The Influence of Personal Skills Development and Coping Self-Efficacy on the Affective Occupational Commitment of Women in STEM Fields

Abstract

Purpose: Despite continuing under-representation of women in STEM fields, the literature still falls short on identifying and explaining the factors that could contribute to women's persistence and commitment. The purpose of this research is to identify cognitive and behavioural factors that will support the occupational commitment of women in STEM.

Design: Quantitative analysis is based on a questionnaire survey of 375 women working in STEM in the Middle East region. Multiple regression and bootstrapping methods were employed in the analysis of the data.

Finding: The results support the following hypotheses: Personal skills development has a positive impact on affective occupational commitment and coping self-efficacy; and, coping self-efficacy mediates the relationship between personal skills development and affective occupational commitment.

Originality: This study adds insights on the dynamic approaches adopted by women in STEM fields to overcome occupational career challenges by testing several internal drivers, coping self-efficacy and personal learning.

KEYWORDS: Coping self-efficacy, affective occupational commitment, personal learning, Social Cognitive Career Theory, women in STEM.

Introduction

Recent statistics in the US show that 74% of science, technology, engineering and mathematics (STEM) employees are males while 26% are females (Martinez and Christnacht, 2021; Munoz-Boudet, 2017;). An UNESCO report (2019) showed similar levels of representation where women constitute less than 35% of the student body in majors within engineering, manufacturing and construction in many Midde East countries. The shortage of maths and science professionals threatens attempts to respond to the vast technical and scientific challenges taking place across the world. Foreclosed and limited STEM educational and occupational opportunities for any specific group of individuals results in a waste of talent and potential limitations to scientific discoveries and innovation (Neilsen, Bloch, and Schiebinger, 2018). Consequently, policies and initiatives have been implemented in various countries to increase the recruitment of qualified individuals in STEM majors and jobs. Developing a larger and more diversified talent pool of women working in STEM industries is likely to improve their economic prospects since STEM jobs pay women more compared to many occupations in other sectors (Munoz-Boudet, 2017).

This research aims to investigate and test the psychological and social factors affecting women's commitment to remain in STEM fields. Previous research has concentrated on increasing the number of women who choose to study STEM majors at various educational levels (Kemp and Zhao, 2016; Wang et al., 2020). Statistics from different countries indicate an increase in the percentage of females graduating with STEM majors which has led some scholars to conclude that recent interventions in the education system have been successful in attracting females to study these subjects and consequently helping them to graduate. However, graduate females are not persisting with their careers in these fields (Hoffman and Friedman, 2018) According to the literature, females and ethnic and racial minoritized groups are drastically underrepresented in

STEM, especially in technical areas such as computer science and biomedical research (Neilsen *et al*., 2018).

Researchers have identified several factors that may be leading to the 'leaky pipeline' of women in STEM fields, such as the existence of an unfriendly environment, which includes condescension, poor accommodation for family obligations, and sexual harassment (Charlesworth and Banaji, 2019; Duguet *et al.*, 2018; Miner, January, Dray and Carter-Sowell, 2018). Dos Santos, Albahari, Díaz, and Cesar De Freitas (2020) conducted a research study on 2,922 Spanish students, both girls and boys who attended a STEM workshop. They stress the need for systemic changes that would motivate increased female participation in STEM careers by tackling gender discrimination and moving towards better gender equality in society. In their recent systematic review, Makarem and Wang (2019) indicate that women's career experiences in STEM is largely impacted by personal characteristics such as self-efficacy. Women also tend to be influenced by contextual factors such as organizational practices and/or social networks. Makarem and Wang (2019) call for broadening the research focus in order to comprehend more clearly the changing dynamics and complexity of the career landscape for STEM women by including theories of career development that link careers to environmental factors (e.g., social context, systems, agency, and power). While several countries have successfully implemented many initiatives to reduce gender inequality in STEM fields, progress towards gender parity is still slow (Casad, Franks, Garasky, Kittleman, Roesler, Hall, and Petzel, 2021; Miner *et al*., 2018). Therefore, several gaps still endure in the literature. First, it remains unclear to what extent learning experiences can affect self-efficacy and ultimately women's career decisions regarding, for example, commitment to their STEM occupations (Brown and Lent, 2019). Second, the literature on women in STEM from the lens of the Career Self-Management Model (CSMM) has so far been linked to only a few

developmental tasks (Brown and Lent, 2019). With technological developments drastically affecting the labor market, employees, and particularly people from under-represented groups need to constantly upskill their work profiles (World Economic Forum, 2017). Women also need to be ready to cope with unprecedented and dynamic career environments that demand effective self-management in order to be gainfully employed and remain committed to their occupations (Hirschi, 2018; Hirschi and Koen, 2021). Finally, research on women in STEM is less common in the Middle East region than it is in Western countries and therefore requires urgent attention (Patterson, Varadarajan, and Salim, 2020). Thus, we will argue that understanding several major antecedents of occupational commitment might offer additional guidance for executives and human resource managers on appropriate organizational practices and career development programs for retaining more women in STEM organizations and industries.

The following study will explore cognitive and behavioural factors that support the occupational commitment of women in STEM. The first section reviews the literature on women in STEM and presents the hypotheses and theoretical framework for personal skills development, coping self-efficacy and affective occupational commitment. Then, we present the methodology, results and discussion on the roles of personal skills development and coping self-efficacy on affective occupational commitment. Finally, several limitations are noted and recommendations given for future research and practice.

Middle East (ME) Context

The Arab Human Development Report (2002) emphasizes the importance of empowering Arab women and recognizing their rights to equal political, economic, social and educational participation (Metcalfe, 2006; 2008). Despite the fact that the Middle East and North Africa (MENA) region has been successful in closing the gender gap in many higher and vocational

education majors, the workplace participation of women has not yet witnessed much progress where female work participation makes up 40% of the workforce (World Economic Forum, 2017; Afiouni, Karam and Makarem, 2020). The situation is not very different for women working in STEM fields. STEM occupations are on the rise due to the high demand on technology and innovation in sectors such as oil and gas, healthcare, information technology, waste management, and fast-moving consumer goods (FMCG). The region is also becoming more open towards attaining gender diversity. However, the under-representation of women in STEM occupations in the region is still problematic (Islam, 2019). Several explanations have been advanced. Some scholars argue that women's under-representation in the workplace may be due to the dominance of patriarchy, family centrality, biased employment systems that favor men and nepotism or what is referred to in the region as wasta (Afiouni and Karam, 2014, 2019; Metcalfe, 2008; Tlaiss and Kauser, 2011). Other researchers have discussed factors such as the political unrest and economic instability that the region is witnessing (Karam and Jamali, 2017), corrupt systems (Tlaiss and Kauser, 2011), and legalized gender discrimination (Afiouni, 2014).

The advancement of science and technology is considered central to advancing the knowledge-based economy for many countries worldwide. However, limited resources are being employed to promote this policy in various countries. Middle Eastern (ME) countries, for instance, face an array of challenges that are unmatched elsewhere and include political, economic, social, , and security issues (Al-Waqfi and Al-Faki, 2015). The impact of falling oil and gas prices for several of these countries has made it harder to manage their economies and make major investments in science and technology infrastructure and development (Greenbaum and Hajjar, 2017). In many ME countries, political turmoil, civil unrest and wars are all too frequent, unemployment is consistently high and the development of science and technology expertise is relatively low in priority for many

government officials. With only a few exceptions, most ME countries are falling behind in science and technology with only one percent of their spending being allocated to research and development (World Bank, 2016). One proposed solution is for ME countries to grow their scientific, academic and industrial communities by attending more assiduously to a severely under-represented proportion of the workforce, namely women.

Literature Review

Theoretical Framework

The theoretical framework for this research is the Career Self-Management Model (CSMM) which is a continuation of social cognitive career theory (SCCT). SCCT explains the influence of background, contextual support and cognitive variables on decision making, goals, interests and persistence in understanding a person's career development (Lent, Brown, and Hackett, 2000). It has been successfully utilized by researchers studying women's under-representation in STEM fields (Cadaret, Hartung, Subich, and Weigold , 2017). For example, SCCT has been used to study the impact of contextual variables on the career advancement of women employed in STEM (Byars-Winston and Fouad, 2008; Lent *et al*., 2000). The CSMM differs from the initial SCCT in that it focuses on the process rather than the content aspects of career development (Brown and Lent, 2019).

