future, 78.2% of the participants answered NO, and 21.8% answered YES.

2.3. Measures

Demographic questionnaire. The participants were asked to fill out a demographic questionnaire, which provided school information, such as the school name, school religion, class size, school location, as well as teacher information including age, education level, teaching grade level, and number of years teaching.

EdMAP scales. The Educator Motivation and Attribute Profile (EdMAP) comprises 23 subscales derived from the previously validated Employee Motivation and Attribute Profile (EMAP), developed by Marsh et al. (1993) with 468 Australian employees of a large industrial firm in Australia. The original EMAP provided a pool of 230 questions measuring 23 discrete dimensions of motivation and attributes, with 10 items in each dimension. In order to shorten the scale for purposes of this study, five items with the strongest content validity and psychometric properties in Marsh et al. (1993) original analyses were selected. The decision to retain 5 items was based on a consideration of the possibility that some suboptimal items might need to be eliminated. The 23 "a priori" scales and their definitions (consistent with that of the original EMAP scales) with their reliability coefficients are presented in Table 1. All items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The full set of items is reported in Appendix A.

As all questions were originally formulated in English, a senior bilingual Research Assistant did a first translation from English to Chinese, after which two other bilingual speakers verified the meaningfulness and accuracy of the Chinese version. Perceived discrepancies were resolved by discussion. The resulting scale was then back-translated into English by a third Research Assistant. This version was then compared with the original English version by two native English speakers. Again, perceived discrepancies were resolved by discussion. An iterative process was then followed in which these steps were repeated until it could be confidently concluded that the Chinese items provided an accurate reflection of the original English items. In order to provide a parsimonious interpretation of the effectiveness of the EdMAP for purposes of this paper the 23 scales were hypothesised to form six higher-order global scales, based on Marsh et al. (1993) recommendations. The higher-order structure is included in Table 1.

Psychological Wellbeing at Work. Teachers' psychological wellbeing at work was assessed using a scale originally developed by Dagenais-Desmarais and Savoie (2012) which comprises five dimensions of wellbeing. The *interpersonal fit at work* dimension refers to teachers' perception of experiencing positive relationships with individuals interacting with oneself within the work context. *Thriving at work* describes teachers' perceptions of accomplishing a significant and interesting job that allows one to fulfil oneself as an individual. The *feeling of competency* refers to teachers' perception of possessing the necessary aptitudes to do one's job efficiently and

Table 1
The EdMAP scales.

	The extent to which a person …
Leadership	
Evaluation (α = .78)	… critically evaluates and interprets information.
Decisiveness (α = .87)	… demonstrates a readiness to make decisions, render judgments, take action and commit him/herself.
Persuasive/Assertive (α = .85)	… seeks to change and influence the ideas and opinions of others and is prepared to press a point of view based on his/her convictions.
Leadership (α = .87)	… can accept responsibility for and demonstrate the confidence to motivate groups of people towards task accomplishment without incurring hostility.
Emotional Control (α = .91)	… controls his/her emotions and mood changes in the workplace.
Goal Orientation	
Career Orientation/Ambition (α = .89)	… demonstrates a desire to reach personal and career goals within specific time frames.
Attention Seeking (α = .84)	… needs to be noticed.
Recognition and Rewards (α = .83)	… desires external recognition and tangible rewards.
Application	
Planning and Organizing (α = .79)	… has a structured approach to tasks involving short and long term aspects for self and others.
Attention to Detail (α = .90)	… shows concern for details, no matter how small, in accomplishing a task.
Application/Energy (α = .78)	… values and maintains a high level of work activity.
Tenacity (α = .86)	… persists until he/she has completed the task.
Variety/Innovation	
Variety/Task Flexibility (α = .86)	… needs change and variety in work.
Innovation (α = .87)	… generates and/or requires imaginative, creative solutions in work situations.
Routine (α = .66)	… is interested in repetitive, proceduralized routines.
Autonomy (α = .70)	… requires freedom from rules and structures.
Abstract Thinking	
Abstract Thinking (α = .85)	… understands and likes to work with complex theoretical concepts.
Technical Orientation (α = .88)	… is comfortable with technical processes, technology and computational sciences in the workplace.
Quantitative/Logical (α = .90)	… uses logical and quantitative approaches to obtain realistic practical outcomes.
Interpersonal	
Behavioral Flexibility (α = .84)	… has the ability to modify behavioral style to achieve a goal.
Consultation/Group Influence (α = .78)	… seeks to consider group dynamics and their impact in reaching consensus through consultation.
People Orientation (α = .88)	… seeks to analyze and understand human behavior.
Group Sociability (α = .86)	… establishes personal friendships and social relationships within the workplace.

have mastery of the tasks to perform. The fourth dimension, *perceived recognition at work,* focuses on teachers' perception of being appreciated within the organization for one's work and one's personhood. The fifth dimension, *desire for involvement at work*, refers to teachers' will to involve oneself in the organization and to contribute to its good functioning and success. More information about the adapted scales used in the present study are described in McInerney et al. (2015a, b), including information on linguistic adaption. Each item was rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Example items are: (1) *Interpersonal fit at work* (5 items; $\alpha = 0.89$; e.g., "I value the people I work with"); (2) *Thriving at work* (5 items; $\alpha = 0.91$; e.g., "I find my job exciting"); (3) *Feeling of competency* (5 items; $\alpha = 0.88$; e.g., "I know I am capable of doing my job"); (4) *Perceived recognition at work* (5 items; $\alpha = 0.88$; e.g., "I feel that my work is recognized"); (5) *Desire for involvement at work* (5 items; $\alpha = 0.81$; e.g., "I want to take initiative in my work").

