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An initial study in the development of International Postgraduate Students Academic Stress Scale (IPSASS)

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Abstract
The aim of this study is to develop a new scale, the International Postgraduate Students Academic Stress Scale (IPSASS), for measuring the sources of academic stress on international postgraduate students. A 79-item prototype was developed by reviewing literatures and conducting interviews. Exploratory Factor Analysis (EFA) was used to investigate the contribution of each item and the number of factor in the IPSASS. The result of study revealed that IPSASS had seven sub scales including: (1) Learning Process, (2) Time Management, (3) Financial Problems, (4) Relationship's Building, (5) Supervision, (6) Acquiring Resources, and (7) Academic Performance. The IPSASS is a reliable and valid instrument for measuring the source and level of academic stress on international postgraduate students. This study has contribution significantly to the literature and practice for providing a valuable understanding regarding psychological and academic issues faced by international postgraduate students.

Keywords: scale development, academic stress scale, reliability, validity.

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Introduction

The total number of international students has increased dramatically since the past four decades. According to the Organization for Economic Co-operation and Development (OECD), the worldwide number of international students increased from .8 million in 1975 to 4.5 million in 2012 (OECD, 2014). The increasing amount of international students was predicted to occur continuously in the subsequent years (Ching, Chao, & Lien, 2014). This situation occurs due to some countries has taken a part as the host nation for students who desire to study aboard. For instance, Taiwan has been one of the destinations to study for international students since 1950 (Lee, 2004) from various countries (e.g., Indonesia, Malaysia, Thailand, India, Japan, Philippines, Vietnam, Germany, America, Africa, Turkey, etc). Based on the report from Ministry of Taiwan Education (2012), the total number of international students who enrolled in the Taiwanese university reached up to 40,843 in 2011.

As new comers in Taiwan, many international students encountered various obstacles seriously during their study. A number of findings indicated that international students deal with many problems including academic, social interaction, accommodation, finance, health, language barriers (English and Mandarin), shock culture, admission, and selection, lack of information and communication between students and their university (Chen & Liu, 2011; Chou et al.,, 2012; Lee, 2004; Jenkins & Galloway, 2009). Moreover,

Ching, Chao, and Lien (2014) found international students experienced psychological problems consisting of depression, anxiety and stress during study in Taiwan. In fact, wherever international student study, she/he perceives much stress while studying the board.

The sources of stress may come from academic pressures, language difficulties, culture diversities, living problems and other adjustment barriers (Lee, 2009; Mori, 2000; Sümer, Poyrazli, & Grahame, 2008; Sapranaviciute, Perminas, & Pauziene, 2012). Consequently, those stressors can lead to psychological problems, such as a sense of loss, anxiety, exhaustion, helplessness, loneliness, depression, isolation, and homesickness (Chen, 1999; Meuleman, Garrett, & King, 2015; Sümer, Poyrazli, & Grahame, 2008). The psychological problems also influence concurrently to a student academic performance and well being (Hyun, Quinn, Madon, & Lustig, 2007; Poyrazli & Kavanaugh, 2006).

Stress is the pivotal issue in academic life, especially in the higher education (Agolla & Ongori, 2009) because university is academic environment in which stress is increasing among students (Robotham & Julian, 2006). Academic stress refers to environmental demands and challenges in academic circumstances that surpass the ability of students to deal with the various sources of stress (Ben-Zur & Zeidner, 2012). Particularly, the academic circumstances frequently become greatly stressful for international students during their study abroad (Wan, Chapman & Biggs, 1992). Prior study pointed out that academics constituted the main factor to cause international students perceiving stress (Hashim & Zhiliang, 2003; Poyrazli, 2015; Randal, Naka, Yamamoto, Nakamoto et al., 1998). Previous studies also indicated that academic stress perceived by international students may relate to academic learning (Lee, 2009), language barriers (McLachlan & Justice, 2009; Lin & Scherz, 2014), interaction with an advisor (Adrian-Taylor, Noels, & Tischler, 2007; Yan & Barliner, 2009). Furthermore, classmate, friends, roommate, lecturers (Dusselier, 2005), time management (Konduri, Gupchup, Borrego, & Worley-Louis, 2006), and financial problems (Chen, 1999) can also contribute to academic stress.

