On the Network of Associations among EFL Learners' Language Learning Strategies, Mindfulness and Personality Traits: A Structural Equation Modeling Approach

Reza Khany (Corresponding author)
English Department of Ilam University, Ilam, Iran
Khani_Reza@yahoo.com
and
Neda Babanezhad Kafshgar
English Department of Ilam University, Ilam, Iran

Abstract

Language learning strategies, personality traits and mindfulness represent three individual learner characteristics that appear to play a crucial role in learners' success or failure in EFL contexts. The main purpose of this study was to scrutinize the network of associations among these three variables and their respective sub-scales. We used Strategy Inventory of Language Learning (SILL), the Big Five Inventory (BFI), and Mindful Attention Awareness Scale (MAAS) to measure the variables. The results of Structural Equation Modeling (SEM) analysis confirmed the hypothesized model of relationships among the study variables. The final model of the network of associations among variables also revealed significant correlations among various sub-scales of the study. The findings of this study have various implications for language teachers and psycholinguistic researchers.

Key words: language learning strategy, personality trait, mindfulness, network of associations

1. Introduction

Central to the entire discipline of language learning is the concept of learners' individual characteristics. Language learners contribute to the process of language learning through their individual characteristics. A growing body of literature has been written on the significant role that learners can play in the total development of language learning (Ellis, 1985, 2004; Oxford & Nyikos, 1989; Oxford & Cohen, 1992; Dewaele and Furnham, 1999; Brown, 2000; Dörnyei, 2005, 2009).


Among the studies being done, some seem to be partially attended to in the previous study. However, few studies can be found to have addressed the issue of language learning strategies in combination with other factors such as learners' personality and mindfulness. Learners' performance has been reported to be affected by such factors in many studies (Salomon and Globerson, 1987; Langer, 2000; Hyland, 2008). Unlike learners' strategies and personality traits, mindfulness as a representative property of learners' attention status has been rarely the focus of studies. Although recent
developments in educational psychology have heightened the need for taking the role of learners' characteristics into account, far too little attention has been paid to the interrelations of these individual factors. This study sought to remedy this problem by exploring the nexus of relationships among learners' language learning strategies, mindfulness and personality traits.

1.1 Language learning strategies

Strategies, as defined by Brown (2000), are specific methods of approaching a problem or task, modes of operation for achieving a particular end, planned designs for controlling and manipulating certain information and they might vary moment to moment, or day to day, or year to year. As Wong & Nunan (2011) claim, every task and exercise will be underpinned by at least one strategy. Oxford (1990) also defined the concept as operations which learners employ to help them with the acquisition, storage, retrieval, and use of information. She further identifies six broad categories of strategies: metacognitive (e.g. self-monitoring, paying attention); affective (e.g. self-encouragement, anxiety reduction); social (e.g. ask questions, become culturally aware); memory (e.g. grouping, imagery, associating); cognitive (e.g. reasoning, analyzing, and summarizing); compensation (e.g. guessing meanings, using synonyms).

A review of the relevant literature considering language learning strategies indicates that over decades of research in this field, this issue has been linked to many aspects of language learning such as learning styles (Ehrman and Oxford, 1990; Oxford, 1990b, 2001, 2003; Rossi-Le, 1995; Ely and Pease-Alvarez, 1996; Carson and Longhini, 2002; Ehrman et al., 2003), language proficiency (Chang, 1990; Green and Oxford, 1995; Park, 1997; Chen, 2002), and motivation (Oxford and Nyikos, 1989; Tamada, 1996) among others. In a nutshell, research in the area of language learning strategies has resulted in a wealth of information with respect to the concept of strategy use by learners with different proficiency levels, motivation categories and learning styles. However, little research has been reported to link learners' language learning strategies to their mindfulness status. Although some researchers have tried to relate different aspects of learning to mindfulness (Salomon & Globerson, 1987; Langer, 1997; Langer, 2000; Hyland, 2008; Yeganeh & Kolb, 2009; Hillgar, 2011), the research to date has tended to focus on the whole concept of learning rather than language learning strategies.