Turnover intentions. Becker and Billings' scales (1993) were used to assess teachers' intentions to quit the school (4 items; $\alpha = 0.87$; e.g., "*I often think about leaving this school*") and the teaching profession (4 items; $\alpha = 0.82$; e.g., "*I often think about quitting teaching*"). Each item was rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Job satisfaction and occupational self-concept. Job satisfaction and occupational self-concept were assessed with 5-item scales adapted from Marsh et al. (1993). An example item for *job satisfaction* ($\alpha = 0.92$) is "I am very satisfied with the kind of work that I do", and an example item for *occupational self-concept* ($\alpha = 0.88$) is "I am good at most things expected of me in my job". Each item was rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

2.4. Analyses

With the aim of testing the construct validity of the EdMAP scales, the 23 scales were grouped according to six aforementioned higher-order factors. All analyses were conducted at the item level and that both the first-order and higher-order models included all items. Confirmatory factor analyses were conducted with M*plus* 7.4 (Muthén & Muthén 1998–2017) Robust Maximum Likelihood (MLR) estimator, in order to establish the factor validity of the EdMAP scales for the Hong Kong sample. The MLR estimator provides parameter estimates, standard errors, and goodness-of-fit results that are robust to the non-normality of the Likert scales underlying responses to the EdMAP items, and to the clustering of teachers within schools when used (as in the current study) jointly with Mplus COMPLEX function (Asparouhov, 2005). The very limited amount of missing data present at the item level (generally less than 2%) was handled by Mplus default Full Information Maximum Likelihood (FIML) estimation process (e.g., Enders, 2010). For each of the six EdMAP scales, a separate higher-order confirmatory factor analysis (CFA) was conducted based upon the first-order factors and the associated items. A series of 11 a priori defined correlated uniquenesses (identified in the Appendix) had to be incorporated to these models to account for the methodological artefact associated with the parallel wording of some items (e.g., I prefer working with complex theoretical questions; I prefer to work with complex theoretical questions) or the reference to some parallel concepts (e.g., I take a quantitative approach; I define problems quantitatively) (e.g., Marsh et al., 2013). Several goodness-of-fit indices were used to determine the model fit, including the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). RMSEA values below 0.06 and 0.08, and CFI/TLI values greater than 0.95 and 0.90 respectively indicate excellent and acceptable fit to the data (e.g., Hu & Bentler, 1999; Marsh, Hau, & Grayson, 2005).

Measurement invariance tests were conducted to evaluate whether the EdMAP measured primary and secondary school teachers' occupational attributes equivalently (Van de Schoot, Lugtig, & Hox, 2012). These tests were performed in a sequential strategy devised through a combination of recommendations for higher-order factor models (Cheung, 2008; Morin et al., 2011). For identification purposes, the measurement invariance of the first-order factors needed to be estimated first: (a) configural invariance (identical measurement model), (b) weak invariance (invariance of the loadings); (c) strong invariance (invariance of the loadings and intercepts); (d) strict invariance (invariance of the loadings, intercepts and uniquenesses). The invariance of the higher-order structure can then be verified in a similar sequence, starting from the most invariant model identified based on steps a to d. The change in CFI, TLI, and RMSEA values were calculated across adjacent models from this sequence, with a decrease in CFI/TLI < 0.01 and an increase in RMSEA < 0.015 taken as evidence of invariance (Chen, 2007; Cheung & Rensvold, 2002).

Third, regression analyses were conducted in SPSS (version 23), in which the six higher-order EdMAP scales were used to predict various outcome variables: teachers' psychological wellbeing, intentions to quit their profession, intentions to quit their current school, job satisfaction, and occupational self-concept. These analyses were conducted separately for each outcome variable, because of the high correlations between some of the outcome variables. In order to control for potential confounding variables, gender, family income, and education levels were also included in the regression models. Due to the estimation of five alterative models (one per outcome), we relied on a *p* value of .001 to indicate statistically significant relations.

3. Results

3.1. Descriptive statistics

Table 2 presents the descriptive statistics of the 23 subscales. The mean scores on each of the items are >4 (the midpoint of the 7-point Likert scale), indicating that, on average, teachers moderately agreed with the statements. The most highly endorsed professional occupational attributes (>5) were emotional control, career orientation, recognition and rewards, planning and organizing, application, tenacity, autonomy, technical orientation, behavioral flexibility, consultation, people orientation and group sociability. Of these tenacity and autonomy were the most highly endorsed. The least endorsed of the professional occupational attributes was attention seeking. All the higher-order factors were moderately endorsed >4.79. Of the 6 higher-order factors, the two most highly endorsed were application and interpersonal. A correlation matrix including all 23 subscales is available upon request from the corresponding author.

3.2. Confirmatory factor analyses

To provide a more parsimonious explanation of the utility of the 23 EdMAP scales we analysed results based on the hypothesised six higher-order factors. CFA were conducted to demonstrate the validity of these six scales, so that they can be used properly in the regression analyses presented in the next paragraphs.

As shown in Table 3, the model fit indices for the CFA model associated with the EdMAP higher-order dimensions of *Leadership, Goal Orientation, Application, Abstract Thinking* and *Interpersonal* were all in the acceptable to excellent range, with CFI and TLI values > 0.90 and RMSEA values < 0.08. However, the model fit indices for the *Variety/Innovation* factor failed to reach an

Table 2
Descriptive statistics.