SCCT and CSMM as its extension both rely on ideas of human agency that assume individuals have certain capacities for self-controlled, planned, and intentional actions which enable an individual to plan, pursue or adjust her career accordingly (Bandura, 2006; Lent, 2013). The SCCT can be viewed as having two complementary levels of theoretical analysis. The first level pertains

to cognitive-person variables such as self-efficacy which makes it possible for a person to maintain control over her own career decisions. The second level of analysis refers to contextual and environmental variables (e.g. gender and race) influencing career-related choices and behaviors (Lent *et al.*, 2000). Since CSMM is an extension of SCCT, it tends to rest on the same theoretical assumptions but is contextualized somewhat differently. Self-efficacy is believed to influence career-related decisions and behaviors in two ways. It acts as a direct influence since it plays a role in aiding a person to persist in the face of challenges or indirectly through the mediating effects of goals and actions. Similar to the SCCT, CSMM assumes that contextual supports may strengthen self-efficacy (Lent and Brown, 2013). The CSMM explains that actions such as commitment are related to three main social cognitive variables, namely self-efficacy, outcome expectations and goals. In addition, the model advocates that learning experiences tend to have an indirect effect on outcomes. Learning is also expected to explain a large proportion of variance related to individual differences in self-efficacy. Brown and Lent (2019) explain that additional research should focus on investigating how learning experiences affect self-efficacy since the latter might serve as a useful intervention target in promoting career decision-making, and therefore this conceptual issue is the focus of this study.

Affective Occupational Commitment (AOC)

Despite many attempts to employ more women in STEM-related courses or careers, the leaky pipeline persists. Globally, women make up 33% of Science, Engineering and Technology (SET) undergraduates but less than 20% of the SET workforce. Other studies have discussed similar levels of under-representation in various parts of the world including the Middle East (Hill, Cobert, and St. Rose, 2010; Hunt, 2016; UNESCO, 2019; World Bank 2019).

Occupational commitment (OCC) is considered crucial to occupational survival in an era where commitment to an organization is becoming more flexible and less secure in terms of length of tenure in the organization as well as overall employability in STEM industries (Di Fabio and Palazzeschi, 2012). OCC is defined as a psychological state where an individual is attached to a particular occupation (Meyer, Allen, and Smith, 1993). The literature cites several individual, organizational and professional factors that affect occupational commitment (Meyer and Espinoza, 2016). For instance, on-going organizational opportunities for individual development directly enhances levels of occupational commitment. Organizational opportunity for development is composed of two main variables, organizational support and work challenge. It enables the individual to obtain more skills and competencies which are directly relevant to her work roles and career (Aryee and Tan, 1992; Hall, 1996). This study follows the definition of Meyer *et al.* (1993), which considers affective occupational commitment (AOC) as a psychological state that bonds an individual to her occupation on the basis of emotional ties.

The majority of current research focuses on increasing women's choice of STEM majors (American Association of University Women [AAUW], 2010; Corbett and Hill, 2015). However, the main challenge that organizations face is the higher rate of women than men exiting these occupations (Glass, Sassler, Levitte, and Michelmore , 2013; Allen, Burgess, and Mayo, 2018). Therefore, more research on the drivers of women's occupational commitment in STEM is a vital consideration (Singh, Zhang, Wan, *et al.* 2018).

Personal Skills Development (PSD)

Personal learning pertains to acquiring knowledge, proficiency and skills that contribute to an individual's career development (Kram and Hall, 1996). It includes personal skills development and rational job learning. Personal skills development (PSD), which is the focus of this study,

relates to interpersonal skills, such as having good communication, problem-solving and socialisation skills (Hall, 1996; Kram and Hall, 1996; Lankau and Scandura, 2002). Scholars have indicated that learning based in the workplace is becoming increasingly important because of the added job-specific knowledge and skillsets it develops in employees (Khandakar and Pangil, 2017).

In recent years, the focus on OCC has increased due to various economic and career reasons, such as globalisation and decreased employment security (Lee, Carswell, and Allen, 2000). Researchers explain that OCC is a significant antecedent of occupational turnover (Meyer *et al.*, 1993). STEM industries and workplaces are characterised as fast-moving, rapidly changing, and engaging advanced technologies and new work practices. Individuals working in these industries are expected to continuously update their skills and knowledge and be able to adapt to frequent innovations. Consequently, routinisation that leads to limited exposure to new learning opportunities or lack of learning opportunities is likely to negatively impact on employees' job satisfaction and ultimately strengthen their intention to quit the organization or sector (Blau, 2007; Dirani, 2009). On the other hand, individuals benefitting from learning and development tend to remain well motivated and experience favorable outcomes, such as enhanced work satisfaction and commitment (Dekoulou and Rivellas, 2015).

Lankau and Scandura (2002) explain that personal learning causes changes in individual behaviour and is an important pre-requisite for effective performance. Employees who are able to enhance their communication and problem-solving skills will tend to feel more competent in their work (Lankau and Scandura, 2002). Therefore, when an individual is exposed to positive learning opportunities, she is likely to become more knowledgeable and constructive about her occupation. Employees in STEM who successfully avail themselves of opportunities in training, learning and

development play an important role in driving innovation and competing in the global economy (Waite and McDonald, 2019). Realisation of available learning opportunities can enhance women's attitudes towards their occupations since they feel more equipped with relevant working knowledge and skills and hence are capable of committing more fully to their occupations. Therefore, the following hypothesis is formulated:

H1: Personal skills development positively enhances affective occupational commitment.

Coping Self-Efficacy (CSE)

Self-efficacy beliefs are developmental cognitive perceptions formulated through individual interpretation of circumstances related to specific task experiences and outcomes. Coping self-efficacy (CSE) refers to an individual's ability to manage contextual demands that may impede performance in certain situations (Cadaret *et al.*, 2017). CSE has four main sources: mastery experience, vicarious experience, social persuasion, and physiological reaction (Bandura, 1997; Pajares, 2005). Mastery experiences are deemed to have the strongest influence on self-efficacy where they provide the most accurate sign of whether an individual is able to successfully achieve a task or not. An individual's sense of self-mastery is based on an interpretation of previous task experiences and performance outcomes. Mastery depends on opportunities to learn and practice the strategies required to perform a task efficiently and effectively. Successful performances and actions help to build a stronger sense of self-efficacy, while unsuccessful ones will tend to weaken it (Rittmayer and Beier, 2009; Yoon, Han, Sung, and Cho, 2018).

Vicarious learning also assists in developing and increasing an individual's sense of CSE through experiences of relevant social models (Bandura, 1997). Being exposed to other similar individuals who can achieve success when facing an adverse environment heightens the observer's self-belief

that she too can succeed. Research indicates that vicarious learning plays a powerful role in women's sense of self-efficacy in STEM task performances (Garaika, Margahana, and Negara, 2019; Zeldin and Pajares, 2000). Therefore we propose the following hypothesis:

H2: Personal skills development positively enhances coping self-efficacy.

Since self-efficacy (SE) relates to judgements about an individual's ability to execute a particular task or set of tasks, it is considered to be a significant aspect in career development. The SE concept has been rigorously analyzed in relation to women's under-representation in STEM fields. Betz and Hackett (1981) argued over 40 years ago that the under-representation of women in STEM industries is due to women's beliefs that they cannot succeed in these domains. Similarly, Byars-Winston and Fouad (2008) explained that women consider it harder to join STEM occupations due to their lower levels of SE. SE has also been found to influence career development and commitment among women in STEM occupations and majors (Blaique *et al.*, 2022; Blaique and Pinnington, 2021; Inda, Rodríguez, and Peña, 2013). Therefore, investigating the impact of this cognitive variable on the AOC of women in STEM industries could offer useful insights into their under-representation.

Research indicates that women working in STEM domains face many barriers which require a strong coping attitude, such as isolation and lack of networks (Casad *et al.*, 2021)), work-related stress and burnout (Hall, Schmader, and Croft, 2015), an unfriendly work atmosphere (Fouad et al. 2016), lack of role models (Porter and Serra, 2020), lack of support from their social networks and family (Young, 2020), and lack of support from their university professors and colleagues (Zeldin and Parajes, 2000).