1.2 Mindfulness

Research on mindfulness has increased dramatically and received specific attention in both the clinical and empirical domains. Mindfulness is increasingly recognized as a phenomenon with functional import for outcomes as diverse as physical health, psychological well-being, work and sport performance, and relationships (Brown & Ryan, 2004). Modern clinical investigators and meditation teachers have offered different definitions of mindfulness (Baer, 2003; Bishop et al., 2004; Germer et al., 2005; Kabat-Zinn, 2003; Salzberg and Goldstein, 2001). According to (Kabat-Zinn, 1994) mindfulness is ‘‘paying attention in a particular way: on purpose, in the present moment, nonjudgmentally’’ (p.4).

Bishop et al. (2004) proposed a two-component model of mindfulness, consisting (a) attention and awareness and (b) acceptance. Awareness is the pure apperception and perception of the field of events that encompass our reality at any given moment. As Allport (1988) suggested, three conditions must be met in order for a person to be aware of a given experience. First, the person must show a behavioral or cognitive change as a result of the experience. Second, the person must report that he/she was aware of the experience at the time it took place. And third, the person must be able to describe the experience. According to Tomlin and Villa (1994), attention is a limited capacity system which constitutes a process of selection and involves controlled rather than automatic processing of information and a process of coordination among competing stimuli and responses.
Acceptance refers to receptively seeing things as they actually are in the present moment (Kabat-Zinn, 1990, cited in Giluk, T. L., 2009). Each moment is viewed as unique, and if one brings to the moment preconceived ideas, he won't be able to experience the moment as it really is. Awareness and attention are, of course, the primary features of conscientiousness and are central to mindfulness and also believed to be essential for detecting discrepancies between current states or levels of functioning (Bowlin & Baer, 2012). Mindfulness specifically concerns the monitoring, observing capacity of conscientiousness. Mindfulness, in its mode of operation, is perceptual, operating upon thought, as well as upon emotion and other contents of conscientiousness. Yeganeh & Kolb (2009) developed this exploration further by making a distinction between two predominant streams of mindfulness research and practice; meditative mindfulness and socio-cognitive mindfulness. Meditative mindfulness requires a discipline of anchoring the mind in the present moment. This is often accompanied with a practice of awareness and acceptance through breathing. Socio-cognitive mindfulness emphasizes cognitive categorization, context and situational awareness. They argue that Meditative mindfulness is often measured by Brown & Ryan’s Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) and socio-cognitive mindfulness is measured by the Langer Mindfulness Scale (LMS).

1.3 Learning and mindfulness

According to Salomon & Globerson (1987), the gap between what learners can do and what they actually do can be narrowed down to a great extent by the notion of mindfulness. Mindfulness is a mid-level construct which reflects a voluntary state of mind, and connects among motivation, cognition, and learning. Langer (2000) argued that mindfulness, achieved without meditation, is discussed with particular reference to learning. Being mindful is the simple act of drawing novel distinctions. It leads us to greater sensitivity to context and perspective, and ultimately to greater control over our lives. Hyland (2008) asserted that as a dimension of the learning process, mindfulness practice can effectively link all forms of learning with the needs, interests and values of learners thus fostering engagement and motivation.

Although the relationship between mindfulness and learning has been tackled theoretically (Salomon & Globerson, 1987; Langer, 1997), the practical aspects of this relationship have been addressed only, recently. Yeganeh & Kolb (2009) explored this relationship with respect to experiential learning and operating on Experiential Learning Theory (ELT) they found links between learning from experience and mindfulness, and also found that individuals who scored high on Langer’s mindfulness scale emphasized direct concrete experience in their learning style. Thus, the results suggested that the practice of mindfulness could help individuals learn from experience. Hillgar, S. D. (2011) investigated the association between mindfulness and self-regulated learning. The correlations between the different measurements revealed the facets of mindfulness to be positively correlated with self-regulated learning, and negatively correlated with test anxiety. Mindfulness becomes important when we consider how we choose to process and learn from the events in our lives. Nunan (1999) argued that knowledge of strategies is important, because the greater awareness you have of what you are doing, if you are conscious of the processes underlying the learning that you are involved in, then learning will be more effective.

1.4. Learning and personality traits

As Barrick, Mount, & Judge (2001) suggested, the well-established five-factor (Big Five) model of personality consists of the traits neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Although there is a rich body of literature which advocates this five-factor model of personality, researchers don’t always agree on the exact definition for each trait. However, these five categories are usually described as follows (John & Srivastava, 1999):
Extraversion involves characteristics such as talkative, energetic, and assertive; Agreeableness includes properties such as sympathetic, kind, and affectionate; Conscientiousness entails organized, thorough, and planful traits; Neuroticism relates to tense, moody, and anxious states; Openness includes characteristics such as imagination and insight.