	n	*M*	*SD*	Range	Skewness	Kurtosis
Leadership						
Evaluation	1096	4.90	.76	2.4–7.0	-.02	-.16
Decisiveness	1096	4.79	.93	1.8–7.0	-.33	-.33
Persuasive/Assertive	1096	4.96	.76	2.2–7.0	-.19	-.15
Leadership	1096	4.72	.90	1.6–7.0	-.29	-.14
Emotional Control	1096	5.05	.94	1.6–7.0	-.56	.15
Leadership (overall)	1096	4.88	.73	2.1–6.8	-.17	-.37
Goal Orientation						
Career Orientation/Ambition	1095	5.24	.90	1.0–7.0	-.51	.58
Attention Seeking	1096	4.12	.99	1.0–6.8	-.13	-.09
Recognition and Rewards	1095	5.29	.80	2.0–7.0	-.42	.16
Goal Orientation (overall)	1096	4.88	.73	1.7–6.9	-.25	.07
Application						
Planning and Organizing	1096	5.20	.75	2.4–7.0	-.29	.09
Attention to Detail	1096	4.93	.92	1.6–7.0	-.43	.13
Application/Energy	1096	5.43	.75	2.6–7.0	-.35	-.08
Tenacity	1096	5.50	.78	2.2–7.0	-.45	.35
Application (overall)	1096	5.27	.68	2.8–7.0	-.28	-.04
Variety/Innovation						
Variety/Task Flexibility	1096	4.80	.92	1.5–7.0	-.16	-.30
Innovation	1091	4.91	.90	1.3–7.0	-.24	.13
Routine	1096	4.29	.88	1.0–7.0	-.24	.54
Autonomy	1096	5.54	.66	3.0–7.0	-.23	-.06
Variety/Innovation (overall)	1096	4.88	.64	3.0–6.9	.08	-.25
Abstract Thinking						
Abstract Thinking	1096	4.62	.89	1.8–7.0	-.23	.07
Technical Orientation	1096	5.02	.89	1.8–7.0	-.33	.03
Quantitative/Logical	1095	4.72	.88	1.0–7.0	-.30	.18
Abstract Thinking (overall)	1096	4.79	.77	1.5–6.9	-.19	.07
Interpersonal						
Behavioral Flexibility	1095	5.10	.71	2.0–7.0	-.19	.03
Consultation/Group Influence	1096	5.34	.66	3.0–7.0	-.30	-.08
People Orientation	1096	5.09	.88	1.6–7.0	-.37	.33
Group Sociability	1095	5.30	.82	2.0–7.0	-.42	.09
Interpersonal (overall)	1096	5.21	.61	3.3–6.9	-.21	-.30

Table 3
Model fit indices from the CFA on the six EdMAP scales.

Models	χ^2	*df*	CFI	TLI	RMSEA	CI
Leadership	1100.863*	267	.928	.919	.053	.050; .057
Goal Orientation	528.697*	86	.917	.900	.069	.063; .074
Application	803.505*	166	.919	.907	.059	.055; .063
Variety/Innovation	1039.950*	163	.858	.835	.070	.066; .074
Variety/Innovation (short)	409.448*	97	.931	.915	.054	.049; .060
Abstract Thinking	265.805*	85	.970	.963	.044	.038; .050
Interpersonal	492.329*	164	.954	.947	.043	.038; .047

Notes: *$p \leq .01$; χ^2 = chi-square; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI: RMSEA 95% confidence interval.

acceptable level. Examination of the parameter estimates and modification indices associated with this model revealed that some items presented weaker main loadings, relatively strong cross loadings on non-target factors (as suggested by the modification indices) and unexpected correlated uniquenesses (as suggested by the modification indices). Based on this information, we decided to eliminate one item per first-order factor in order to achieve a well-balanced measured of these first-order factors based on the four most optimal items rather than five per subscales (see Appendix). The goodness-of-fit associated with this reduced model proved to be fully acceptable (RMSEA < 0.06, CFI/TLI > 0.90). Overall, these CFA models resulted in the estimation of first-order factor loadings ranging between 0.338 and 0.879, and of even stronger higher-order factor loadings ranging from 0.662 to 0.945.

Measurement invariance tests were then performed to assess whether the EdMAP measured the same constructs across samples of primary and secondary school teachers. Results from these tests are reported in Tables 4a, 4b, and 4c, and support the strict measurement invariance of all first-order and higher-order factors across samples, attesting to the generalizability of our results across

Table 4
Model fit indices from the Measurement Invariance Tests Comparing Primary and Secondary School Teachers on the six EdMAP Scales.