International postgraduate students are highly susceptible to perceive stress (Jamsiah, Taher, & Taufik, 2014) in their academic environment because of the afflict pressure for accomplishing their best academic achievement and professional performances (Bang & Montgomery, 2013). The sources of stress perceived by international postgraduate students are from their academic, which was associated with financial difficulties (Kim, 2011; Kono, Eskandarieh, Obayashi, Arai, & Tamashiro, 2015), dealing with lecturer or advisor (Adrian-Taylor et al., 2007; Hyun et al., 2007; Yan & Barliner, 2009), time management (Zhu & Degeneffe, 2011; Yi, Lin & Kishimoto, 2003), and languge barriers (Poyrazli & Kavanaugh, 2006; Sümer et al., 2008).

In spite of many studies were conducted on academic stress among international students, there is a necessary to develop academic stress scale for measuring stress among international postgraduate. It is due to most of academic stress scales ware developed by participating university students, such as Academic Stress Inventory of Students (ASIS) (Lin & Chen, 2009), Stress in Academic Life Scale (SALS) (Alzaeem, Sulaiman, & Gillani, 2010), Survey of College Academic Stressor (SCAS) (Calaguas, 2012), Lakaev Academic Stress Response Scale (LASRS) (Lakaev, 2009), Student-Life Stress Inventory (SSI) (Gadzella, 1994); The Perception of Academic Stress Scale (PASC) (Bedewy & Gabriel, 2015), Academic Expectations Stress Inventory (AESI) (Ang & Huan, 2006), University Stress Questionnaire (USQ) (Spiridon & Evangelia, 2015), and Student Stress Inventory (SSI) (Zeidner, 1992).

Only few researchers developed instruments for measuring academic stress by involving international postgraduate students. They are Konduri, Gupchup, Borrego, and Worley-Louis (2006); Rocha-Signh (1994), and Yang and Clum (1995). Unfortunately, those scales are still neglected or not comprehensive to investigate academic stress experienced by international postgraduate students. Alzaeem, Sulaiman, and Gillani (2010) suggested "Identifying stress and categorize it specifically for certain students requires specially designed tools for each population of students (p.241)". Therefore, the aim of this study was to develop a new academic stress scale for measuring academic stress among international postgraduate students.

Method

Participants were 321 international postgraduate students from 45 countries, which were 81.3% of Asian students, 9.3% of African Students, 5.9% of American Students, and 3.4% of European students.

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Those participants enrolled at fifteen universities in three regions of Taiwan (Northern, Southern, and Eastern). Participants were 183 male (50.8%) and 158 female (49.2%). The average age of participants was 25.8 years. Mostly, the participants enrolled at master program (70.1%), and only 96 enrolled at doctoral program (29.9%).

Primarily, there were 79 items developed based on two steps consisting review literature and interview. The literature relates to academic stress scales including SALS (Alzaeem, Sulaiman, & Gillani, 2010), SCAS (Calaguas, 2012), MSC (Konduri, Gupchup, Borrego, & Worley-Louis, 2006), ASIS (Lin & Chen, 2009), SSI (Zeidner, 1992), SSI (Gadzella, 1994), AESI (Ang & Huan, 2006), LASRS (Lakaev, 2009), PASC (Bedewy & Gabriel, 2015), and USQ (Spiridon & Evangelia, 2015) and various studies concerning with international students (Lee (2009), Yang and Clum (1994), Kim (2011), Mukminin and McMahon (2013), Yi et al. (2003), Zhu and Degeneffe (2011), Yan and Barliner (2009), Poyrazli and Kavanaugh (2006), Andrian-Taylor et al. (2007), Misra et al. (2003), Sovic (2008), Poyrazli and Kavanaugh (2006), Chen (1999), Erichsen and Bolliger (2011), Dusselier (2005), Hashim and Zhialiang (2014), MacClure (2005), Chen (1999), and Mori (2000).