Costa & McCrae (1992) proposed that it is widely accepted that the Big Five personality traits are the cause of most of the individual differences in behavioral patterns. Thus, it seems logical to study these traits as major sources of individual differences in learners' performance in academic settings (Chamorro-Premuzic& Furnham, 2008; Furnham & Monsen, 2009; Nguyen, Allen& Fraccastoro, 2005; O'Connor & Paunonen, 2007).

Besides the direct effect, learners' personality factors may also contribute to the explanation of differences in other important predictors of academic performance like approaches to learning, learning strategies, cognitive abilities, and academic motivation (Barrick & Mount, 1996; Bidjerano & Yun Dai, 2007; Clark & Schroth, 2010; Diseth, 2003; Swanberg & Martinsen, 2010, Kang, 2012).

Cohen (1998) quoted from Brown that learning strategies do not operate by themselves, but rather are directly tied to the learner's underlying learning styles and other personality related variables in the learner.

1.5 Personality traits and mindfulness

Recently, researchers have shown an increased interest in relating different personality traits to various factors of mindfulness. Among Big Five personality traits, Neuroticism showed the most powerful negative relationship with mindfulness (Feltman et.al, 2009, Kostanski, 2007, Hurk et al., 2011, Latzman & Matsuda, 2013). Neurotic persons are anxious, insecure, moody and self-conscious (Barrick, Mount, & Judge, 2001). Costa and McCrae (1992) also proposed that the neuroticism dimension assesses adjustment or emotional stability versus maladjustment or neuroticism. Highly neurotic individuals will experience emotional instability and will show characteristics of worrying, fear, guilt, sadness, anger, embarrassment, and disgust. Since mindfulness is associated with psychological well-being mental health and self-regulated functioning, it can be predicted that neuroticism is negatively related to mindfulness.

According to Barrick et al. (2001) extraversion consists of sociability, dominance, ambition, positive emotionality and excitement-seeking. All of these properties seem to be positively related to mindfulness except for excitement-seeking (Costa &McCrae, 1992). Thus the direction of relationship remains. Barrick et al. (2001) defines openness to experience as a concept of intelligence, creativity, unconventionality, and broad-mindedness. According to Costa &McCrae (1992), open persons are curious about themselves and the outer world. This property seems to go with attention and awareness which are central issues in mindfulness. Key words in defining the concept of agreeableness are cooperation, trustfulness, compliance and affability (Barrick et al. 2001) also seems to correlate positively with acceptance and receptivity issues of mindfulness (Kabat-Zinn, 1990, cited in Giluk, T. L., 2009). Conscientiousness is associated with dependability, achievement striving, and planfulness (Barrick et al. 2001). These characteristics seem to positively relate to focusing and deliberateness issues in mindfulness (Kabat-Zinn, 1990, cited in Giluk, T. L., 2009, Costa &McCrae, 1992, Latzman & Matsuda, 2013). However, controversial findings also exist in literature (Hurk et al., 2011).

1.6 The current study

As it is revealed by the aforementioned literature, learners' language learning strategy use, mindfulness status and personality dimensions have been linked to each other from different perspectives. So far, however, there has been little discussion about the interrelationships of these three concepts studied simultaneously. Furthermore, the research methods used to date lack a unified
theory behind. Most of the studies reported do not draw upon the more robust methodological designs and models which can give a more precise and inclusive pictures of the associations of the variables in the study. One such model is structural equation modeling. Such gaps kindled the researchers to explore the network of associations amongst learners' language learning strategies, mindfulness status and personality traits. Hence, in the light of previous findings, we expected significant relationships among these three variables and also their various sub-scales and based on these expectations we proposed a model in which all of these three learner variables are correlated to each other (Figure 1). In order to investigate the relationships in detail and probe into the interrelationships of various sub-scales of the study, we conducted a structural equation modeling approach. According to Bollen and Long (1993), Structural Equation Modeling (SEM) is a powerful multivariate analysis approach which is performed to both validate the measurement model and fit the structural model. These are analyzed through exploratory and confirmatory phases the result of which is reported in the following sections.

Figure 1. The hypothesized model of the relationships among main variables of the study.