Models	χ^2	*df*	CFI	TLI	RMSEA	CI	$\Delta\chi^2$	Δdf	ΔCFI	ΔTLI	ΔRMSEA
a) Leadership & Goal Orientation											
Leadership: First-Order											
Configural Invariance	1414.116*	524	.929	.919	.056	.052; .059					
Weak Invariance	1430.649*	544	.930	.922	.055	.051; .058	16.095	20	+.001	+.003	-.001
Strong Invariance	1463.302*	564	.929	.924	.054	.051; .057	27.955	20	-.001	+.002	-.001
Strict Invariance	1464.155*	589	.930	.929	.052	.049; .055	25.520	25	+.001	+.005	-.002
Leadership: Higher-Order											
Configural Invariance	1573.378*	599	.923	.922	.054	.051; .058					
Weak Invariance	1577.347*	603	.923	.923	.054	.051; .058	2.500	4	.000	+.001	.000
Strong Invariance	1582.740*	607	.922	.923	.054	.051; .057	5.647	4	-.001	.000	.000
Strict Invariance	1608.038*	612	.921	.922	.054	.051; .058	22.429*	5	-.001	-.001	.000
Goal Orientation: First-Order											
Configural Invariance	671.390*	172	.913	.900	.073	.067; .079					
Weak Invariance	694.795*	184	.911	.900	.071	.066; .077	25.370	12	-.002	.000	-.002
Strong Invariance	722.884*	196	.908	.902	.070	.065; .076	24.738	12	-.003	+.002	-.001
Strict Invariance	716.254*	211	.912	.912	.066	.061; .071	18.069	15	+.004	+.010	-.004
Goal Orientation: Higher-Order											
Configural Invariance	716.251*	211	.912	.912	.066	.061; .071					
Weak Invariance	717.857*	213	.912	.913	.066	.061; .071	1.193	2	.000	+.001	.000
Strong Invariance	725.128*	215	.911	.913	.066	.061; .071	7.519	2	-.001	.000	.000
Strict Invariance	733.192*	218	.910	.914	.066	.060; .071	8.092	3	-.001	+.001	.000
b) Application & Variety/Innovation											
Application: First-Order											
Configural Invariance	1028.853*	328	.917	.903	.062	.058; .067					
Weak Invariance	1069.679*	344	.914	.905	.062	.058; .066	39.665*	16	-.003	+.002	.000
Strong Invariance	1109.305*	360	.911	.906	.062	.058; .066	37.407*	16	-.003	+.001	.000
Strict Invariance	1123.326*	380	.912	.912	.060	.056; .064	31.761	20	+.001	+.006	-.002
Application: Higher-Order											
Configural Invariance	1146.362*	384	.909	.910	.060	.056; .064					
Weak Invariance	1151.194*	387	.909	.911	.060	.056; .064	3.912	3	.000	+.001	.000
Strong Invariance	1160.856*	390	.908	.911	.060	.056; .064	9.636	3	-.001	.000	.000
Strict Invariance	1169.636*	394	.908	.911	.060	.056; .064	9.771	4	.000	.000	.000
Variety/Innovation: First-Order											
Configural Invariance	532.336*	190	.930	.911	.057	.052; .063					
Weak Invariance	531.766*	202	.932	.920	.055	.049; .060	2.727	12	+.002	+.009	-.002
Strong Invariance	562.342*	214	.929	.920	.055	.049; .060	30.520*	12	-.003	+.000	.000
Strict Invariance	571.897*	230	.930	.927	.052	.047; .057	17.664	16	+.001	+.007	-.003
Variety/Innovation: Higher-Order											
Configural Invariance	597.987*	234	.925	.923	.053	.048; .059					
Weak Invariance	611.650*	237	.923	.922	.054	.048; .059	14.971*	3	-.002	-.001	+.001
Strong Invariance	613.297*	240	.923	.923	.053	.048; .059	1.022	3	.000	+.001	-.001
Strict Invariance	627.001*	244	.921	.923	.054	.048; .059	12.571	4	-.002	.000	+.001
c) Abstract Thinking & Interpersonal											
Abstract Thinking: First-Order											
Configural Invariance	380.647*	170	.968	.961	.048	.041; .054					
Weak Invariance	394.955*	182	.968	.963	.046	.040; .052	13.377	12	.000	+.002	-.002
Strong Invariance	428.299*	194	.965	.962	.047	.051; .053	34.821*	12	-.003	-.001	+.001
Strict Invariance	465.746*	209	.961	.961	.047	.042; .053	36.264*	15	-.004	-.001	.000
Abstract Thinking: Higher-Order											
Configural Invariance	465.746*	209	.961	.961	.047	.042; .053					
Weak Invariance	464.739*	211	.962	.962	.047	.041; .053	.239	2	+.001	+.001	.000
Strong Invariance	471.439*	213	.961	.962	.047	.041; .053	7.299	2	-.001	.000	.000
Strict Invariance	502.862*	216	.957	.958	.049	.044; .055	24.115*	3	-.004	-.004	+.002
Interpersonal: First-Order											
Configural Invariance	710.428*	324	.950	.941	.047	.042; .051					
Weak Invariance	730.792*	340	.949	.943	.046	.041; .050	17.615	16	-.001	+.002	-.001
Strong Invariance	760.005*	356	.948	.944	.046	.041; .050	28.071	16	-.001	+.001	.000
Strict Invariance	781.559*	376	.947	.947	.044	.040; .049	29.066	20	-.001	+.003	-.002
Interpersonal: Higher-Order											
Configural Invariance	793.362*	380	.946	.946	.045	.040; .049					
Weak Invariance	797.871*	383	.946	.947	.044	.040; .049	4.124	3	.000	+.001	-.001
Strong Invariance	806.093*	386	.946	.946	.045	.040; .049	9.475	3	.000	-.001	+.001
Strict Invariance	818.432*	390	.945	.946	.045	.040; .049	11.304	4	-.001	.000	.000

Notes: *$p \leq .01$; χ^2 = chi-square; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI: RMSEA 95% confidence interval; Δ = change in specific indicator relative to the previous model in the sequence (including the robust scaled chi square difference tests).

types of teachers. Therefore, the regression analyses will rely on the whole sample of participants.

3.3. Hierarchical regression: teachers' psychological wellbeing

The relations between Hong Kong teachers' psychological wellbeing at work and the higher-order EdMAP scales were explored in hierarchical regression analyses reported in Table 5. The analyses were conducted separately for the five psychological wellbeing scales (*interpersonal fit at work, thriving at work, feeling of competency, perceived recognition at work*, and *desire for involvement at work*). Gender, family income, and education levels were included in Step 1 of the regression analyses. The mean scores of the EdMAP scales were added to the analyses in Step 2. Family income had a significant effect on teachers' *feeling of competency* and their *perceived recognition at work*. These effects became insignificant when the EdMAP scales were added to the regression models.

Adding the EdMAP scales revealed the following results. The only significant factor related to teachers' *interpersonal fit at work* was the Interpersonal scale. For all other wellbeing scales, multiple EdMAP scales showed significant relations. The Goal Orientation, Application, and Variety/Innovation scales were positively associated with teachers' *thriving at work* and teachers' *desire for involvement at work*. The Leadership, Application and Interpersonal scales were positively associated with teachers' *feeling of competency,* whereas the Abstract Thinking scale was negatively associated with this scale. Finally, the Leadership, Goal Orientation, Application and Interpersonal scales were all positively associated with teachers' *perceived recognition at work.* This examination demonstrates the varied role each of EdMAP scale played in various aspects of teachers' psychological wellbeing. In summary, the EdMAP scales were generally found to be positively associated with teachers' psychological wellbeing, explaining a large portion of its variability. A significant amount of variance in each of the wellbeing scales was explained, ranging from 41% to 58%.

