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Evaluating a Chinese Adult Attachment Questionnaire Using a Taiwanese Sample

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ABSTRACT

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Researchers have taken the adult attachment instruments established in the western countries into other cultural settings. Taiwan is one of the many countries to which cross-cultural adult attachment research has been extended to, and where translated attachment survey instruments were applied. The problem with these translated measurements in Taiwan, however, is that the commonly-used instruments were not peer-reviewed, and often no reliability tests were even done, and the cultural appropriateness of these translated measurements was not evaluated. The usage and results of these instruments may therefore be questionable. The purpose of this current study is to present a Mandarin Chinese version of the Adult Attachment Questionnaire (AAQ) that was translated following common protocols, administered to 320 native Taiwanese participants, and evaluated for measurement invariance. Various statistical analyses (including reliability test, confirmatory factor analysis, , and measurement invariance test) were conducted, and results from the Taiwanese college students who responded to the Chinese AAQ were compared with the results of the same instrument written and administered in its original English format and delivered to 330 participants in the United States. CFA revealed that a revision of the original AAQ was necessary. Measurement invariance test further indicated that while configural invariance was established, the findings on metric invariance were mixed, and the scalar invariance was partially established. These findings suggested a potential lack of equivalence between the Chinese and English adult attachment measurement. Specifically, some items of the scales were less invariant than others, indicating specific possible cultural differences between the two ethnic groups.

Keywords: adult attachment, measurement development, Taiwan

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Adult attachment has been a research focus for a few decades in various fields across different cultures (e.g., Pittman, Keiley, & Kerpelman, 2011; Selcuk, Zayas, & Hazan, 2010; Wei, Russell, Mallinckrodt, & Zakalik, 2004). Many researchers have taken the adult attachment findings established in western countries into other cultural settings to examine how well or differently the theory applies (Van Ijzendoorn & Sagi-Schwartz, 2008). Such efforts, especially in quantitative studies, naturally rely heavily on the instrument through which data is collected and analyzed. However, appropriately-developed instruments (especially in a cross-cultural setting) can be hard to come by due to many issues such as reliability, validity, and cultural appropriateness (Milfont & Fischer, 2015; Segall, Dasen, Berry, & Poortinga, 1990). Among these issues, cultural appropriateness is often the major and most neglected subject. The terms cultural appropriateness (and/or cultural equivalency) refers to the issue of whether a measurement developed in one culture can be appropriately used in another culture, and whether the measurement means or measures the same thing from one culture to another (Lau, Cummins, & McPherson, 2005; Watkins, 2010; Wei et al., 2004). Just like any other area of cross-cultural study, the research of adult attachment would benefit from including these issues.

Taiwan is one of the many countries to which cross-cultural adult attachment research has been extended. The primary approach of adult attachment studies in Taiwan (or with Taiwanese samples) has been to utilize attachment survey instruments translated from English into Mandarin Chinese, the official language in Taiwan (e.g., Huang & Chen, 2011; Wang, Lin, & Chang, 1997). The problem with these translated measurements in Taiwan is that some commonly-used instruments are not peer-reviewed, and often no reliability tests are even done (e.g. Li, 2008; Tsai & Wu, 1998; Tseng, 2007; Wu & Lin, 2005). The usage and results of these

instruments may therefore be questionable. While a few translated instruments are peer-reviewed, and various tests of reliability are taken into consideration (e.g., Huang & Chen, 2011; Wang et al., 1997), no study has examined or evaluated the cultural appropriateness of these translated measurements. Though an instrument designed and written in a Western country can be translated and its reliability can be verified, can it be appropriately applied in another culture? Would it capture the same desired latent concepts both in the original culture in which the instrument was designed and in the culture for which the instrument was translated? If the equivalency is either partial or non-existent, what does that mean?