According to Bandura (1997), individuals with high CSE perceive social realities as challenges,

while those with low CSE perceive those same realities as threats. Lent *et al.* (2000) explain that a person's view of the same reality can be seen differently either as an enormous obstacle or as a small barrier or as either a challenge or an opportunity for building character. Research points to the positive influence of SE on career decisions and persistence (Inda *et al*., 2013; Lee, Flores, Navarro, and Kanagui-Muñoz, 2015). Therefore, the following hypothesis is formulated:

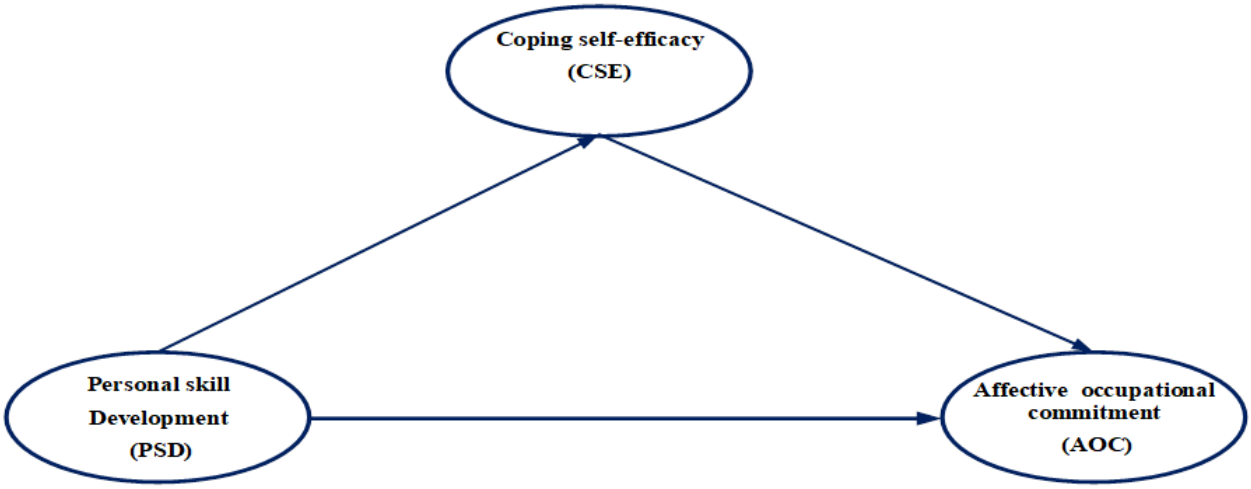
H3: Coping self-efficacy positively affects affective occupational commitment.

The Mediating Role of CSE

As discussed earlier, Bandura (1997) explains that self-efficacy is informed through four main sources: mastery experiences, vicarious learning, social persuasion, and psychological indexes. Being exposed to successful learning experiences strengthens an individual's coping self-efficacy through these sources. To reiterate, mastery experience has the strongest effect on CSE since it offers the most accurate indication of whether an individual is able to successfully achieve the task at issue. When individuals with strong self-efficacy are faced with hardships, they commit to resolving problems that relate to these hardships, whereas those with low self-efficacy tend to avoid dealing with such hardships (Bandura, 1997). One main reason why women in STEM are capable of commiting to their occupations is due to their strong SE (Peng and Chang, 2010). Therefore we propose the following hypothesis:

H4: Coping self-efficacy mediates the relationship between personal skill development and affective occupational commitment.

Figure 1 : Conceptual Framework



Methodology

Sample Selection and Data Collection

A survey was administered for data collection. The survey consisted of two parts. The first part collected demographic data on the respondents. The second part contained our measures of AOC, CSE and PSD.

The survey targeted females who have been working in STEM industries for more than two years. Several universities were contacted for approval to administer the survey among their female alumni in the UAE and Lebanon. The survey was also shared on several professional platforms dedicated to empowering women in STEM. The sample size was 375. Table I presents the demographic characteristics of the respondents to the survey.

The majority of the respondents were from the engineering field (n=230, 61.33%), a further 29%

worked in technology, 8.53% worked in the sciences and 1.07% were from the field of mathematics. At a professional level, most of the respondents were coordinators (n=148, 39.47%), 23.2% occupied the post of manager and 4.53% were directors. All of the survey returns were from female employees (n=375, 100%); also, the majority of the females reported being single (n= 260, 69.33%) whereas 27.7% were married.

INSERT TABLE I ABOUT HERE

Measures

The six items for AOC were measured using the occupational commitment survey scale developed by Meyer, Smith and Allen (1993). Their OCC scale measures three occupational commitment dimensions normative, affective, and continuance, containing 18 items, using six items for measuring each dimension on a 7-point Likert scale with 1 being "strongly disagree" and 7 "strongly agree". The OCC scale has been widely applied to investigate commitment across various occupations such as teaching, nursing, and STEM (Klassen and Chui, 2011; Meyer *et al*., 1993; Riegle-Crumb, Peng, and Russo-Tait, 2020).

CSE was measured using the scale developed by Chesney et al. (2006). It contains 26 items on a ten-point Likert scale (0=Cannot do at all, 10= Certain can do). The instrument aims to measure one's confidence in coping efficiently with a stressor rather than coping styles. The scale is adopted from the Lazarus stress and coping theory and also draws from the ways of coping questionnaire (Folkman and Lazarus, 1988). Three coping domains were identified through exploratory and confirmatory factor analysis: "stopping unpleasant thoughts or feelings" with a Cronbach's alpha

value of 0.91, “problem focused coping” with a Cronbach’s alpha of 0.91, and “getting support from friends and family” with a Cronbach’s alpha of 0.8. These three subscales can be used separately to measure self-efficacy since each is a distinctive domain of coping or can be combined into one construct.

Personal skill development was measured using six items from the personal learning scale developed by Lankau and Scandura (2002). In addition to the new measures, Lankau and Scandura (2002) incorporated the measure of organizational socialisation from Chao, O'Leary-Kell, Wolf, Klein, and Gardner (1994) and a dispositional measure of learning goal orientation (Button, Mathieu, and Zajac, 1996). The results of the pilot studies, exploratory factor analyses (EFA) and content adequacy indicated construct validity evidence of two dimensions of personal learning. The results of the EFA (N=375 indicated that the two-factor model ((GFI = .89, RMSR = .05, NNFI = .88, CFI = .90) had a better fit than the one-factor model (GFI = .72, RMSR = .10, NNFI = .70, CFI = .75). The Chi-square difference test also showed better significance for the two-factor model (Lankau and Scandura, 2002; Pan, Sun, and Chow, 2011).

Results

Descriptive Statistics

The means, standard deviations (SD), Cronbach’s alpha, the correlation between the variables, and skewness and kurtosis are reported in Table II. Cronbach’s alpha indicates satisfactory internal consistencies (PSD= 0.849 , CSE= 0.925, AOC=0.732) for the three construct scales. The highest correlation is CSE with PSD (r = 0.410), which is significant at 1%, followed by CSE with AOC (r = 0.276), which is significant at 1%. Furthermore, PSD is correlated significantly at 1% with

AOC (r = 0.216).

INSERT TABLE II ABOUT HERE

Assessment of Common Method Bias

To ensure reliable results, the Cronbach's alpha test was administered revealing results above 0.7 for all constructs. In addition an analysis of common method bias (CMB) was adminstered (Malhotra, N., Schaller, T. and Patil, 2017). The results indicated CMB =28.441% of variation which is substantially below the 50% cutoff. We also used confirmatory factor analysis (CFA) technique by loading all items into one factor (Malhotra, Kim, and Patil, 2006). The results indicated that the one factor model (merged all indicators of PSD, CSE and AOC) is X^2 = 3829.313, df= 665, CFI= 0.549, TLI= 0.523, SRMR=0.102, RMSEA= 0.113, which has unacceptable goodness of fit. Therefore, we assert that CMV is not a problem in the presented sample.