Furthermore, a semi-interview was conducted by involving five international postgraduate students (master and doctoral students). The semi-structured interview protocol was used in order to collect information regarding the sources of academic stress experienced by international postgraduate students during their study in Taiwan. Furthermore, the result of the semi-structure interview was categorized according the main issues faced by international postgraduate students.

A five-point scale was employed as the response format, which is labeled: 1 = no stress, 2 = mild stress, 3 = moderate stress, 4 = severe stress, 5 = extreme stress. This format asked participants to identify their source and level of stress when international postgraduate student deals with every academic environment. A higher score on the five-point scale indicates that the academic environment is very stressful, according to be perceived by the participants.

Exploratory Factor Analysis (EFA) "is to explore how many factors exist among a set of variable and the degree to which the variables are related to the factors" (Khan, 2006, p.686). EFA was conducted in order to understand the simply structure of the 79 International Postgraduate Academic Stress Scale (IPASS) items by involving 321 international postgraduate students. As a part of Exploratory Factor Analysis, Extraction, Percentage of Variance, and Factor Rotation was conducted to investigate the number factors in the IPSASS. *First,* factor Extraction is to remove variance common to sets of variables from the original matrix of association so that after extracting the residual matrix remains (Henson & Roberts, 2006). Principal Component Analysis (PCA) was used as the extraction method. The aim of PCA is to reduce the number of variables through creating linear combinations that retain as much of the original measure 'variance as possible' (without interpretation in terms of constructs) (Conway & Huffcutt, 2003). Researchers suggested that PCA is often used as factor extraction methods for the EFA (Constantin, 2014; Schmitt, 2011). It is due to its ability to provide almost identical results. Therefore, in this study the PCA was used to extract the number of factors for the IPSASS.

Second, Percentage of Variance is a useful method to understand how many factors are useful for the new scale. Khan (2006) recommended the percentage of variance among variables explained by each factor as one intuitive method of determining the number of factors to retain. Moreover, Williams, Onsman, and Brown (2010) suggested that the explained variance was commonly as low as 50-60% in the humanities. *Third,* factor rotation is to enhance the chance of the simple structure to appear. It is a key part of most factor analysis (Furr, 2011). Researchers recommended that oblique rotation is a better method to explain the nature of the factors (Conway & Huffcutt, 2003; Floyd & Widaman, 1995; Furr, 2011; Schmitt, 2011). The Oblique rotation allows each factor to correlate with each other. Schmitt (2011) argued that most educational and psychological factors are correlated. Therefore, in this study, oblique rotation (e.g., promax) was used as the rotation method due to its ability to produce the realistic result and statistically sound factor structures (Schmitt, 2011).

Results and Discussions

Initially, the adequacy of data was evaluated using Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. The KMO demonstrated data has high sampling adequacy (.93). The Bartlett's Test of Sphericity indicated that inter-item correlations was significant (*Chi-Square* = 20284.627, *df* = 3081, $p <$ .001). According to Williams, Brown and Onsman (2012), the data were appropriate to conduct Exploratory Factor Analysis (EFA) due to the adequacy of sample was higher than .50 and the significant of inter-item correlation was lower than .05. Thus, the result of EFA generated seven factors of the

IPSASS with the percentage of cumulative variance stopped at 58.159% as shown in the Table 1.