To expand the literature on cross-cultural studies of adult attachment styles in Taiwan, in the current study a Mandarin Chinese version of the Adult Attachment Questionnaire (AAQ) was translated and administered to native Taiwanese participants. The AAQ was developed by Simpson and his colleagues (see Simpson, 1990; Simpson, Rholes, & Phillips, 1996), transforming Hazan and Shaver's (1987) three-category adult attachment prototypes (namely secured, anxious, and avoidant attachment) into Likert-type items. This influential scale has been used in many adult attachment studies over the past two decades, and the scale itself as well as the research findings derived from this study has been cited close to 1,000 times in academic journals. Prior to this study, the AAQ had not yet been adopted in studies in Taiwan. Because the AAQ was a long-standing scale has been found to capture the adult attachment styles well (Mikulincer & Shaver, 2007), it appeared to fit the purpose of this study and was therefore adopted as part of the research design. The results from the Taiwanese participants filling out the Chinese AAQ were then evaluated for measurement invariance, a key type of evaluation that has not been done yet for adult attachment instruments in this cultural context. It is hoped that by

accomplishing these tasks, the instrument can be developed and further utilized to study adult attachment in Taiwan.

In order to present the Chinese AAQ, the current trends in developing adult attachment instruments in Taiwan were also examined. Finally, the results from a sample of 320 Taiwanese college students who responded to the Chinese AAQ were compared with the results of the same instrument written and administered in its original English format and delivered to 330 participants in the United States to attempt to establish one aspect of the cultural equivalency of the this translated instrument.

Guiding Theory

The development, administration, and analysis of the Chinese AAQ in Taiwan was based on attachment theory, with a special focus on the studies of adult attachment in a cross-cultural setting. Attachment theory has been a research focus for over half a century, started by John Bowlby (1958) and carried on by many other prominent scholars (eg., Ainsworth, 1963; Harlow, 1958; Sroufe & Waters, 1977). The emotional bonds the researchers studied were found among both rhesus monkeys and human infants and children (Bowlby, 1958; Harlow, 1958). Attachment theory states that children develop and seek attachment and proximity to their primary caregivers, and such bonds are particularly evident when threats are present and comfort is needed. The children are distressed when the proximity to their caregivers is not satisfying, or if they perceive threats or dangers. In situations like this, their attachment system is activated, and they seek out their caregivers for comfort and soothing (Cassidy, 2008). Under the attachment system, children can be characterized as either securely attached or insecurely attached.

Researchers believe that the attachment system lasts throughout life (Feeney, 2008), and attachment studies have thus been applied to adolescents and adults (Allen, 2008). Through research, it is established that adults also monitor for potential threats in the surrounding environment and continue to seek proximity (Mikulincer & Shaver, 2007). The difference is that such attachment bonds are often found between the adults and their romantic partners, instead of a primary caregiver as in the case of infants and children. For adults, there are also secure and insecure attachment representations. Adults consistently seek proximity with their romantic partners, and monitor for potential threats. If threats are detected, their attachment system is activated and they seek support, comfort, and security from their partners. If their needs and their attempts for security are not consistently met, they then may experience anxiety and/or avoidance as strategies to deactivate their insecurity. The history of the adults' experiences of activating/deactivating the attachment system forms primary attachment styles which determine how individuals tend to interact with others in relationships. These adult attachment styles include secure, avoidant, and anxious attachment styles. While secured individuals feel comfortable with close relationships and dependence, avoidant individuals tend to find being close to others and having mutual dependence to be uncomfortable. Meanwhile, anxious individuals are prone to more closeness and are often fearful of abandonment. The attachment model is crucial, fundamental, and merits continual research attention because it is proven to predict individual well-being as well as couple relationship outcomes (Mikulincer & Shaver, 2007).

Attachment research also has been studied extensively in various cultures. In a review of several decades of attachment research in cross-cultural settings, Van Ijzendoorn and Sagi-Schwartz (2008) commented that a few issues were raised in these cross-cultural attachment

research efforts. One of the important issues is the universality versus cultural-specificity aspects

of attachment relationships (see also Bakermans-Kranenburg & van IJendoorn, 2009), which

researchers continue to address by examining the similarities and differences of attachment

bonds across cultures. So far, most of the evidence indicates that attachment bonds are present

among human beings regardless of culture. However, culture-specific attachment development

also exists, which means that demonstrations of attachment behaviors may be different in

individual cultures (Van Ijzendoorn & Sagi-Schwartz, 2008). The rationale behind such issues is

that perhaps humans detect the norm within a culture, and thus develop strategies that will meet

the demand of the environment, which differ from culture to culture. Together, these two aspects

of attachment development state the universality of attachment bonds, and yet also provide

possibilities for minor environmental and contextual differences that are unique to each culture.