3.4. Hierarchical regression: turnover intentions, job satisfaction, and occupational self-concept

Each of the higher-order EdMAP scales was then regressed on teachers' quitting intentions, job satisfaction, and occupational self-concept. These results are reported in Table 6. Family income had a significant negative effect on teachers' *intentions to quit* and a positive effect on their *occupational self-concept*. When the EdMAP scales were added to the regression models, the negative effect of family income on teachers' *intentions to quit the profession* and their *occupational self-concept* became non-significant. Only the negative effect of family income on teachers' *intentions to quit the current school* remained significant.

Two EdMAP scales were significantly related to teachers' *intention to quit the teaching profession*, that is, Application (negative) and Abstract Thinking (positive). Application was also negatively related to teachers' *intention to quit the current school.* Leadership, Goal Orientation, Application and Variety/Innovation were positively associated with teachers' *job satisfaction.* Finally, Leadership and Application were positively associated with teachers' *occupational self-concept*, whereas Abstract Thinking was negatively associated with their *occupational self-concept.* As was the case with teachers' psychological wellbeing, the results demonstrate the varied role the EdMAP scales play in teachers' quitting intentions, job satisfaction and occupational self-concept. The EdMAP scales explained a relatively small portion of the variance in teachers' quitting intentions (8%–10%) and a significant amount of variance in teachers' *job satisfaction* (45%) and teachers' *occupational self-concept* (63%).

4. Conclusions and discussion

4.1. Conclusions

The present study demonstrates the reliability and factor validity of responses to the EdMAP in a non-Western sample (research question 1). Confirmatory factor analyses showed acceptable goodness of fit indices for the original EdMAP scales assessing Goal Orientation, Application, Abstract Thinking, Interpersonal, and Leadership, and for a slightly reduced (with 4 items per subscale rather than 5) Variety/Innovation scale. Overall, these findings provide support for the soundness of the EdMAP measurement instrument for further applications in educational practice.

On a seven-point scale, the most highly endorsed EdMAP scales (research question 2) were Autonomy (5.54) Tenacity (5.50), Application/Energy (5.43), Consultation/Group Influence (5.34), and Group Sociability (5.30). The least endorsed EdMAP scales were

Table 5
Hierarchical regression analyses for teachers' psychological wellbeing.

	Interpersonal fit at work	Thriving at work	Feeling of competency	Perceived recognition at work	Desire for involvement at work
Gender	-.02	-.04	-.01	.01	-.09
Family income	.04	.03	.14*	.13*	.03
Education	-.02	.02	.01	<.01	.08
R^2	*<.01*	*<.01*	*.02*	*.02*	*.02*
	Interpersonal fit at work	Thriving at work	Feeling of competency	Perceived recognition at work	Desire for involvement at work
Gender	-.03	-.03	-.03	<.01	-.06
Family income	.01	-.01	.06	.07	<.01
Education	-.03	<-.01	-.01	-.01	.05
Leadership	.04	.15	.32*	.22*	.05
Goal Orientation	.06	.20*	-.03	.13*	.23*
Application	.13	.18*	.44*	.25*	.15*
Variety/Innovation	-.06	.20*	.09	<.01	.26*
Abstract Thinking	-.03	-.07	-.18*	-.09	.05
Interpersonal	.54*	.08	.15*	.20*	.12
R^2 change	*.41**	*.43**	*.56**	*.41**	*.56**
R^2	*.41*	*.43*	*.58*	*.43*	*.57*

Note. Table presents the standardized coefficients (β).
*$p < .001$.

Table 6
Hierarchical regression analyses for teachers' quitting intentions, job satisfaction, and occupational self-concept.

	Quit teaching	Quit the school	Job satisfaction	Occupational self-concept
Gender	.02	.02	<-.01	-.02
Family income	-.11*	-.13*	.07	.15*
Education	-.03	-.01	.01	.02
R^2	*.01*	*.02*	*.01*	*.02*
	Quit teaching	Quit the school	Job satisfaction	Occupational self-concept
Gender	.08	.06	.02	-.02
Family income	-.08	-.10*	.02	.05
Education	-.03	-.01	-.01	<-.01
Leadership	.01	-.03	.26*	.38*
Goal Orientation	-.04	<.01	.16*	.02
Application	-.28*	-.21*	.19*	.45*
Variety/Innovation	-.02	.07	.20*	.06
Abstract Thinking	.18*	.12	-.08	-.11*
Interpersonal	-.13	-.15	.02	.03
R^2 change	*.09**	*.06**	*.45**	*.61**
R^2	*.10*	*.08*	*.45*	*.63*

Note. Table presents the standardized coefficients (β).
*$p < .001$.

Attention Seeking (4.12), Routine (4.29), Abstract Thinking (4.62) and the Quantitative/Logical and Leadership scales (both 4.72). The most highly endorsed higher-order factors were Application (5.27) and Interpersonal (5.21), with the other four higher-order factors having scores between 4.79 and 4.88. Essentially, there were no 'stand-out' professional occupational attributes with most being moderately endorsed. It is instructive, however, that the most highly endorsed of the 23 separate scales were tenacity and autonomy which speaks to the challenging nature of the profession, as well as the desire for teachers to experience appropriate levels of autonomy as they perform their professional duties. It is also instructive that socially oriented professional attributes such as consultation and group sociability appear to be more salient than what might be considered more 'individual' attributes such as routine and abstract thinking. These two general points were supported by the finding that the most endorsed higher-order factors were application and interpersonal. We may draw from this a tentative conclusion that a teaching context that provides an opportunity for both social connections and autonomy is most conducive for the teaching profession.