Table 1.
Total Variance Explained of the Seven Factors of IPSASS

Factors	Initial Eigen-values		
	Total	% of Variance	Cumulative %
1	26.119	33.062	33.062
2	6.422	8.129	41.191
3	3.897	4.933	46.124
4	2.989	3.783	49.907
5	2.505	3.171	53.078
6	2.130	2.696	55.774
7	1.884	2.385	58.159

In order to determine the names of each factor (sub-scale) and items in the seven factors of IPSASS, thus factor loading greater than .40 was retained due to it is very strong for the structure of underlying construct. Many researchers recommended that factor loadings (item-factor) more than .30, or .40 are reasonably strong (Floyd & Widaman, 1995; Furr, 2011). Particularly, items with high communalities are also necessary in determining the factorability of a data set (Worthington & Whittaker, 2006). It is to confirm that those items are related to others items. Consequently, items have to own communalities higher than .40 (Castello & Osborne, 2005: Worthington & Whittaker, 2006). Accordingly, fifty-six items (variables) on seven factors had been selected that each factor consists of eight items. It meets the minimum number of six variables for conducting factor analysis (Kahn, 2006). Hence, the IPSASS consists of fifty-six items in the seven factors as shown in the Table 2. Those items of the IPSASS have high factor loading (from .50 to .96) and high communalities (from .45 to .73).

Table 2.
Seven factors with 56 items for the IPSASS

Rank	Items	Loading	h^2
Factor 1: Learning Process			
1.	Completing assignments	.83	.70
2.	Writing assignments/papers	.83	.65
3.	English language incapability	.77	.44
4.	Giving a presentation	.75	.59
5.	Comprehending English textbook, journals, and thesis/dissertation	.74	.52
6.	Trying new things or conducting experiments	.73	.56
7.	Participating in classroom discussions	.72	.54
8.	Coping with independent learning	.68	.62
Factor 2: Time Management			
1.	Discovery of appropriate time for recreational activities	.90	.67
2.	Doing the schedule of activities	.90	.70
3.	Reviewing activities	.87	.69
4.	Priorities setting	.81	.68
5.	Evaluating daily schedule	.80	.70
6.	Taking part for extra-curricular activities in university setting	.80	.51
7.	Schedule arrangement	.74	.69
8.	Balancing between academic activities and social activities	.63	.60
Factor 3: Financial Problems			
1.	Paying bills (e.g., dormitory fee, health insurance fee, tuition fee, etc)	.83	.70
2.	Saving money for academic uses	.82	.74
3.	Budgeting of allowance	.81	.75
4.	Dealing with the cost of living	.80	.76
5.	Lack of sufficient funds	.79	.71
6.	Finding part-time job toward additional fund	.77	.58
7.	Having a part-time job on campus or off campus	.73	.56

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8.	Dealing with unexpected expenses	.69	.61
Factor 4 Relationship's Building			
1.	Expressing feelings to lab-mate, classmates, and roommates	.96	.48
2.	Making friends with international students	.93	.63
3.	Communicating with international students	.92	.73
4.	Arguing with lab-mates (classmates)	.77	.71
5.	Competing with classmate (lab-mates)	.72	.72
6.	Dealing with lab-mates (classmates)	.65	.45
7.	Disturbances from lab-mate, classmates, and roommates	.66	.72
8.	Handling the expectation of lab-mates, classmates, and roommates	.66	.68
Factor 5: Supervision			
1.	Advisor has not enough time	.81	.48
2.	Lack of communication with advisor	.76	.63
3.	Preparation to discuss with advisor	.73	.73
4.	Lack of authority or support to organize academic work	.71	.71
5.	Carrying out the results of discussion with advisor	.69	.72
6.	Choosing advisor	.68	.45
7.	Discussion with advisor concerning research projects	.67	.72
8.	Dealing with the advisor's expectations	.53	.68
Factor 6: Acquiring Resources			
1.	Changing/adding of courses	.82	.61
2.	Following of enrolment procedures	.80	.65
3.	Applying for the certificate of resident	.75	.54
4.	Applying for scholarship	.73	.63
5.	Course selection	.72	.61
6.	Waiting for scholarship announcement	.63	.54
7.	Completing documents	.62	.56
8.	Dealing with university's administrator	.54	.52
Factor 7 Academic Performance			
1.	Academic performance that is not good as other students	.86	.70
2.	Dealing with academic performance	.82	.75
3.	Fail to achieve academic success	.81	.64
4.	Hard working in academic activities	.69	.67
5.	Handling of self-expectations	.63	.65
6.	Maintaining motivation in academic activities	.59	.68
7.	Taking some courses that make out of breath	.54	.52
8.	Taking some courses that are not attractive	.50	.47