Applying attachment theory, the current study is based on the premises that (1)

attachment bonds are universal and exist across human lifespan and cultures, and yet (2) minor

differences in the expressions of attachment bonds may also manifest themselves and differ from

one cultural setting to another. Perhaps due to the theoretical assumption of the universality of

adult attachment, many instruments have already been translated and applied in different

cultures. However, these instruments were applied without first testing to see if any culture-

specific differences existed. If cultural specific differences do exist, it would then be

inappropriate to simply translate a measure and use it on another culture that manifests

fundamental differences in a concept. In order to examine this crucial issue, the current study

was designed and carried out to help broaden the literature on this subject.

Evaluating an Instrument to Be Used in Taiwan

Taiwan is an Eastern culture much more monocultural and cohesive than China due to

geographical size. Because of its intertwined history with China, it is deeply rooted in ancient Chinese philosophies, primarily Confucianism. Confucianism encourages collectivism-oriented ideologies which state that every individual is responsible for achieving harmony in the larger unit, such as family or society (Chen & Luster, 2002). Thus, Taiwanese culture is often also considered to be collectivistic (Ali, Lee, Hsieh, & Krishnan, 2005; Chiou, 2001). In order to achieve harmony in the collective, individuals oftentimes may need to suppress personal feelings or sacrifice self-interests in order to achieve the greater group goals (Huang & Gove, 2012). Individuals under such influence are oftentimes perceived as conservative (Zhang, Lin, Nonaka, & Beom, 2005), and their emotions are often highly regulated (Bond, 1993). Embedded in such culture, researchers have discovered that many aspects of Taiwanese practices and behaviors (including communication patterns and parenting practices) differ from those in the United States (e.g., Camras, Kolmodin, & Chen, 2008; Lin & Fu, 1990; Zhang, 2007). These findings and contrasts of cultures thus make Taiwan an interesting environment to study whether adult attachment would differ in the two cultures, especially since adult attachment originated in childhood attachment and is closely associated with emotional expression and communication.

General Guidelines on Instrument Evaluation

There are several general guidelines when it comes to developing instruments in a cross-cultural setting. These guidelines include developing the instrument using an emit or etic approach, the translation procedures (if the etic approach is used), testing of reliability, and evaluating cultural appropriateness (Carroll, Holman, Segura-Bartholomew, Bird, & Busby, 2001; Dimitrov, 2012; Mallinckrodt & Wang, 2004; Milfont & Fischer, 2015). The terms "emic" and "etic" originated from Pike (1967) and were summarized and expanded by Berry (1969). In the emic approach, the researchers study the phenomena from within the cultural setting, and

develop the instrument from the perspectives of the natives. In contrast, the etic approach comes

from an outside perspective, and compares the cultures. Researchers utilizing an etic approach

often take established theories/findings/instruments and apply them to a different culture to study

the similarities or differences. The etic approach is often criticized because the researchers'

perceptions of the study participants is often rooted in and therefore influenced by another

culture. However, the etic approach is still a more common approach in cross-cultural adult

attachment studies (Van Ijzendoorn & Sagi-Schwartz, 2008) because attachment theory and

research originated in Western countries and is being applied to other cultures based on the idea

of universality.

Within the etic approach, there are many procedures that have been developed over the

years to adjust for potential problems and dangers of an etic approach. One of the major

procedures is the translation process. An ideal translation process entails translation and back

translations done by native speakers of both the original culture and the culture to be studied

(Carroll et al., 2001; Mallinckrodt & Wang, 2004). Still, even if translation is done accurately,

cultural nuances often exist so that the translators have to work with potentially difficult

situations. After proper translation was done, it is often suggested that statistical analyses be

conducted to evaluate the reliability of the instrument constructs (Milfont & Fischer, 2015), and

to test whether the instrument can be appropriately used to compare the different cultural groups

(Chen, 2008).