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) obtained the following results: X^2 [551] = 1011.404, p < 0.001, CFI=0.928; TLI=0.918; SRMR=0.056; RMSEA=0.047. In more detail, the Comparative Fit Index (CFI) = .928 which is greater than .90 indicates a good model fit (Cheung and Rensvold, 2002). The Tucker-Lewis index (TLI) =.918 is below the acceptable cutoff of .95 (Hu and Bentler, 1999). The standardized root mean square (SRMR) in the study is 0.056. Hu and Bentler (1999) proposed a cutoff result of SRMR close to 0.08. The root mean square error of approximation (RMSEA) = 0.047 is less than 0.08, thus it is accepted and considered reasonable error accordingly. Therefore, all of our indicators have acceptable levels of fit. The details of these results are

presented in Table III.

INSERT TABLE III ABOUT HERE

Preliminary Analysis

We tested for group differences between our participants, and there are no significant differences between participants for *marital status* (single, married, and others) (F=.845, p=430), and *professional level* (coordinator, director, manager, c-level, and administrative) (F=.506, p=731). However, we found there is a significant difference for the *participant's field* (engineering or technology or science or mathematics) (F=3.938, p=.009). Given the fact that participant's field significantly differs between the four groups, we controlled for this variable in our tests of the hypotheses because the participant's field might affect our model results.

Tests of Hypotheses

To test the direct effect of PSD on AOC and the mediating role of CSE, mediation analyses were conducted in SPSS 23.0 using PROCESS macro extension procedures and models as specified by Hayes (2018). Specifically, data were entered into PROCESS macro-Model 4 with 95% corrected confidence intervals (CI) and 5000 bootstrap iterations. Firstly, the direct relationship between PSD and AOC is positive and significant (B =0.132, t=2.443, $p < 0.05$) which supports H1. Secondly, we find that the relationship between PSD and CSE is positive and significant (B =0.411, t=8.677, $p < 0.001$) which supports H2. Thirdly, the relationship between CSE and AOC is positive and significant (B =0.223, t=4.136, $p < 0.001$) which supports H3. We find, consistent

with H4, that the relationship between PSD and AOC was mediated by CSE (point estimate: 0.092, 95% CI [0.047 to 0.145]), since the zero does not fall between the confidence interval range [.047, .145], we conclude that $p < 0.05$, thus, H4 is supported. In other words, the indirect effect of PSD on AOC via CSE is positive and significant (B = 0.092) at 5%. Furthermore, the direct effect of PSD on AOC reduced from (B=0.132, t=2.443, $p < 0.05$) to (B =0.092, $p < 0.05$) after adding CSE as a mediator. The regression results are shown in Table IV.

INSERT TABLE IV ABOUT HERE

As previously stated, field participants may have an effect in our statistical model; thus, we controlled for it in our test of the hypotheses the findings reveal that participants' field has an influence on our dependent variable (AOC) (B =-0.173, t=-2.447, $p < 0.05$). We also ran two tests as a supplementary analysis in order to understand if such differences in participants' fields serve as moderating factors in affective occupational commitment:

First, we employed PSD as an independent variable and AOC as the dependent variable, and field of participant as a moderator, the regression coefficients results (Hayes, 2018, Model 1) indicates that the relationship between PSD and AOC is insignificant (B =0.210, t=1.795, $p > 0.05$). Further, the interactions between PSD and participant field in the relationship between PSD and AOC were also not significant (B =0.010, t=.125, $p > 0.05$).

Second, we selected CSE as an independent variable and AOC as the dependent variable, and participants' field as a moderator, the regression coefficients results (Hayes, 2018, Model 1) indicates that the relationship between CSE and AOC remains positive and significant (B =0.282,

t=2.431, $p < 0.05$). However, the interactions between CSE and participant field in the relationship between CSE and AOC were negative and not significant (B =-0.004, t=-.051, $p > 0.05$).

Discussion

Main Findings and Interpretations

This study examines the under-representation of women employed in STEM fields. Our research is guided by the CSMM (Brown and Lent, 2019). The study's aim was to try to understand the impact of both PSD and CSE on the AOC of these women (Garaika *et al.* , 2019; Waite and McDonald, 2019).

The findings of this study reveal a positive impact of PSD on both AOC and CSE. The results also show that CSE mediates this relationship between PSD and AOC. Common work environment factors cited in the literature on the IT work environment include unanticipated continuous change in user demands, the challenge of keeping up-to-date with ever-advancing technologies and unrealistic job demands (Shih, Venkatesh, Chen, and Kruse, 2013). These occurrences can also be cited in other STEM domains which make commitment more challenging and highlight the importance of continuous learning, not to forget the under-representation of women or omit the inhospitable climate that some have to deal with. Scholars have long argued the important role that self-efficacy plays in shaping human agency, career development and outcomes. SE can act as a motivating force, which enables individuals to perform certain actions, persist and follow their goals (Brown and Lent, 2019).

The results of the study supported H1 which proposed that PSD positively impacts AOC. This major finding adds to theory by investigating the mechanism underlying the relationship between PSD and AOC. The result is consistent with results obtained in previous studies (Meyer *et al*.,

1993; Ng, Eby, Sorensen, and Feldman, 2005; Son, and Kim, 2019; Wang, Chiang, and Lee, 2014) about the relationship between the two variables. In industries that involve STEM fields, updating one's knowledge is considered a necessary continuous activity for gaining a competitive advantage. The IT profession, for example, is considered to be an occupation where fiercely advancing technologies dictate continuous learning to enable the individual to remain competent in these work fields (Major and Major, 2013). Thus, learning, acquiring new knowledge, and being exposed to new technologies and scientific developments are major issues for women working in STEM fields.

The results also supported H2 which proposed that PSD positively enhances CSE. PSD which is a form of personal learning, has been found to cause changes in behaviour (Lankau and Scandura, 2002). Research indicates that PSD adds proficiency in dealing with problems (Gouillart and Kelly, 1995). Women who work in STEM fields must resort to learning and enhancing their skillsets when facing technical challenges during their careers. This helps them to enhance their work performance, feel competent and overall be more confident. This result is consistent with Bandura's (1997) self-efficacy theory where he explains that self-efficacy is informed through four primary sources: mastery experiences, vicarious learning, social persuasion and psychological indexes. This result also reaffirms previous research on the positive impact of learning on self-efficacy (Gaudine and Saks, 2004; Gist, Stevens, and Bavett, 1991; Morin and Latham, 2000).

The results of our study supported H3 which proposed that CSE positively enhances AOC. This result is consistent with results that were achieved in previous studies on the positive impact of self-efficacy in strengthening occupational commitment (Ahmed, 2019; Syed, Zurbriggen, Chemers, Goza, Bearman, Crosby, Shaw, Hunter and Morgan, 2019). As discussed earlier through the resources of CSE, it can act as a motivating force for women who work in STEM fields to

further strengthen their occupational commitment. Women with strong CSE are expected to deal with stressful situations more efficiently. Thus, CSE contributes to their persistence when facing adverse circumstances so that, in turn, they remain strongly committed to their occupation.

The results of the study also supported H4 which proposed that CSE mediates the relationship between PSD and AOC. Drawing on the CSMM, we contribute towards the literature on occupation commitment by investigating the potential mediating role of CSE in the relationship between PSD and AOC. Based on CSMM, learning experiences on which self-efficacy are based can be effectively utilized in intervention strategies that enhance career-related decision making (Brown and Lent, 2019; Bandura, 1997). The results of the study show that availability and provision of learning opportunities for women advances their skills and enhances their CSE which encourages them to persist with their STEM occupations.

The analysis results indicate there are no group differences between participants based on neither marital status (single, married, and others) (F=.845, p=430) nor *professional level* (coordinator, director, manager, c-level, and administrative) (F=.506, p=731). However, we found that the difference is significant for *participant's field* (engineering or technology or science or mathematics) (F=3.938, p=.009) and therefore, we controlled for participant's field in our hypotheses testing. The results are presented in Table IV.

Contribution and Practical Implications

While research on women in STEM industries is a much-discussed topic, studies investigating the under-representation of women in occupational settings are still limited compared to those conducted in educational settings. Our study makes several contributions to the literature and theory.

First, we add to understanding of the predictors of occupational commitment of women working

in STEM. The findings of our study provide organizations, HR professionals and executives an opportunity to implement necessary changes within the boundaries of their firms to facilitate more recruitment and retention of women.