Note: h^2: Communalities

Validity of the IPSASS was investigated based on its content and criterion-related validity. The content validity of the IPASS was examined based on the judgment of the experts. Seven experts corrected and confirmed that all items in the IPSASS were valid. The criterion-related validity was examined for the IPSASS. The criterion-related validity refers to the empirical relationship between one measurement with its performance on some other variables (DeVon, Block, Moyle-Wright, Ernst, Hayden et al., 2007). The criterion-related validity can be determined by investigating the relationship between scores on a measurement and some independent variables (Reber & Reber, 2002). The criterion-related validity of IPSASS was examined by using two single-item scales, namely: (1) Single Item General Stress Scale (SIGSS) and (2) Single Item Happiness Scale (SIHS). The two single variables were designed to check correlation between IPSASS and other variables, such as perceiving of stress and feeling of happiness.

Two assumptions were proposed and accepted to validate the IPSASS. *First,* there would be a positive correlation between the IPSASS and the SIGSS. Kyriacou and Sutcliffe (1978) found that the SIGSS had positive correlation significantly with source of stress and symptoms of stress among teachers. After calculating, the SIGSS has a positive significantly correlation with the IPSASS (r = .61, p < .001). Thus, it was convinced further that the IPSASS correlates positively with the SIGSS. Hence, this first assumption was accepted well.

Second, there would be negative correlation between the IPSASS and the SIHS. Previous study found

that stress had negative correlations with happiness (Abdollahi, Abu Talib, Yaacob, & Ismail, 2014; Jung, 2014; Schiffrin & Nelson, 2010). After calculating, the single item to measure the feeling of happiness (SIHS) on international postgraduate students has inverse correlation with the IPSASS (r = -.120, p < 0.05). It was convinced further that the IPSASS correlated positively with the SIHS. Hence, this second assumption was accepted well.

In order to establish the reliability of the IPSASS (International Postgraduate Academic Stress Scale), the internal consistency was calculated. After calculating data collected from participants (n=321), the reliability (α) of the IPSASS was very high (.96). As shown in the Table 3, the Cronbach's alpha of the seven subscales was ranged from .89 to .93.

Table 3.
Reliability (α), Mean (M), and Standard Deviation (SD) of the IPSASS

Subscale of the IPSASS	Number of Items	M (SD)	Reliability (α)
Subscale (1): Learning process	8	19.73 (6.47)	.89
Subscale (2): Time management	8	19.20 (6.98)	.92
Subscale (3): Financial problems	8	19.79 (8.15)	.93
Subscale (4): Relationship's building	8	14.99 (6.07)	.90
Subscale (5): Supervision	8	20.06 (7.75)	.92
Subscale (6): Acquiring resources	8	17.23 (6.31)	.89
Subscale (7): Academic performance	8	21.13 (7.34)	.91
Total	56	132.13 (35.88)	.96

International Postgraduate Students Academic Stress Scale (IPSASS) was investigated based on the psychometric approach (Costello & Osborne, 2005; Furr, 2011; Kline, 2013; Williams et al., 2012). Particularly, Exploratory Factor Analysis (EFA) was used to determine the structure of the IPSASS. The result of analysis by EFA revealed that IPSASS consisted of seven-sub scales with 56 items with high factor loadings and item communalities.

Firstly, Learning Process is very challenging for international postgraduate students due to they have to deal with the various academic demands. This study found that the students perceive stress during learning process. The learning process consists of assignments, class discussion, giving presentation and language difficulties. Those items were supported by the prior findings that indicated international students perceive stress during their learning process (Erichsen & Bolliger, 2011; Lee, 2009; Kim, 2011; Mukimin & McMahon, 2013; Sovic, 2008).