Adult Attachment Measurements Used to Study Taiwanese

Research studies related to adult attachment using Taiwanese samples started in the

1990s. In the past several decades, about 50 studies have been peer-reviewed and published. (If

the non-peer-reviewed studies such as graduate school theses and dissertations are also included,

close to 100 studies have been completed.) These studies used adult attachment as one of the primary variables to study Taiwanese samples, and surveys in Mandarin Chinese were administered to native Taiwanese participants. (While Taiwan is a separate country from China, most Taiwanese residents share Chinese origin, and the official language in Taiwan is Mandarin Chinese.) These research studies were on a variety of topics and how they were related to adult attachment, such as adult attachment and peer relationships, romantic relationships, family violence, trauma, attitudes towards marriage, and internet usage (e.g., Li, Lin, & Hsiu, 2011; Liu, Wu, & Lin, 2009; Sun, 2014; Tseng, W. C., 2007; Wu & Lin, 2005).

These adult attachment instruments used in the Taiwanese studies were mostly developed using the etic approach. That is, the researchers adopted an existing instrument developed and written in another culture and language, and translated them into Mandarin Chinese to apply to the Taiwanese culture (e.g., Huang & Chen, 2011; Wang et al., 1997). However, the quality of the instrument translation and development is oftentimes questionable, and the credibility of these instruments vary dramatically from study to study. In some cases, the instruments used in the studies were adopted from other authors' unpublished theses / dissertations or even conference posters (e.g., Li et al., 2011; Liu et al., 2009; Sun, 2014; Wang, 2008; Wu & Yao, 2008). In other cases, the instruments used in the studies appeared to be self-translated by the authors, and detailed instrument development processes such as a credible translation process were not mentioned at all (e.g., Li, 2008; Lin, Ko, & Wu, 2011; Lin, Wang, & Wu, 2005; Tsai & Wu, 1998; Tseng, 2007; Wu & Lin, 2005). In yet other cases, the instrument was developed by a large association, such as the International Sexuality Description Project (ISDP) which involved collaboration from more than 17,000 participants from 62 cultures. Still, studies with these instruments and data also failed to report how the instruments were translated and/or how well

the items worked together in terms of reliability and whether they were appropriate for use in the cultural context of Taiwan (e.g., Schmitt, 2008; Schmitt et al., 2004). A lack of detailed reporting of instrument development in all of these cases mentioned demonstrate numerous problems.

Despite the larger trend of unsophisticated development of adult attachment instruments, a few studies did demonstrate both an appropriate translation process and well thought-out and adequate reliability tests. For example, to ensure translation accuracy, Mallinckrodt and Wang (2004) adopted a series of vigorous translation procedures, including English-to-Chinese translation, Chinese-to-English back translation, and native speaker proof reading. Wang and colleagues (1997) tested the translated instruments using alpha reliability and multidimensional scaling. Huang and Chen (2011) conducted reliability tests, ANOVA, and exploratory and confirmatory factor analyses on their translated measures. While in these cases, the authors were careful in ensuring the reliability and the proper procedure of instrument translation, none of the studies took the cultural equivalency issue into consideration, or tested whether the instruments were measuring the same concepts both in the original language/culture and in the target language/culture.