2. Method
2.1 Participants and procedure
384 (136 male and 248 female) EFL learners participated in this study. They were drawn from two state universities in Iran; Ilam University and Mazandaran University. Their mean age was 23.59 years (SD= 4.77). All the participants had at least 3 to 5 years of experience in language learning. All the subjects of the study were invited to participate in the survey without any financial reward. They were ensured about their privacy concerns. Willing participants were given an anonymous pack of survey pages which contained of all of the questionnaires used in the study.

2.2 Instruments
Three self-report questionnaires were used in this study.

2.2.1 Strategy inventory for language learning (SILL) developed by Oxford (1990) is a 50-items self-report questionnaire that has been used extensively by various researchers. Oxford (1996) reported high reliability, validity and utility indexes for the measure. This 50 likert-type questionnaire, which is designed to obtain information concerning language learners' strategy use in second language situations, covers six subscales of language learning strategies that include memory(9 items), cognitive(14 items), compensation(6 items), meta-cognitive(9 items), affective(6 items), and social strategies(6 items). As suggested by Ellis (1994), this is the most comprehensive classification of learning strategies to date. The questionnaire was translated into Persian and adapted to our research context. The Persian adapted version of SILL was used in this study to obtain information regarding learners' language learning strategies.

2.2.2 Mindful Attention Awareness Scale (MAAS) which is one of the most popular measures of mindfulness is a 15-item scale. Participants respond to each item on a 6-point Likert scale from “almost always” to “almost never”. According to Brown and Ryan (2003), this scale is designed to assess a core characteristic of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present. This questionnaire covers two subscales which con-
tain attention (10 items) and awareness (5 items). This scale was also translated into Persian and was adapted to our participants’ situational and cultural specific requirements.

2.2.3 Big Five Inventory (BFI) proposed by John and Srivastava (1999) is a likert-type scale which is designed to measure different personality traits. This 44-items questionnaire covers five subscales which include neuroticism (8 items), extraversion (8 items), openness to experience (10 items), agreeableness (9 items), and conscientiousness (9 items). The participants were asked to respond to each item on a 5-point Likert scale from ‘‘strongly disagree” to ‘‘strongly agree”. This questionnaire was also translated and adapted to the context of study.

2.3 Data analysis

In order to explore the relationships assumed in our hypothesized model, using the AMOS 21 program, we tested the model by means of SEM (structural equation modeling) analyses. At the first step and in an exploratory approach to analyze our data, we conducted Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett’s Test of Sphericity to validate the sub-scales or observed variables which we considered for each of our main or latent variables. The second step was devoted to validation of the full posited model (the main variables and their sub-scales) through a confirmatory statistical approach referred to as the goodness of fit. In order to estimate how the supposed relationships among model’s variables fit the data, various conventional fit indices were calculated. Following Tseng et al. (2006), we chose root mean square error of approximation (RMSEA), root mean squared residual (RMR), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normal fit index (NFI), comparative fit index (CFI), incremental fit index (IFI) as well as normal chi-square as indices of good model fit. Values of GFI, NFI, CFI, and IFI> 0.90 are considered to be acceptable fitness indices. The acceptable value for AGFI is greater than 0.85 and for RMR is equal or greater than 0. This index for RMSEA is greater than 0.05 and in case of normal chi-square the acceptable value is greater than 5 (Bollen, 1989; Steiger, 1990; Hu & Bentler, 1999; Byrne, 2001). We then explored the significant relationships among the main variables and subscales of our proposed model. In so doing, along with estimating goodness of fit indices and the matrix of correlations, multiple regression analyses were run to reveal the model path predictions. In the following section, the results are reported at length.