In answer to research question 3, the EdMAP scales, reflecting teacher' occupational attributes, were positively associated with teachers' psychological wellbeing (as defined by Dagenais-Desmarais & Savoie, 2012), job satisfaction (in line with the studies of Chen, 2007; Skaalvik & Skaalvik, 2011) and occupational self-concept (similar to e.g., Bogler & Somech, 2004; Chan et al., 2008; Klassen & Chiu, 2011). All results were in line with our general expectations that the EdMAP factors should positively predict job satisfaction and negatively predict quitting intentions, with the exception of Abstract Thinking. The main findings for each EdMAP scale are discussed below, including a discussion on the unexpected results for the Abstract Thinking scale, followed by some summarizing remarks.

Teachers with high scores on the Leadership scale showed feelings of competency in their profession, felt recognized at work, and showed high levels of occupational self-concept and job satisfaction. In other words, strong (self-perceived) leaders who are critical evaluators, who are decisive and persuasive, who feel responsible, and are in control of their emotions generally showed higher levels of psychological wellbeing. Similar results apply to those who believe they are good at planning and organizing, pay attention to details, have a high work ethos and show persistence to complete their task. More precisely, teachers with high scores on the Application scale also showed found their work exciting want to take initiative in their work, in addition to higher levels of feelings of competency and recognition at work. These findings strongly support the idea that a satisfied teacher metaphorically speaking is a jack-of-all-trades, showing both leadership skills and application to their work (see also Chan, 2006 on the importance of personal accomplishment).

Similar findings were found for the Goal Orientation and Variety/Innovation scales. Goal-oriented teachers seek to attain their personal and career goals, desire external recognition and tangible rewards, and like to be in the center of attention. They are ambitious and like to be seen. These teachers also felt recognized at work. Regarding the Variety/Innovation scale, the positive associations with teachers' psychological wellbeing indicated that teachers who felt autonomous (see also Guarino et al., 2006), who liked routine work yet also desired variety and innovations in the tasks they performed showed higher levels of psychological wellbeing, in addition to higher levels of thriving and a desire for involvement at work.

In a complementary manner, teachers with high scores on the Interpersonal scale showed higher levels of interpersonal fit at work (e.g., value the people they work with) and felt competent and recognized at work. These findings exemplify that teaching is a social profession in which social connections and collegial support among teachers may be essential for teachers' psychological wellbeing (see also Guarino et al., 2006; Van Horn et al., 2004). Either informally or more formally organized (e.g., in professional learning communities; e.g., Fresko & Alhija, 2015; Pang, Wang, & Zoe, 2016; Tam, 2015), teachers seem to desire and benefit from interpersonal relationships with their colleagues. In a similar vein, Heikonen et al. (2016) found that perceived inadequacy in teacher-student interactions was associated with turnover intentions among Finnish teachers. To what extent this also holds for Hong Kong teachers is unclear. Nevertheless, these studies stress the importance of social connections among teachers as well as positive teacher-student relationships for teachers in order to stay in the teaching profession.

The Abstract Thinking scale is the only one that showed somewhat different results. More precisely, teachers with low scores on this scale felt more competent and had higher occupational self-concept and weaker desire to quit from the teaching profession.

This seems to suggest that Abstract Thinking may not be such a valuable attribute for teaching. We will get back to this interpretation further on in the discussion. Abstract thinkers can be seen as having a more theoretical approach to things in life. A plausible explanation for our findings is that – due to the increasing popularity of student-centered approaches to learning (Slavich & Zimbardo, 2012) – the abstract thinkers in our teacher sample felt less confident in assuming their changing role-related responsibilities.

Finally, the EdMAP scales explained up to 10% of the variance in teachers' quitting intentions, supporting the results from previous studies (e.g., Klassen & Chiu, 2011). Although having the intention to quit is not the same as actually quitting, these results are alarming. In Hong Kong, job dissatisfaction and poor psychological wellbeing may not lead to actually dropping out from the teaching profession. This is a serious issue because if dissatisfied teachers remain in the profession there will be consequences for the teachers personally, their students and the system as a whole. The key predictor was teachers' score on the Application scale, suggesting that application may act as a protective factor in reducing job attrition among new teachers (e.g., Ingersoll, 2001; Weiss, 1999) exposed to the Chinese teaching profession in Hong Kong. This finding suggests that teachers with (self-perceived) good planning and organization skills, attention to detail, high work ethos and persistence to complete their task are less likely to quit, presumably because they feel 'in control'.

All in all, all higher-order factors, with the exception of Abstract Thinking, were positively related to positive outcomes (such as psychological well-being), and negatively related to negative outcomes (such as intentions to quit the teaching profession). Abstract Thinking provides an example of what may appear to be a counterintuitive finding with positive relations with intention to quit and negative relations with occupational self-concept. Conversely, however, if the results are interpreted such that teachers who are lower in Abstract Thinking are less likely to quit and have higher occupational self-concept, the results seem sensible. Abstract Thinking, with its emphasis on working with theoretical concepts, technical and computational processes, and quantitative approaches to solving problems, may not be perceived as an important part of the teachers' skill set, and, indeed, may be undervalued, particularly in the context of other attributes such as interpersonal skills and leadership skills. Replication of the current study is necessary to examine the consistency of this notable finding across various samples.