Second, Time Management is one of the crucial stressors for international postgraduate students. This present study revealed that those who failed to manage their time appropriately; they experienced stress in academic life. Previous study also found international students perceive stress due to time management issues (Konduri, Gupchup, Borrego & Worley-Louis, 2006; Yi, Giseala & Kishimoto, 2003). In addition to time management, Zhu and Degeneffe (2011) revealed international postgraduate students who have many demands of their schedules and time for the academic workload (e.g. assignments) experience pressure. This suggest that time management is one important issues encountered by international postgraduate students.

Third, Financial Problem is the source of academic stress experienced by international postgraduate students. Actually, the financial problem has been documented well in the previous academic stress scale due to the financial problems are the most common source of stress to international students. For instance, prior studies found that international students were very likely to perceive stress due to financial issues (Forbes-Mewett, Marginson, Nyland, Ramia, & Sawir, 2009; Mehdizadeh & Scott, 2005; Sherry, Thomas, & Chui, 2010; Yang & Clum, 1995). Therefore, international postgraduate students are susceptible to perceive stress in academic environment due to process of survival in maintaining a good academic performance, social interaction, and work. This finding is supported by previous research (Salamonson, Andrew, & Everett, 2009; Kono, Eskandarieh, Obayashi, Arai, & Tamashiro, 2015).

Fourth, Relationship's Building with other students is very important for international postgraduate

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students who are studying aboard. This current research found that 'relationship's building' is the source of academic stress. For instance, difficulties to deal with other students (e.g., roommate, classmate, and lab-mate) are very likely to cause stress. Akhtar and Kroner-Herwig (2015) argued building new social networks and adjusting to new cultural demands is not easy. Consequently, difficulties to build relationship can contribute to perceive stress. Previous study found that international students perceived stress when build relationship with others students (Dusselier, 2005; Hashim & Zhialiang, 2014).

Fifth, Supervision is the source of academic stress to international postgraduate students. Particularly, international postgraduate students have to deal with their advisor in the supervision process. This present research reported that the students pointed out various problems were associated with the supervision, including advisor's lack of time, communication, choosing advisor, preparation, discussion, and expectations. This finding is supported by prior studies that supervision can be the sources of academic stress to international postgraduate students (Adrian-Taylor, Noels & Tischler, 2007; Yan & Barliner, 2009). Moreover, Hyun, Quinn, Madon, and Lustig (2007) documented also that there was positive correlation between problems associated with academic advisor and stress.

Sixth, Acquiring Resources is the source of stress to international postgraduate students. This finding revealed that international postgraduate students perceived academic stress while acquiring their academic needs in the host country. The resources are acquired while studying aboard associated with course selection, enrolment procedures, the certificate of resident, scholarship, documents, and interaction with administrator. Kim (2011) indicated that some requirements, such as international student visa and scholarship problems could be the additional sources of stress on international students. Furthermore, international students also faced stress related to universtiy service (Oswalt & Riddock, 2007)

Finally, Academic Performance is one academic stressor to international postgraduate students. Most international students studying aboard want to perform the best academic. They will be frustrated and worry when they did not meet their expectation. Hence, those who pursue the best in academic tend to perceive stress in academic. This current research found that academic performance was associated with handling of self-expectation, maintaining motivation, taking course, and study hard. Previous research indicated self-expectation is as the source of academic stress on international students (Khawaja & Dempsey, 2007; Yang & Clum, 1995). In summary, the IPSASS demonstrated high reliability and was supported by factorial and criterion-related validity, which related to two variables, including perceiving of stress and happiness. Therefore, the IPSASS is a reliable and valid instrument for measuring academic stress on international postgraduate students.

Conclusions

This study was to develop International Postgraduate Students Academic Stress Scale (IPSASS). The instrument is valid and reliable that can be used to investigate the source and level of academic stress among international postgraduate students. Due to the IPSASS is initial scale development, the further studies are required to examine and improve the psychometric qualities of the IPSASS. For instance, the future research should involve a large sample of international postgraduate students from various countries and universities, and decrease the number of participants who are from Asian Countries. Furthermore, the IPSASS requires validation further in order to support psychometrically. Other instruments may be administered with the IPSASS to validate differently.

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