The Need for Measurement Invariance Tests

The issue of cultural appropriateness is crucial especially in measurement development in cross-cultural studies. When a measurement is developed in one culture and carried to another culture without first checking if the constructs captured in the original culture function the same in the target culture, it could lead to the potential hazards of capturing only a superficial representation of the constructs and dismissing the underlying nuances that are rich and unique to the target culture (Watkins, 2010). It is therefore very important to first conduct a series of evaluations to begin to establish whether an instrument is appropriate to be used in another

culture or not. Measurement invariance tests are a good way to conduct such an evaluation (Chen, 2008). By conducting measurement invariance tests, a multi-group confirmatory factor analysis is conducted to measure the constructs across different groups. The goodness-of-fit index is then examined to compare the model fit of the different nested models (Cheung & Rensvold, 2002). Different levels of equivalency in the construct (including factor loadings, intercepts, and residual variances) are also checked. If an equivalence in the construct is not established, it is inappropriate to assume that the construct is equivalent across groups. In the case of cultural studies, if measurement invariance is not achieved, the construct should not be freely used from one culture to another without first examining potential reasons behind the lack of invariance. Forcing an instrument into another culture prematurely without first checking the equivalency is both theoretically and statistically inappropriate and could lead to various problems such as an imposed etic, meaning to inaccurately imposing an idea that works in one culture onto another culture (Dyer, 2015; Segall, Lonner, & Berry, 1998). The current developmental progress of the adult attachment studies in Taiwan has clearly come to the point where such test needs to be conducted.

Research Questions

In summary, the purposes of this current study are to first translate an adult attachment instrument in Mandarin Chinese, and then test its cultural appropriateness by conducting invariance tests. To achieve these purposes, the following research questions are asked:

(1) Does the Mandarin Chinese version of the adult attachment scale have adequate reliability when evaluated using the established guidelines in the etic cross-cultural approach (e.g., Carroll et al., 2001; Mallinckrodt & Wang, 2004; Milfont & Fischer, 2015)?

(2) Can measurement invariance be established between the Chinese and English versions of

the adult attachment Questionnaire?

Methods

Samples and Procedures

Samples. The participants for this study were recruited from universities in Taiwan and

the United States, both using the RELATE online survey (Busby, Holman, & Taniguchi, 2001;

see also http://relateinstitute.com/). This survey includes a variety of questions in areas of

personal characteristics and familial / romantic relationships, such as communication, conflict

resolution, and attachment styles. The participants in Taiwan were recruited from university

undergraduate and graduate classes, and included 320 individuals (258 females, 62 males),

whose ages ranged from 18 to 34 (with a mean age of 21.7). The participants in the United States

were recruited from a wide variety of settings including university undergraduate and graduate

classes and other venues such as relationship education experiences, counseling and educational

workshops. For the purpose of this study, only Caucasian Americans were included in the final

sample, which is a total of 330 individuals (227 females, 103 males). Their age ranged from 18

to 35, with a mean age of 23.6. In terms of education level, for the Caucasian sample, 2.1% had

high school diploma or less education, 60.7% had some college education, 11.5% had

Associate's degrees, 10.9% had Bachelor's degrees, and 14.8% were in the process of

completing or have completed graduate degrees. For the Taiwanese sample, 81.5% had some

college education, 2.2% had Associate's degrees, 4.7% had Bachelor's degrees, and 11.6% were

in the process of or had obtained graduate degrees. All participants filled out a consent form

prior to answering the surveys.

Measures. The measure used in this study is a commonly used Attachment measure, the Adult Attachment Questionnaire (AAQ) developed by Simpson (1990) and colleagues (Simpson et al., 1996). It includes 17 items, which were designed to be loaded on two scales: attachment anxiety scale (such as "I often worry that my partners don't really love me") and attachment avoidance scale (such as "I don't like people getting too close to me"). There are a total of 17 items, rated on a 7-point scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = undecided, 5 = somewhat agree, 6 = agree, and 7 = strongly agree). Ten of the total 17 items with negative valence were reverse-coded.

To ensure the accuracy of translation, the AAQ was forward-translated (English to Chinese) and backward-translated (Chinese to English) by two bilingual speakers whose native language was Mandarin Chinese. The backward-translated script was reviewed by a native English speaker to ensure the accuracy of the translated product. The final Chinese translation version of AAQ was then reviewed by a third native Mandarin Chinese speaker to ensure that all concepts described in the items were easily understood in Chinese.

For a detailed list of the items in both the original English version and the translated Chinese version of AAQ, please refer to Appendix 1.

Analyses

To answer each research question, the following analyses were conducted, using IBM SPSS Statistics 23 and MPlus 7.