4.2. Limitations and suggestions for further study

The study is cross-sectional in nature, including merely correlational results; therefore, the direction of effects needs further investigation in longitudinal studies. Reciprocal effects are likely as well, because teachers' psychological wellbeing, job satisfaction, occupational self-concept, and quitting intentions presumably influence their occupational attributes as well and influence each other over time. Chen, Ployhart, Thomas, Anderson, and Bliese (2011), for example, demonstrated reciprocal longitudinal relations between low job satisfaction and drop-out intentions.

The data were collected within a timeframe of about ten months to fit in with school timetables. This time frame may be considered as a limitation of the study. Teachers' responses on self-report measures may vary to some extent throughout the year, resulting in more positive or more negative responses either at the beginning or at the end of the school year. Since both trends can be expected, we do not expect that this methodological issue has influenced the results to a large extent. However, a longitudinal study investigating the stability/variability of teachers' occupational attributes, wellbeing, job satisfaction, job self-concept, and turnover intentions throughout a school year is necessary to come up with empirical evidence that supports this assumption.

Furthermore, self-report data are commonly used when investigating teachers' occupational attributes (e.g. Renshaw et al., 2015), but self-report data may be biased, stressing the need for triangulation of data collection methods (e.g., interview data in addition to self-report data for cross-validation of the findings). Nevertheless, the anonymous and voluntary nature of the survey would mitigate the likelihood of bias. A more qualitative approach, for example interviewing teachers with drop-out intentions or teachers who have just decided to leave the profession, would contribute to our understanding of the reasons behind these intentions (see e.g., Trent, 2017). One relevant topic to address would be to investigate to what extent changes in approaches to learning in school may be less attractive to abstract thinkers in the teaching profession. The EdMAP scale Abstract Thinking consists of the first-order scales *abstract thinking, technical orientation,* and *quantitative/logical*. The current trend towards more data-driven teaching (see e.g., Schildkamp & Kuiper, 2010) and the integration of technology and computer-supported learning (e.g., Tamin, 2011) in the daily teaching practice presumably could make the teaching profession more appealing for these teachers. An additional suggestion is to explore the role of possible protective factors, such as social support from supervisors, mentors, and colleagues among newly appointed teachers (Hong, 2012; Leung & Lee, 2006; Sass, Seal, & Martin, 2011; Skaalvik & Skaalvik, 2016). As Yildirim (2015) states: "Principals' positive comments make teachers feel successful."

We add the caveat that this research was conducted among a large group of Chinese teachers in Hong Kong, an educational jurisdiction largely controlled as a centralized education system through the Ministry of Education. The presented findings may not necessarily apply to more decentralized education systems nor to non-Chinese teachers.

A further limitation may be the fact that the sample comes from a population which has a relatively low drop-out rate. Because teaching in Hong Kong is controlled by the Ministry of Education, and virtually all graduate teachers are placed in schools with secured positions, good salary, and other benefits, attrition rates might be understated to the extent that many teachers may remain in the profession for pragmatic reasons and other cultural factors, while being dissatisfied, and psychologically unsuited to teaching. All in all, the generalizability of the results to other countries, needs to be further explored among more typical populations of teachers with higher drop-out rates.

4.3. Implications

This paper demonstrated the utility value of the EdMAP for assessing teachers' professional occupational attributes among both primary and secondary school teachers in Hong Kong. The instrument can be used to identify factors that may increase teachers' wellbeing, job satisfaction and occupational self-concept. Using this information, school leaders may be able to proactively identify teachers who are well suited for the teaching profession, or, conversely identify teachers in jeopardy of dropping out from the profession. Teachers' occupational attributes are adaptive, as is shown in previous publications. Firestone (1996), for example, states that increasing teacher collegial interaction and participation in decision making are important to make schools more professional workplaces, but that more is needed to professionalize teaching, for example, improvement of teacher training and upgrading the knowledge of current teachers (see also Choi & Tang, 2009).

Following from the presented results, the dimensions included

in the EdMAP occupational attributes questionnaire can be used to develop suitable interventions for teachers. Generally, all higher-order factors of the EdMAP (except Abstract Thinking) could be part of such an intervention, since all these were positively related to the outcome variables. For example, supporting and further developing teachers' leadership skills, and giving teachers more autonomy, may increase their job satisfaction and self-concept, while supporting teachers' sense of application may prevent them from quitting the teaching profession. Our findings indicate that a wide variety of factors was endorsed by the teachers, exemplifying the need to pay attention to both professional attributes (e.g. organizational and personal competencies) and personal attributes (e.g. devotion, application) in the suggested interventions. In recent literature, several interventions have already been suggested to improve teachers' psychological wellbeing and teacher efficacy, as well as to reduce teachers' quitting intentions. For example, schoolwide interventions such as positive behaviour support programs may improve teacher efficacy (Ross, Romer, & Horner, 2012). Furthermore, stress management interventions may reduce teachers' feelings of burnout and increase their psychological wellbeing (Wu, Li, Wang, Wang, & Li, 2006), although it has to be pointed out that short interventions may not result in significant changes in, for example, feelings of burnout (e.g., emotional exhaustion, see Siu, Cooper, & Phillips, 2014). In future studies, more intensive intervention studies (e.g. Wu et al., 2006) should be developed and tested among a diverse set of teachers with unfavourable occupational attributes, to identify promising ways to reduce teacher attrition. In line with the EdMAP results, those interventions should incorporate activities to stimulate teachers' sense of application, because this was, in our study, the strongest (negative) predictor of teachers' quitting intentions. Following from the subscales included in the higher-order factor Application, this would entail, for example, providing teachers with sufficient opportunities to work on tasks that give them energy, stimulating them to be persistent in their tasks, and improving their organizational and planning skills.