Second, our study seeks to extend CSMM by suggesting that learning experiences on which self-efficacy is based offer a useful intervention strategy in efforts to promote occupational commitment. Recent evidence concentrates attention on the significant impact of learning experiences on individuals' self-efficacy (Bandura, 1997; Lent *et al.*, 2013).

On a similar note, we also extend CSMM by testing it with other important developmental tasks, namely occupational commitment and have attempted therefore to broaden the theory's range of applicability; an area that clearly requires more research (Brown and Lent, 2019).

Third, our study contributes to both the social cognitive and occupational commitment literatures by combining the two within a theoretically integrated framework and offering a new perspective on how and why women in STEM fields are able to successfully commit to their occupations. In doing so, we conclude on several significant factors that have implications for women employed in a critical set of industries where to-date they have been noticeably under-represented.

This study also attempts to bridge theory into practice by applying the research findings using CSMM and identifying systematic practical interventions for recruiting and retaining more women in STEM fields. Such theory-into-practice research is recommended as a valuable future research strategy for achieving mutual gains (i.e. for employees and employers), as has recently been argued by Brown and Lent (2019).

Finally, this study offers a worthwhile methodological contribution to these literatures by empirically testing the antecedents of occupational commitment using data from a sample of 375 female engineers, scientists, mathematicians, and technology experts working in two countries in

the Middle East region.

The results of this study highlight the important role that self-efficacy plays in shaping career choices. The study findings further reinforce the idea that career advancement interventions should be used to enhance females' efficacy beliefs about their work interests, values and talents. Furthermore, managers and HR professionals can attempt to enhance the self-efficacies of newly recruited women employees by providing them with positive encouragement and constructive feedback. They can provide them with information and resources to help their learning and decrease uncertainty. Career counsellors could also discuss with women their successful past achievements, which would help them to set clear goals, engage in career exploration and focus on particular task performances that might enhance their career capabilities and accomplishments. HR professionals can support women with respect to performance management systems by facilitating the interpersonal and organizational conditions that foster and support high engagement in order to achieve high levels of individual performance. They could also facilitate vicarious learning by connecting the female employees with role models or inspirational figures in STEM and related work domains. Female employees who are dealing with anxiety that may be related to role ambiguity or role conflict can enrol in anxiety management programmes and learn how to control self-defeating and negative thoughts through relaxation techniques and activities supportive of increasing their CSE. Organizations can facilitate the availability of such programmes, for instance, through employee well-being schemes and employee assistance programs.

The results of this study also draw researchers and practitioners attention to the valuable role that personal learning plays in enhancing the AOC of women working in STEM. Organizations have some capabilities to develop employees' positive attitudes towards their occupations not least by

providing them with readily accessible opportunities to improve their personal learning and development. Our recommendation is for HR managers to develop HRM policies and procedures that promote learning and development activities and programs, that women can benefit from through frequent participation (Blaique, Ismail, and Aldabbas, 2022; Laursen and De Welde, 2019; Pinnington et al., 2022). HR professionals are therefore encouraged to provide women with suitable job resources and recommend training programs that can help women to enhance their personal resources, workplace interactions and career decisions enabling them to share their ideas and to voice their concerns in order to transform and improve the status quo.

STEM industries rely heavily on learning and knowledge updates. Women employed in STEM when compared to men, may not be receiving sufficient learning opportunities to motivate them and increase their self-confidence (Dekoulou and Trivellas, 2015). Wherever there is a lack of learning opportunities it is likely to lead to problems with career advancement and increased job dissatisfaction, which decreases OCC (Mulraney and Turner, 2001). This may indeed be one of the reasons for the leaky pipeline that STEM industries endure. Researchers indicate that providing employees with learning possibilities can increase job satisfaction and ultimately improve their occupational commitment (Eylon and Bamberger, 2000).

In her prominent work, Acker (1990) suggests gender as a social practice is vigorously present in many structural units within organizations. While all of the above proposed organizational interventions can be re-examined for their ability to offer a basis for transformative change away from gendered organizations (Acker, 1990; Benschop, Holgersson, Van den Brink, and Wahl, 2015), additional efforts are required by organizations to try to eradicate gendered subcultures through educating everyone about gendered processes and practices (Bird, 2011; Bustelo, Ferguson, and Forest., 2016; Lombardo and Mergaert, 2016). Organizations should facilitate

discussion and reflection on gendered organizational norms and work practices. All managers and employees are also encouraged to facilitate creation of new narratives and to experiment with new work practices that support progress beyond the problems created by gendered organization cultures (Leenders, Bleijenbergh, and Van den Brink, 2020).

Limitations and Future Research

This research has several limitations. The results of this study indicate a direct positive relationship between CSE and AOC, PSD and AOC and PSD and CSE which support previous research (Aryee and Tan, 1992; Klassen and Chiu, 2011; Park and Junk, 2015). Since this research focuses solely on CSE and PSD as predictors of AOC, further research should investigate other variables that may impact the occupational commitment of women in STEM fields such as work-role salience and family support (Singh *et al.*, 2018). Further studies possibly could also examine normative and continuance commitment in addition to affective commitment.

Since differences between participants' fields (e.g. engineering or technology or science or mathematics) could serve as predictors in both CSE and AOC they might lead to high scores for both variables. Female engineers, for example, may devote themselves to their work, resulting in high scores for CSE and AOC. To reduce the possibility of confounding effects, our study controlled for the participant's field. If more longitudinal designs are employed in future research, it would provide greater knowledge about our study's assumptions and actual differences between STEM fields. The sample in our study is exclusively female participants. Future research could investigate women and men assessing gender differences in the relationships between PSD and CSE on the one side, and between CSE and AOC on the other.

Future research might also focus on qualitative research designs using alternative methods of data collection such as workplace observations and open forum discussions that may offer more in-depth understanding of the lived experiences of women in STEM fields. Moreover, future research could consider conducting longitudinal studies of the career stages of women working in STEM fields.

Conclusion

Drawing from the CSMM, this study contributes to knowledge by seeking to test some aspects that may cause some women to persist in STEM-related fields while many others leave. The impact of CSE and PSD on AOC were tested using multiple regression. The study concludes that the commitment and persistence of women in STEM fields can be enhanced by strengthening their CSE and enhancing their personal learning.

References

Ahmed, N. O. A. (2019), "Career commitment: the role of self-efficacy, career satisfaction and organizational commitment", *World Journal of Entrepreneurship, Management and Sustainable Development*.

Afiouni, F., and Karam, C. M. (2014), "Structure, agency, and notions of career success: A process-oriented, subjectively malleable and localized approach", *Career Development International*, Vol. 19, pp. 548–571.

Afiouni, F. and Karam, C.M. (2019), "The formative role of contextual hardships in women's career calling", *Journal of Vocational Behavior*, Vol. 114 pp. 69-87.

Afiouni, F., Karam, C. M., and Makarem, Y. (2020), "Contextual embeddedness of careers: female "nonsurvivors" and their gendered relational context", *Human Resource Management Journal*, Vol. 30 No. 3, pp. 343-364.

Acker, J. (1990), "Hierarchies, jobs, bodies: a theory of gendered organizations", *Gender and Society*, Vol. 4 No. 2, pp. 139-158.

Allen, R., Burgess, S., and Mayo, J. (2018), "The teacher labour market, teacher turnover and disadvantaged schools: new evidence for England, *Education Economics*, Vol. 26 No. 1, pp. 4-23.

Al-Waqfi, M.A. and Al-faki, I. (2015), "Gender-based differences in employment conditions of local and expatriate workers in the GCC context: Empirical evidence from the United Arab Emirates", *International Journal of Manpower*, Vol. 36 No. 3, pp. 397-415.

American Association of University Women (AAUW), (2010). Why so few? Women in science, technology, engineering, and mathematics, Washington, DC. Retrieved from http://www.aauw.org/research/whysofew.cfm

Aryee, S., and Tan, K. (1992), “Antecedents and outcomes of career commitment”, *Journal of Vocational Behaviour*, Vol. 40 No. 3, pp. 288–305.

Bandura, A. (1997), *Self-efficacy: The exercise of control*, Freeman, New York.

Bandura, A. (2006), “Toward a psychology of human agency”, *Perspectives on Psychological Science*, Vol. 1 No. 2, pp. 164–180.