3. Results

Descriptive statistics of all measures are shown in Table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Z</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>Personality traits</td>
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<tr>
<td>Extraversion</td>
<td>384</td>
<td>3.20</td>
<td>0.573</td>
<td>-.012</td>
<td>-.486</td>
<td>2.059</td>
<td>0.000</td>
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<tr>
<td>Agreeableness</td>
<td>384</td>
<td>3.69</td>
<td>0.464</td>
<td>-.122</td>
<td>-.320</td>
<td>1.656</td>
<td>0.008</td>
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<tr>
<td>Conscientiousness</td>
<td>384</td>
<td>3.45</td>
<td>0.589</td>
<td>.244</td>
<td>.025</td>
<td>1.412</td>
<td>0.037</td>
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<tr>
<td>Neuroticism</td>
<td>384</td>
<td>2.87</td>
<td>0.655</td>
<td>.177</td>
<td>-.951</td>
<td>1.852</td>
<td>0.002</td>
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<tr>
<td>Openness</td>
<td>384</td>
<td>3.36</td>
<td>0.523</td>
<td>-.002</td>
<td>.184</td>
<td>1.906</td>
<td>0.001</td>
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<td>L.L. Strategies</td>
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<tr>
<td>Memory</td>
<td>384</td>
<td>3.13</td>
<td>0.652</td>
<td>.242</td>
<td>-.175</td>
<td>1.552</td>
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<tr>
<td>Cognitive</td>
<td>384</td>
<td>3.22</td>
<td>0.542</td>
<td>-.686</td>
<td>.618</td>
<td>1.908</td>
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<td>Compensatory</td>
<td>384</td>
<td>3.25</td>
<td>0.654</td>
<td>-.211</td>
<td>.013</td>
<td>1.897</td>
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<td>Meta cognitive</td>
<td>384</td>
<td>3.65</td>
<td>0.731</td>
<td>-.682</td>
<td>.899</td>
<td>1.926</td>
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<td>Affective</td>
<td>384</td>
<td>3.10</td>
<td>0.734</td>
<td>-.044</td>
<td>.234</td>
<td>1.989</td>
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<td>Social</td>
<td>384</td>
<td>3.40</td>
<td>0.667</td>
<td>-.181</td>
<td>.617</td>
<td>2.185</td>
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<td>Attention</td>
<td>384</td>
<td>3.26</td>
<td>0.688</td>
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<td>-.128</td>
<td>1.707</td>
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<td>.068</td>
<td>-.709</td>
<td>1.366</td>
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As it can be inferred from Table 1, all of the variables were not normally distributed, thus, Spearman coefficients were calculated. Table 2 represents correlation matrix of all of the sub-scales of the study.

<table>
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<tr>
<th>Sub-scales</th>
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<td>1.Extraversion</td>
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<td>2.Agreeableness</td>
<td>0.055</td>
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<td>3.Conscientiousness</td>
<td>0.033</td>
<td>0.420**</td>
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<td>4.neuroticism</td>
<td>-0.028</td>
<td>-0.444**</td>
<td>-0.110</td>
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<td>5.openness</td>
<td>0.296**</td>
<td>0.086</td>
<td>0.036</td>
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<td>6.memory</td>
<td>0.033</td>
<td>0.096</td>
<td>0.134**</td>
<td>-0.183**</td>
<td>0.135**</td>
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<td>7.cognitive</td>
<td>-0.048</td>
<td>-0.117</td>
<td>0.057</td>
<td>0.058</td>
<td>0.157</td>
<td>0.453**</td>
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<td>8.compensation</td>
<td>0.026</td>
<td>-0.158</td>
<td>-0.076</td>
<td>-0.198</td>
<td>-0.004</td>
<td>0.209</td>
<td>-0.401**</td>
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<td>9.meta cognitive</td>
<td>-0.114**</td>
<td>0.036</td>
<td>0.175**</td>
<td>-0.044</td>
<td>0.117</td>
<td>0.407**</td>
<td>0.541**</td>
<td>-0.299**</td>
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<td>10.affective</td>
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<td>0.143**</td>
<td>0.227**</td>
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<td>0.468**</td>
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<td>11.social</td>
<td>-0.093</td>
<td>0.010</td>
<td>0.113</td>
<td>-0.146**</td>
<td>0.159**</td>
<td>0.265**</td>
<td>0.533**</td>
<td>0.215</td>
<td>0.594**</td>
<td>-0.448**</td>
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<td>Mindfulness</td>
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<td>12.Attention</td>
<td>-0.088</td>
<td>0.370**</td>
<td>0.357**</td>
<td>-0.295**</td>
<td>0.103</td>
<td>-0.119</td>
<td>0.134**</td>
<td>0.172**</td>
<td>0.052</td>
<td>-0.019</td>
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<td>13.Awareness</td>
<td>0.021</td>
<td>0.221**</td>
<td>0.223</td>
<td>-0.220</td>
<td>0.017</td>
<td>0.093</td>
<td>-0.012</td>
<td>0.268**</td>
<td>-0.038</td>
<td>-0.084</td>
<td>-0.143**</td>
<td>0.569**</td>
<td></td>
</tr>
</tbody>
</table>

\[p^*<.05 \quad p^{**}<.01\]