Furthermore, as suggested in the literature, cognitive self-regulation skills such as performance control and self-reflection (Mattern & Bauer, 2014) and various coping strategies (Parker, Martin, Colmar, & Liem, 2012), may prevent emotional exhaustion and help teachers to deal with their daily workload. The ultimate goal of improving teachers' occupational attributes (which can be measured with the EdMAP) is to increase teachers' psychological well-being and job satisfaction and, consequently, prevent good teachers from leaving the profession.

Teachers who identify with the school (sense of school belonging and valuing the activities in the school) show high levels of teacher commitment to the teaching profession (Chan et al., 2008). Chan et al. (2008) also found that teachers who frequently converse with other teachers about teaching (reflective dialogue) showed higher levels of teacher self-efficacy and identification with school, which emphasizes the importance of collegial interaction. It is possible that both pre-service and in-service training courses, as well as the selection and maintenance of teachers in the profession may be well informed by a judicious use of the EdMAP scales.

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Appendix A

The EdMAP items

	EdMAP items
Leadership	
Evaluation	I am not prepared to accept things at face value.
	I like to question the validity of assumption.
	I look for flaws in arguments.
	I review information critically.[a]
	I critically evaluate and interpret data.[a]
Decisiveness	I can readily take decisions.
	I am able to make decisions easily.
	I assess situations quickly and decisively.
	I make up my mind quickly on major issues.
	I like making decisions with high impact.
Persuasive/Assertive	I can convince others with my argument.
	I can argue persuasively for my point of view.
	I am skilful arguing a point of view.
	I can express an argument convincingly.
	I like to make my point of view heard.
Leadership	I can keep a group working together as a team.
	I am seen as an effective leader.
	I am confident directing the activities of others.
	I like to have leadership responsibility.[b]
	I confidently approach leadership tasks.[b]
Emotional Control	I remain calm when emergencies occur.
	I stay calm under pressure.
	I control my emotions in all circumstances.[c]
	I am firmly in control of my emotion.[c]
	I am unflappable regardless of the situation.
Goal Orientation	
Career Orientation/Ambition	I want to achieve career goal.
	I am ambitious about my career.

(*continued on next page*)

(*continued*)

	EdMAP items
	I have a vision for my career.
	I want to keep progressing in my career.
	I have a well-defined set of personal career goals.
Attention Seeking	I need to be noticed.
	I enjoy being the center of attention.
	I like to be the center of attention.
	I adopt a high profile.
	I attract the attention of others.
Recognition and Rewards	I seek reward for work well done.
	I desire recognition for my work.[d]
	I expect praise for doing a good job.
	I seek recognition from superiors in works or actions.
	I desire recognition and reward.[d]
Application	
Planning and Organizing	I like to plan and work with schedules.
	I use a structured approach to tasks.
	I am forward looking and anticipate problems.
	I like to be prepared ahead of time.
	I have a planned approach to activities.
Attention to Detail	I prefer to work with considerable attention to detail.
	I like tasks that require careful detailed attention.
	I pay attention to detail in my work.
	I enjoy detailed work.
	I show a high concern for details.
Application/Energy	I can handle a lot of work.
	I am hard working.
	I place high value on hard work.
	I sustain effort over a long period of time.
	I put in long hours when required.
Tenacity	I finish what I start.
	I persist in completing a task.
	Once I take on a job I stick with it.
	I keep working at a task until it is finished.
	I never leave a job incomplete.
Variety/Innovation	
Variety/Task Flexibility	I enjoy the chance to do different things.
	Prefers to do many different things.
	I prefer work responsibilities to change frequently.
	I like to work on new tasks and projects.
	I am happier with frequent changes of activity.
Innovation	*I think creatively and imaginatively.*
	I like opportunities to be creative.
	I work best in creative situation.
	I like to use creative and innovative responses.
	I like to create new ideas, programs, etc.
Routine	I like repetitive work.[e]
	I am comfortable with routine work.
	I see routine work as important.
	I like working with detailed clerical procedures.[e]
	I find routine work interesting.
Autonomy	I like to have freedom to act in my own area.[f]
	I need freedom to do my own thing.[f,g]
	I need freedom to choose my own method of working.[g]
	I like to make my own rules.
	I am comfortable "doing my own thing".
Abstract Thinking	
Abstract Thinking	I prefer working with complex theoretical questions.[h]
	I have a theoretical orientation to problem solving.
	I enjoy taking conceptual or theoretical approaches.
	I like operating from a theoretical base.
	I prefer to work with complex theoretical questions.[h]
Technical Orientation	I enjoy mastering new equipment and techniques.
	I enjoy using equipment and technical procedures.
	I like to learn new technology and approaches.
	I stay abreast of technical changes.
	I am comfortable working with scientific information.
Quantitative/Logical	I take a numerical approach to solving problems.
	I use facts and figures in problem solving.
	I take a quantitative approach.[i]
	I am comfortable with statistical reasoning
	I define problems quantitatively.[i]

(*continued*)

	EdMAP items
Interpersonal	
Behavioral Flexibility	I cope with frequent changes to situations.
	I adapt my behaviour to suit the situation.
	I can change my approach to achieve a goal.
	I change my behaviour as circumstances demand.
	I readily adapt my personal approach to the situation.
Consultation/Group Influence	I support and encourage the contribution of others.
	I like to consult and reach consensus.
	I like to resolve issues by consensus.[j]
	I seek consensus on group decisions.[j]
	I consider different views in reaching consensus.
People Orientation	I analyze people's behaviour.
	I am interested in understanding people's behaviour.
	I analyze body language.
	I seek out motives behind people's behaviour.[k]
	I look for reasons for people's behaviour.[k]
Group Sociability	I make friends easily.
	I like to develop close friendships.
	I am a highly sociable, gregarious person.
	I enjoy my social networks.
	I establish personal friendships and social relationships.

Note. The uniquenesses of items marked with the same subscript were allowed to correlate in the measurement models. Items in italics have been deleted as part of this study.

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