Baron, R., and Kenny, D. (1986), « The moderator-mediator variable distinction in social psychological research : Conceptual, strategic, and statistical considerations”, *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173–1182.

Benschop, Y., Holgersson, C., Van den Brink, M. and Wahl, A. (2015), “Future challenges for practices of diversity management in organizations”, Handbook for Diversity in Organizations, Oxford University Press, Oxford, pp. 553-574

Betz, N. and Hackett, G. (1981), “The relationship of career-related self-efficacy expectations to perceived career options in college women and men”, *Journal of Counseling Psychology*, Vol. 28 No. 5, pp. 399–410.

Bird, S. R. (2011), “Unsettling universities' incongruous, gendered bureaucratic structures: A case-study approach”, *Gender, Work and Organization*, Vol. 18 No. 2, pp. 202–230.

Blaique, L., Ismail, H. N., and Aldabbas, H. (2022), “Organizational learning, resilience and psychological empowerment as antecedents of work engagement during COVID-19”, *International Journal of Productivity and Performance Management*.

Blaique, L., Pinnington, A. and Aldabbas, H. (2022), "Mentoring and coping self-efficacy as predictors of affective occupational commitment for women in STEM", *Personnel Review*.

Blaique, L., and Pinnington, A. H. (2021), “Occupational commitment of women working in SET: The impact of coping self-efficacy and mentoring”, *Human Resource Management Journal*.

Blau, G. (2007), “Does a corresponding set of variables for explaining voluntary organizational turnover transfer to explaining voluntary occupational turnover?”, *Journal of Vocational Behavior,* Vol. 70 No. 1, pp. 135–48.

Brown, S. D., and Lent, R. W. (2019), “Social cognitive career theory at 25: Progress in studying the domain satisfaction and career self-management models”, *Journal of Career Assessment,* Vol. 27 No. 4, pp. 563-578.

Bustelo, M., Ferguson, L., and Forest, M. (2016). *The politics of feminist knowledge transfer: Gender training and gender expertise*. Basingstoke, UK: Palgrave Macmillan.

Button, S.B., Mathieu, J.E. and Zajac, D.M. (1996), “Goal orientation in organizational research: A conceptual and empirical foundation”, *Organizational Behavior and Human Decision Processes,* Vol. 67 No. 1, pp. 26–48.

Byars-Winston, A. and Fouad, N. (2008), “Math/science social cognitive variables in college students: Contributions of contextual factors in predicting goals”, *Journal of Career Assessment,* Vol. 16 No. 4, pp. 425–440.

Cadaret, M., Hartung, P., Subich, L. and Weigold, I. (2017), “Stereotype threat as a barrier to women entering engineering careers”, *Journal of Vocational Behavior*, Vol. 99 No. 2017, pp. 40–51.

Casad, B. J., Franks, J. E., Garasky, C. E., Kittleman, M. M., Roesler, A. C., Hall, D. Y., and Petzel, Z. W. (2021), “Gender inequality in academia: Problems and solutions for women faculty in STEM”, *Journal of neuroscience research*, Vol. 99 No. 1, pp. 13-23.

Charlesworth, T. E. and Banaji, M. R. (2019), “Gender in science, technology, engineering, and mathematics: Issues, causes, solutions. *Journal of Neuroscience,* Vol. 39 No. 37, pp. 7228-7243.

Chao, G.T., O'Leary-Kelly, A.M., Wolf, S., Klein, H.J. and Gardner, P. (1994), “Organizational

socialization: Its content and consequences.", *Journal of Applied Psychology,* Vol. 79 No. 5, pp. 730–743.

Chesney, M.A., Neilands, T.B., Chambers, D.B., Taylor, J.M. and Folkman, S. (2006), "A validity and reliability study of the coping self-efficacy scale", *British Journal of Health Psychology,* Vol. 11 No. 3, pp. 421–37.

Cheung, G. and Rensvold, R. (2002), "Evaluating goodness-of-fit indexes for testing measurement invariance", *Structural Equation Modeling: A Multidisciplinary Journal,* Vol. 9 No. 2, pp. 233–255.

Corbett, C., and Hill, C.A. (2015). Solving the equation: The variables for women's success in engineering and computing, Washington, DC: AAUW.

Davila Dos Santos, E., Albahari, A., Díaz, S., and De Freitas, E. C. (2021), "Science and Technology as Feminine': raising awareness about and reducing the gender gap in STEM careers", *Journal of Gender Studies,* pp.1-14.

Dekoulou, P. and Trivellas, P. (2015), "Measuring the impact of learning organization on job satisfaction and individual performance in Greek advertising sector", *Social and Behavioral Sciences,* Vol. 175 No. 2015, pp. 367– 375.

Di Fabio, A. and Palazzeschi, L. (2012), "The role of personality traits, core self-evaluation, and emotional intelligence in career decision-making difficulties", *The Journal of Employment Counseling,* Vol. 48 No. 3, pp. 118–129.

Dirani, K.M. (2009), "Measuring the learning organization culture, organizational commitment and job satisfaction in the Lebanese banking sector", *Human Resource Development International,* Vol. 12 No. 2, pp. 189–208.

Duguet, E., du Parquet, L., L'Horty, Y. and Petit, P. (2018), "Counterproductive hiring

discrimination against women: Evidence from a French correspondence test", *International Journal of Manpower*, Vol. 39 No. 1, pp. 37-50.

Eylon, D. and Bamberger, P. (2000), "Empowerment Cognitions and Empowerment Acts: Recognizing the Importance of Gender", *Group and Organization Management*, Vol. 25 No. 4, pp. 354–372.

Folkman, S. and Lazarus, R. S. (1984), *Stress, appraisal, and coping*, New York, Springer.

Fouad, N.A., Singh, R., Cappaert, K. et al. (2016), "Comparison of women engineers who persist in or depart from engineering", *Journal of Vocational Behavior*, Vol. 92 No. February 2016, pp. 79–93.

Garaika, G., Margahana, H. M., and Negara, S. T. (2019), "Self efficacy, self personality and self confidence on entrepreneurial intention: study on young enterprises", *Journal of Entrepreneurship Education*, Vol. *22* No. 1, pp. 1-12.

Gaudine, A. P., and Saks, A. M. (2004), "A longitudinal quasi-experiment on the effects of posttraining transfer interventions", *Human Resource Development Quarterly*, Vol. 15 No. 1, pp. 57-76.

Gist, M. E., Stevens, C. K., and Bavetta, A. G. (1991), "Effects of self-efficacy and post-training intervention on the acquisition and maintenance of complex interpersonal skills", *Personnel Psychology*, Vol. 44 No. 4, pp. 837-861.

Gouillart, F. J., and Kelly, J. N. (1995), *Transforming the organization*, McGraw-Hill Companies.

Glass, J. L., Sassler, S., Levitte, Y., and Michelmore, K. M. (2013), "What's so special about STEM? A comparison of women's retention in STEM and professional occupations", *Social Forces*, Vol. 92, pp. 723–756.

Greenbaum, S., and Hajjar, D. (2017), "Can Science Diplomacy Advance STEM Education Particularly for Women in the Middle East?", American Diplomacy. Retrieved from https://americandiplomacy.web.unc.edu/2017/06/can-science-diplomacy-advance-stem-education-particularly-for-women-in-the-middle-east/

Hall, D.T. (1996), "Long live the career -- A relational approach", Hall, D.T. and Associates (Ed.), *The career is dead -- Long live the career*, Jossey-Bass Publishers ,San Francisco, pp. 1–14.

Hall, W. M., Schmader, T., and Croft, E. (2015), "Engineering exchanges: Daily social identity threat predicts burnout among female engineers", *Social Psychological and Personality Science*, Vol. 6 No. 5, pp. 528-534.

Hayes, A. (2018), *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*, Guilford Press, New York, NY.

Hill, C., Corbett, C. and St. Rose, A. (2010), *Why so few? Women in Science, Technology, Engineering, and Mathematics*, AAUW, Washington, DC.

Hirschi, A. (2018), "The fourth industrial revolution: Issues and implications for career research and practice", *The career development quarterly*, Vol. 66 No. 3, pp. 192-204.

Hirschi, A., and Koen, J. (2021), "Contemporary career orientations and career self-management: A review and integration", *Journal of Vocational Behavior*, Vol. *126*, 103505.