As it can be figured out from Table 2, in addition to the intra-scale relationships among various sub-scales of our main variables, there were a number of significant links among different sub-scales of distinct main variables. Memory strategy was correlated to openness and conscientiousness personality traits positively and to neuroticism trait and attention negatively. Cognitive strategy was linked to openness in positive and to agreeableness in negative direction. There was also a positive correlation between this strategy and attention mindfulness. Compensation strategy had negative relationships with neuroticism personality trait and positive relations with both attention and awareness mindfulness. It was also linked to agreeableness negatively. Meta-cognitive strategy was correlated to extraversion negatively and to conscientiousness and openness positively. Affective strategy demonstrated significant positive relationships to agreeableness, conscientiousness, and openness as well as negative links to neuroticism. Social strategy indicated positive correlations to conscientiousness and openness personality traits and negative correlations to neuroticism and awareness. Also attention and awareness mindfulness were negatively correlated to neuroticism and positively to agreeableness and conscientiousness. Attention mindfulness was also positively related to openness. Although multiple relationships were found among various subscales of different variables, simple correlation analysis couldn’t be accounted as a strong confirmatory measure to suggest accuracy of these relations in the network of associations among different components of our hypothesized model. Therefore, the researchers decided to probe into the significant relationships in the network of associations via SEM (structural equation modeling) procedure in exploratory and confirmatory phases.

Since each of our substantial variables encompassed multiple sub-scales, validation of these factors was necessary. At the exploratory phase of our analysis and in order to ensure about sufficiency of sampling and appropriateness of the factor model for each of our main variables, we used KMO measure of sampling adequacy and Bartlett’s Test of Sphericity. As it is shown in Table 3, all of the statistics for KMO measure were greater than 0.5 which conveyed sufficiency of sampling. Furthermore, confidence level of 0.000 for Bartlett’s test signified appropriateness of factor model for all of our main variables.
Table 3 which represents KMO and Bartlett’s test results, indicated that each set of sub-scales appropriately measured their respective variables. The next phase of our analysis included a confirmatory approach to examine accuracy of the relationships among the study main variables as well as the links among various sub-scales. In order to ensure about the fitness of our hypothesized model to the collected data, it was necessary to perform a confirmatory factor analysis with the help of AMOS 21 program. The calculated fitness indices (Table 4) indicated that our posited model of the relationships among study main variables fitted the data ($\chi^2$/d.f.=1.082, RMSEA=0.015, RMR=0.016, GFI= 0.981, AGFI= 0.962, NFI= 0.970, CFI=0.998, IFI=0.998).

![Table 3. KMO and Bartlett’s Test of study variables](image)

<table>
<thead>
<tr>
<th>Variables</th>
<th>L.L. Strategies</th>
<th>Personality</th>
<th>Mindfulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO measure of sampling adequacy</td>
<td>0.782</td>
<td>0.789</td>
<td>0.500</td>
</tr>
<tr>
<td>Bartlett’s Test</td>
<td>$\chi^2$</td>
<td>$\chi^2$</td>
<td>$\chi^2$</td>
</tr>
<tr>
<td></td>
<td>872.556</td>
<td>2423.183</td>
<td>142.471</td>
</tr>
<tr>
<td>d.f.</td>
<td>15</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

![Table 4. Structural equation model: fit statistics](image)