Hoffman, S. F., and Friedman, H. H. (2018), "Machine learning and meaningful careers: increasing the number of women in STEM", *Journal of Research in Gender Studies*, Vol. 8 No. 1, pp. 11-27.

Hu, L. and Bentler, P. (1999), "Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives", *Structural Equation Modeling: A Multidisciplinary*

Journal, Vol. 6 No. 1, pp. 1–55.

Hunt, J. (2016), "Why do women leave science and engineering", *IRL Review,* Vol. 69 No. 1, pp. 199–226.

Inda, M., Rodríguez, C. and Peña, J.V. (2013), "Gender differences in applying social cognitive career theory in engineering students", *Journal of Vocational Behavior,* Vol. 83 No. 3, pp. 346–355.

Islam., S. (2019), "Science, Technology, Engineering and Mathematics (STEM): Liberating Women in the Middle East", *World Journal of Education,* Vol. 9 No. 3, pp. 94–104.

Karam, C. M., and Jamali, D. (2017), "A cross-cultural and feminist perspective on CSR in developing countries: Uncovering latent power dynamics", *Journal of Business Ethics,* Vol. 142 No. 3, pp. 461–477.

Kemp, L. J., and Zhao, F. (2016), "Influences of cultural orientations on Emirati women's careers", *Personnel Review,* Vol. 45 No. 5, pp. 988-1009.

Khandakar, S. and Pangil, F. (2017), "An Empirical Study on Assessing the Relationship Between Affective commitment and Informal workplace learning", *International Journal of Academic Research in Business and Social Sciences,* Vol. 7 No. 12, pp. 1018–1028.

Klassen, R.M., and Chiu, M., M. (2011), "The occupational commitment and intention to quit of practicing and pre-service teachers: Influence of self-efficacy, job stress, and teaching context", *Contemporary Educational Psychology,* Vol. 36 No.2, pp. 114-129.

Kram, K.E. and Hall, D.T. (1996), "Mentoring in a Context of Diversity and Turbulence", Kossek, E.E. and Lobel, S.A. (Ed.), *Managing diversity: Human resource strategy for transforming the workplace,* Blackwell, Cambridge, MA, pp. 108–136.

Lankau, M. and Scandura, T. (2002), "An investigation of personal learning in mentoring relationships: Content, antecedents, and consequences.", *Academy of Management Journal,* Vol.

45 No. 4, pp. 779−790.

Laursen, S. L., and De Welde, K. (2019), "The changer and the changed: Evolving theories and practices of change in ADVANCE calls for institutional transformation", *Equality, Diversity and Inclusion: An International Journal,* Vol. 38 No. 2, 140-159

Lee, K., Carswell, J. and Allen, N. (2000), "A Meta-Analytic Review of Occupational Commitment: Relations with Person- and Work-Related Variables", *Journal of Applied Psychology,* Vol. 85 No. 5, pp. 799–811.

Lee, H.S., Flores, L.Y., Navarro, R.L. and Kanagui-Muñoz, M. (2015), "A longitudinal test of social cognitive career theory's academic persistence model among Latino/a and White men and women engineering students", *Journal of Vocational Behavior,* Vol. 88 No. June 2015, pp. 95–103.

Leenders, J., Bleijenbergh, I. L., and Van den Brink, M. C. (2020), "Myriad potential for mentoring: Understanding the process of transformational change through a gender equality intervention", *Gender, Work & Organization*, Vol. *27* No. 3, pp. 379-394.

Lent, R. W. (2013), "Career-life preparedness: Revisiting career planning and adjustment in the new workplace", *The Career Development Quarterly,* Vol. 61 No. 1, pp. 2-14.

Lent, R. W., and Brown, S. D. (2013), "Social cognitive model of career self-management: toward a unifying view of adaptive career behavior across the life span", *Journal of counseling psychology,* Vol. 60 No. 4, pp. 557–568Lent, R.W., Brown, S.D. and Hackett, G. (1994), "Toward a unifying social cognitive theory of career and academic interest, choice, and performance", *Journal of Vocational Behavior,* Vol. 45 No. 1, pp. 79–122.

Lent, R.W., Brown, S.D. and Hackett, G. (2000), "Contextual supports and barriers to career choice: A social cognitive analysis", *Journal of Counseling Psychology,* Vol. 47 No. 1, pp. 36–49.

Major, C.T. and Major, C.H. (2013), "Learning Context and Perceptions of Problem-Based Learning: A Marketing Course Project at a Community College", *Community College Journal of Research and Practice,* Vol. 37 No. 8, pp. 620–628.

Lombardo, E., and Mergaert, L. (2016). Resistance in gender training and mainstreaming processes, Bustelo, M., Ferguson, L. and Forest, M. (Eds.), *The politics of feminist knowledge transfer. Gender training and gender expertise,* Palgrave Macmillan, Basingstoke, UK, pp. 43–61.

Makarem, Y. and Wang, J. (2020), "Career experiences of women in science, technology, engineering, and mathematics fields: A systematic literature review", *Human Resource Development Quarterly*, Vol. 31 No. 1, pp. 91-111.

Malhotra, N. K., Kim, S. S. and Patil, A. (2006), "Common method variance in IS research: A comparision of alternative approaches and a reanalysis of past research", *Management Science*, Vol.52 No. 12, pp. 65–1883.

Malhotra, N., Schaller, T. and Patil, A. (2017), "Common method variance in advertising research: When to be concerned and how to control for It", *Journal of Advertising*, Vol. 6 No. 1, pp. 193-212.

Martinez, A., and Christnacht, M. (2021), "Women are nearly half of U.S. workforce but only 27% of STEM workers", United States Census Bureau. Available at: https://www.census.gov/library/stories/2021/01/women-making-gains-in-stem-occupations-but-still-underrepresented.html

Metcalfe, B. D. (2006), "Exploring Cultural Dimensions of Gender and Management in the Middle East", *Thunderbird International Business Review*, Vol. 48 No. 1, pp. 93 107.

Metcalfe, B. D. (2008), "Women, management and globalization in the Middle East", *Journal of Business Ethics,* Vol. 83 No.1, pp. 85-100.Merriam, S.B. and Heuer, B. (1996), "Meaning-making, adult learning and development: A model with implications for practice", *International Journal of Lifelong Education,* Vol. 15 No. 4, pp. 243–255.

Miner, K., January, S., Dray, K., and Carter-Sowell, A. (2018), "Is it always this cold? Chilly interpersonal climates as a barrier to the well-being of early-career women faculty in STEM", *Equality, Diversity and Inclusion: An International Journal*, Vol. 38 No. 2, pp. 226-245.

Mulraney, J. and Turner, P. (2001), "Learning from Small Enterprise Structured Work Placement", *ERIC,* Report no. ED456325.

Meyer, J. P., and Espinoza, J. A. (2016). Occupational commitment. In *Handbook of employee commitment*. Edward Elgar Publishing.

Meyer, J.P., Allen, N.J. and Smith, C.A. (1993), "Commitment to organizations and occupations: Extension and test of a three-component conceptualization", *Journal of Applied Psychology,* Vol. 78 No. 4, pp. 538–551.

Morin, L., and Latham, G. (2000), "The effect of mental practice and goal setting as a transfer of training intervention on supervisors' self-efficacy and communication skills: an exploratory study", *Applied Psychology*, Vol. *49* No. 3, pp. 566-578.

Munoz-Boudet, A.M. (2017), "STEM fields still have a gender imbalance. Here's what we can do about it", *World Economic Forum.* Available at: https://www.weforum.org/agenda/2017/03/women-are-still-under-represented-in-science-maths-and-engineering-heres-what-we-can-do

Ng, T. W., Eby, L. T., Sorensen, K. L., and Feldman, D. C. (2005), "Predictors of objective and subjective career success: A meta-analysis, *Personnel psychology*, Vol. *58* No. 2, pp. 367-408.

Nielsen, M. W., Bloch, C. W., and Schiebinger, L. (2018), "Making gender diversity work for scientific discovery and innovation, *Nature human behaviour*, Vol. *2* No. 10, pp. 726-734.

Pajares, F. (2005). Gender differences in mathematics self-efficacy beliefs, Gallagher, M. and Kaufman, J. (Eds.), *Gender differences in mathematics: An integrative psychological approach*, Cambridge University Press, New York, NY, pp. 294–315.

Pan, W., Sun, L. and Chow, I.H. (2011), "The impact of supervisory mentoring on personal learning and career outcomes: The dual moderating effect of self-efficacy", *Journal of Vocational Behavior,* Vol. 78 No. 2011, pp. 264-273.

Park, I., Jung, H. (2015), "Relationships among future time perspective, career and organizational commitment, occupational self-efficacy, and turnover intention", *Social Behaviorr and Personality,* Vol. 43 No. 9, pp. 1547–1562.

Patterson, L., Varadarajan, D. S., and Salim, B. S. (2020), "Women in STEM/SET: gender gap research review of the United Arab Emirates (UAE)–a meta-analysis", *Gender in Management: An International Journal*.

Peng, Z.P. and Chang, K.B. (2010), "Family Economic Status, Self Career Concept, & Career Self-Efficacy of High School Students", *Journal of Family Education and Counsel*, Vol. 9, pp. 33-60.

Pinnington, A.H., Aldabbas, H., Mirshahi, F., & Pirie, T.A. (2022), "Organisational development programmes and employees' career development: The moderating role of gender", *Journal of Workplace Learning*, https://www.emerald.com/insight/content/doi/10.1108/JWL-08-2021-0103/full/html

Porter, C., and Serra, D. (2020), "Gender differences in the choice of major: The importance of female role models", *American Economic Journal: Applied Economics*, Vol. 12 No. 3, pp. 226-

54.

Riegle-Crumb, C., Peng, M., and Russo-Tait, T. (2020), "Committed to STEM? Examining factors that predict occupational commitment among Asian and White female students completing STEM US postsecondary programs", *Sex Roles,* Vol. 82 No. 1, pp. 102-116.

Rittmayer, M.A. and Beier, M.E. (2009), Self-Efficacy in STEM, Bogue, B. and Cady, E. (Eds.), Applying Research to Practice (ARP) Resources. Retrieved from http://www.engr.psu.edu/AWE/ARPresources.aspx

Shih, E., Venkatesh, A., Chen, S. and Kruse, E. (2013), "Dynamic Use Diffusion Model in a Cross-National Context: A Comparative Study of the United States, Sweden, and India", *Journal of Product Innovation Management,* Vol. 30 No. 1, pp. 4–16.

Sidani, Y. M. (2018), Muslim women at work religious discourses in Arab society. Palgrave Macmillan.

Singh, R., Zhang, Y., Wan, M., et al. (2018), "Why do women engineers leave the engineering profession? The roles of work–family conflict, occupational commitment, and perceived organizational support", *Human Resource Management,* Vol. 57 No. 4, pp. 901–914.

Son, S., and Kim, D. Y. (2021), "Organizational career growth and career commitment: Moderated mediation model of work engagement and role modelling", *The International Journal of Human Resource Management,* Vol. 32 No. 20, pp. 4287-4310.

Syed, M., Zurbriggen, E. L., Chemers, M. M., Goza, B. K., Bearman, S., Crosby, F. J., Shaw, J., Hunter, L. and Morgan (2019), "The role of self-efficacy and identity in mediating the effects of STEM support experiences", *Analyses of Social Issues and Public Policy: ASAP,* Vol. 19 No. 1, p. 7.

Tlaiss, H., & Kauser, S. (2011), "The importance of wasta in the career success of Middle Eastern managers", *Journal of European Industrial Training*, Vol. 35, pp. 467–486.

United Nations Development Programme and Arab Human Fund for Economic and Social Development, Arab Human Development Report (2002), Creating Opportunities for Future Generations, New York, United Nations Publication.

UNESCO Institute of Statistics (2019). Retrieved from http://data.uis.unesco.org

Wang, Y. F., Chiang, M. H., and Lee, Y. J. (2014), "The relationships amongst the intern anxiety, internship outcomes, and career commitment of hospitality college students", *Journal of Hospitality, Leisure, Sport & Tourism Education*, Vol. 15, pp. 86-93.

Wang, Y. C., Brondolo, E., Monane, R., Kiernan, M., and Davidson, K. W. (2021), "Equity, Diversity and Inclusion: Introducing the MAVEN Leadership Training Initiative to diversify the scientific workforce", *Elife*, Vol. 10, e69063.

Waite, A. M., and McDonald, K. S. (2019), "Exploring challenges and solutions facing STEM careers in the 21st century: A human resource development perspective", *Advances in Developing Human Resources*, Vol. 21 No. 1, pp. 3-15.

World Bank. (2016), 'Research and development expenditure (% of GDP)', Retrieved from http://www.worldbank.org

World Bank. (2019), Retrieved from http://www.worldbank.org

World Economic Forum (2017), The global gender gap report. Geneva, Switzerland: World Economic Forum.

Yoon, D. Y., Han, S. H., Sung, M., and Cho, J. (2018), "Informal learning, organizational commitment and self-efficacy: a study of a structural equation model exploring

mediation", *Journal of Workplace Learning*.

Young, W. B. (2020), "It Takes a Village: Mentors, Colleagues, Family, and Friends", *ACS Medicinal Chemistry Letters*, Vol. 11 No. 3, pp. 214-216.

Zeldin, A.L. and Pajares, F. (2000), "Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers", *American Educational Research Journal*, Vol. 37 No. 1, pp. 215–246.

Table I: Demographic information

Variables	Frequency	Percentage
Field		
Engineering	230	61.33%
Technology	109	29.07%
Science	32	8.53%
Mathematics	4	1.07%
Marital Status		
Single	260	69.33%
Other	11	2.93%
Married	104	27.73%
Prof level		
Coordinator	148	39.47%
Director	17	4.53%
Manager	87	23.20%
C Level	65	17.33%
Administrative	58	15.47%
Gender		
Female	375	100%

Table II: Means, standard deviations, Cronbach's alpha, correlations, skewness and kurtosis

Constructs	Mean	S.D.	PSD	CSE	AOC	Skewness	Kurtosis
PSD	8.414	1.137	(.849)			-.861	.648
CSE	7.315	1.280	.410**	(.925)		-.151	-.330
AOC	6.146	0.738	.216**	.276**	(.732)	-.955	.660

** Correlation is significant at the 0.01 level (2-tailed); PSD: Personal skill development; CSE: Coping self-efficacy; AOC: Affective occupational commitment; Cronbach's alpha in parentheses.

Table III: Comparison of alternative measurement models

Models	X^2	df	CFI	TLI	SRMR	RMSEA
Three-factor (Hypothesized model)	1011.404	551	0.928	0. 918	0.056	0.047
Two-factor (merged PSD, and CSE)	3354.140	626	0.602	0. 577	0.095	0.108
One-factor (merged PSD, CSE, and AOC)	3829.313	665	0.549	0. 523	0.102	0.113

Note: PSD: Personal skill development; CSE: Coping self-efficacy; AOC: Affective occupational commitment; df: degree freedom.

Table IV: Regression coefficients results of PROCESS (Hayes, 2018, Model 4).

Consequent										
Antecedents	**M (**Coping self-efficacy (CSE))					**Y (**Affective occupational commitment (AOC))				
	B	SE	*t*	p value	[LLCI, ULCI]	B	SE	*t*	p value	[LLCI, ULCI]
PSD	0.411	0.047	8.677	< .001	[.317, .504]	0.132	0.054	2.443	< .05	[.026, .238]
CSE	-	-	-	-	-	0.223	0.054	4.136	< .001	[.117, .329]
Field participants	-.019	.068	-.274	-.274	[-.152, .115]	-.173	.071	-2.447	< .05	[-.312, -.034]
Constant	.028	.112	.249	.804	[-.192, .248]	.258	.116	2.219	< .05	[.029, .487]
	R^2 = 0.168 F (2,372) = 37.587, p < 001					R^2 = 0.103 F (3,371) = 14.237, p < 001				

B: Beta; regression coefficients are reported. Sample size = 375; M: Mediator; Y: Dependent Variable; SE: Standard Error; LLCI: lower limit confidence interval; ULCI: upper limit confidence interval; PSD: Personal skill development; CSE: Coping self-efficacy; AOC: Affective occupational commitment