<table>
<thead>
<tr>
<th>Fit statistics</th>
<th>Acceptable level</th>
<th>Current level</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal chi-Square ($\chi^2$/d.f.) &lt; 5</td>
<td>1.082</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Root Mean Squared Error of Approximation RMSEA &lt; 0.05</td>
<td>0.015</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Root Mean Squared Residual RMR \geq 0</td>
<td>0.016</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Goodness-of-Fit Index GFI &gt; 0.9</td>
<td>0.981</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Adjusted Goodness-of-Fit Index AGFI &gt; 0.85</td>
<td>0.962</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Normal Fit Index or Bentler-Bonett Index NFI &gt; 0.90</td>
<td>0.970</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Comparative Fit Index CFI &gt; 0.90</td>
<td>0.998</td>
<td>Accept</td>
<td></td>
</tr>
<tr>
<td>Incremental Fit Index IFI &gt; 0.90</td>
<td>0.998</td>
<td>Accept</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2 displays the schematic representation of the accepted model as well as standardized path correlations among main variables and sub-scales. The non-significant paths were deleted from the final accepted model. It is clearly indicated that language learning strategy use, personality traits, and mindfulness of our participants were associated with each other. As it is detectable from this figure, all of the links among these variables were of direct, positive and reciprocal type with the strongest association between learners’ language learning strategy and their personality traits (0.28). The next strong link was found between participants’ personality traits and their mindfulness status (0.24) and the last one was between learners’ language learning strategy and their mindfulness status (0.11). In addition to the relations found among the main variables of the study, various sub-scales of one particular variable as well as various sub-scales of different variables demonstrated to be associated with each other in either positive or negative directions. In case of big five personality traits, openness exhibited relations to extraversion and agreeableness. Furthermore, neuroticism was related to conscientiousness. Attention and awareness, as two sub-scales of mindfulness weren’t linked to each other. Four intra-group associations were found among various sub-scales of language learning strategy; relations between memory and cognitive strategies; relations between cognitive and compensation strategies; relations between compensation and affective strategies; and negative relations between social and memory strategies.

With regard to inter-group associations among various sub-scales of different variables six reciprocal relations were detected. Social language learning strategy was positively linked to awareness mindfulness status and negatively linked to neuroticism personality trait. Neuroticism was also...
negatively related to affective language learning strategy. Meta-cognitive strategy was found to be associated with openness in a positive direction. Compensation strategy was positively related to awareness mindfulness, whereas, memory strategy was negatively linked to attention mindfulness status. Among these inter-group relations the link between awareness mindfulness status and social as well as compensation language learning strategies demonstrated the strongest associations (0.27).

Fig. 2. Structural model of relations among language learning strategies, big five personality traits and mindfulness and their sub-scales.

Multiple regression findings also confirmed the relationships obtained by SEM. To see how main variables of study load each other and how predictions are made, a multiple regression were run. Table 5 shows the findings.
Table 5. Multiple regressions with personality traits and mindfulness as independent variables and language learning strategies as dependent variable

<table>
<thead>
<tr>
<th>Language Learning Strategies</th>
<th>β</th>
<th>t</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>1.581</td>
<td>5.714</td>
<td>.000</td>
</tr>
<tr>
<td>Personality traits</td>
<td>.269</td>
<td>5.461</td>
<td>.000</td>
</tr>
<tr>
<td>mindfulness</td>
<td>.108</td>
<td>2.198</td>
<td>.029</td>
</tr>
</tbody>
</table>

Multiple regression analysis indicated that learners’ personality traits (B=.269, t=5.461, sig=.000) predict their language learning strategies more powerfully than mindfulness status (B=.108, t=2.198, sig=.029). As is indicated by their β and t values, these two measures were positive predictors of language learning strategies.

4. Discussion

This study aimed to probe into the network of associations among learners’ language learning strategies, their personality traits and mindfulness status. Although the associations between each two main variables were touched on by previous research, the network of links among these three learner variables and their respective sub-scales were rarely the subject of relevant studies. The main results of this study, obtained through SEM analysis, confirmed the proposed model of the relationships among the study variables, since all of our three main variables proved to be related to each other. The main findings of this paper were in line with previous studies which demonstrated the relationships between language learning strategies and personality traits (Barrick & Mount, 1996, Sharp, 2008; Kang, 2012), language learning strategies and mindfulness (Yeganeh & Kolb, 2009, Hillgar, 2011), and personality traits and mindfulness (Hurk et al., 2011, Latzman & Matsuda, 2013).

In order to investigate the links among various sub-scales of the main variables, first spearman correlations were calculated which revealed multiple associations among different sub-scales (Table 1). In case of the links between learning strategies and personality traits, conscientiousness and openness demonstrated the most positive links to four of the six learning strategies. These findings served as verification to Blickle’s (1996) claim with regard to relations between openness and the desire to use wider learning strategies. Kang (2012) also found positive relationships between conscientiousness and openness traits and most of language learning strategies. The positive link between successful language learning and the conscientiousness trait was also supported by other studies (Reiss, 1983; Barchard, 2003; Noftle & Robins, 2007). As it was evinced by correlation matrix (Table 1), neuroticism trait indicated negative significant relations to half of the language learning strategies. This finding also indicated consistency with previous research (Kang, 2012) in this regard. McCrae and Costa (2004) also proposed that neuroticism is connected with negativism and anxiety. Furthermore, Dörnyei (2005) referred to anxiety involved in neuroticism as producing negative learning outcomes.

Another set of links that can be detected from Table 1 are the correlations between various language learning strategies and different mindfulness sub-scales. Attention and awareness were positively associated to cognitive and compensation strategies, meanwhile, negatively linked to memory and social strategies. The positive associations between mindfulness and learning strategies were
confirmed by previous research. According to Oxford (2003), learners consciously choose strategies that fit their learning style. Thus, we expect consciousness to be closely related to learning strategies. Schmidt (1994) introduced four dimensions of consciousness; intention (deliberateness of the learner in attention to a stimulus), attention (detection of a stimulus), awareness (the learner’s knowledge or subjective experience that he/she is detecting a stimulus), control (the extent to which the language learner’s output is controlled). Accordingly, the positive significant association found between compensation strategies and attention and awareness mindfulness seems to be logical, meanwhile, the negative relations between attention and awareness sub-scales and memory and social language learning strategies are not consistent with previous psycholinguistic research (Hatch, 1983; Gass, 1988, 1997; Pienemann, 1989; Pienemann & Johnston, 1987; Robinson, 1995; Swain, 1995; Ellis, 1996; Skehan, 1998) that emphasized the role of attention as a necessary element for storage and hypothesis formation and testing which are a priori factors in memory strategies.

The last significant connections represented in correlation matrix (Table 1) that are discussed in this section are the links between various personality traits and mindfulness sub-scales. Openness, agreeableness, and conscientiousness personality traits showed positive associations with mindfulness status, whereas, neuroticism proved negative links to both attention and awareness mindfulness. These findings were exactly in line with previous studies in literature (Costa & McCrae, 1992; Kabat-Zinn, 1990, cited in Giluk, T. L., 2009; Brown &Ryan, 2004; Hurk et al., 2011; Latzman &Matsuda, 2013) that referred to receptivity to experience, showing feelings of empathy, and deliberateness as common properties between mindfulness and openness to experience, agreeableness, and conscientiousness, respectively.

To see if the significant relationships obtained via simple correlation processes are confirmed in the network of associations among the study variables, it was necessary to render the data to SEM analysis approach. It was revealed that all of the main variables of the study were associated with each other. Furthermore, in addition to significant relationships that were found among sub-scales of each main variable, six of the correlations discussed previously were confirmed through SEM analysis. As discussed before, negative links between memory and social strategy and mindfulness sub-scales were inconsistent with previous findings. One reason may be that of the nature of concepts which are measured through MAAS as the scale to evaluate mindfulness status. As Walach et al. (2006) argued, since the scale places a priori focus on attention and awareness, other aspects of mindfulness, such as the non-judgmental, accepting attitude, and insightful understanding are left out. However, in other studies, mindfulness has been regarded as a concept related to psychological inflexibility (Hayes et al., 2006, Baer et al., 2006). Thus, considering substantial properties of social language learning strategy, the negative links between mindfulness and this strategy seems to be logical. Another link that proved to be significant in SEM analysis was the positive association between compensation strategy and awareness mindfulness. Metacognitive strategy and openness personality trait also proved significant positive relations via SEM analysis. Neuroticism trait exhibited negative association with affective and social strategies. All of these relations were discussed previously in this section.

5. Conclusion

In this study, we used SEM analysis to provide a more precise estimate of the relationships among language learning strategies, personality traits and mindfulness in a network of associations. Results of the current study indicated that all of these three variables had positive reciprocal relationships with each other. Some of the sub-scales of the main variables involved in the study also proved to be associated with one another. The fact that there is a network of associations among
these three individual learner characteristics, suggests that in any language learning and teaching programs learners must be considered as whole human beings each with their own individual properties. The results of this study confirmed that teachers who are to plan language learning strategy training courses for their students should consider various personality dimensions of their learners as effective factors in selecting the most appropriate strategies used in a specific learning task. There are some limitations that should be taken into consideration. First is that of gender distribution. Almost two third of our participants were females. Thus, it was logically impossible to control for potential sex effects. Secondly, all of the measurement that were used in this study were self-report questionnaires and therefore prone to response bias. Future research in this field should be directed at a further integration of the various conceptualizations of leaners individual characteristics and to incorporate the effects of cultural differences and language on the relationships between learning strategies, personality traits and mindfulness.

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