Answering research question 1. In order to answer the first research question regarding the reliability of the Chinese version of AAQ, statistical analyses including preliminary analyses (such as an overview of means, standard deviations, correlational analyses), Cronbach's Alpha reliability analysis, and confirmatory factor analysis were conducted for both the English and the

Chinese versions of AAQ. Because the original English AAQ is a long-standing instrument utilized repeatedly, comparing the preliminary analyses results of the instrument in both languages could reveal any initial concerns. The descriptive analyses would provide a layout for the basic relationships among the 17 items in the scales. Cronbach's Alpha indices would reveal the internal reliability of the items in the scales. Confirmatory factor analyses would also establish how well the items hold together in demonstrating the two separate latent constructs (namely the avoidant and anxious attachment scales).

Answering research question 2. To answer the second research question, a measurement invariance test was conducted to evaluate various levels of equivalence of the English and Chinese AAQs across the Taiwanese Asian group and the American Caucasian group. Following the guidelines outlined by Muthén and Muthén (1998-2012) as well as Brown (2015), four models ought to be tested: the configural, metric, scaler, and strict models. Within the configural model, all parameters (including factor loadings, intercepts, and residual variances) are freely estimated across the two groups. If the configural invariance is established, that would mean the basic factor structure is equivalent across the groups, and that the same items are used for each latent factor. For the metric model, the factor loadings are constrained to be equal across groups, but the rest of the parameters are estimated freely. If the metric invariance is established, it means the relationship between the items and the factors are invariant across groups. In a scaler model, both the factor loadings and the intercepts are constrained to be equal, but the residual variances are freely estimated. Finally, in a strict model, factor loadings, intercepts, and residual variances are all constrained to be equal across groups. While this is the ideal procedure, if invariance is not established in all models, the testing will stop at the model in which the invariance cannot be found.

It is important to note that the traditional statistical index used to determine level of invariance is the Chi-square value. However, Chi-square has become known to be sensitive to large sample sizes, and therefore may not be the best standard to use. As suggested by various scholars (such as Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2008; Putnick & Bornstein, 2016), CFI is a more reliable alternative fit index when comparing model fit information and in judging whether the null hypothesis of measurement invariance should be accepted or not. However, there are various opinions when it comes to a proper threshold for the CFI differences. Cheung & Rensvold (2002) recommended that a value of CFI difference smaller than or equal to .01 should indicate that measurement invariance was established. Meade et al (2008), on the other hand, suggested a threshold CFI difference of .002. Meanwhile, Putnick & Bornstein (2016) commented that .01 was too loose a standard, and yet .002 would be too strict. They went on to suggest that researchers make informed decisions, and yet they did not provide any specific recommended CFI thresholds. In this current study, both Chi-square and CFI difference tests would be performed to compare the configural, metric, scaler, and strict models in order to find out the level at which measurement invariance is established.

After identifying the level of invariance, the possibility of partial measurement invariance would also be examined. If found, further investigations would then be conducted to identify the items that contribute to the partial invariance.

Results

Preliminary Analyses

Descriptive statistics did not yield suspicions regarding variables and the scales. The correlations were as expected and consistent with previous associations found in the literature. Table 1 lists the means, standard deviations, and correlations among the study variables.

Reliability analyses showed that for the English Adult Attachment Questionnaire, Cronbach's

Alpha was .84 for the avoidant attachment scale and .83 for the anxious attachment scale. For the

Chinese AAQ, Cronbach's Alpha was .72 for the avoidant attachment scale and .77 for the

anxious attachment scale.

While descriptive statistics and reliability analyses appeared to provide fairly ideal

outputs for the scales, confirmatory factor analyses produced unexpected outcomes. Because the

AAQ is an established instrument which has been used in a large number of studies over the past

20 years, it was assumed that the factor structure was solid and that the items would load well on

the designed factors. However, to the author's surprise, not only the Chinese translated AAQ but

also the original English AAQ confirmatory factor analyses results yielded very poor model fit

and showed that several items did not load well on the designed factors. For the English AAQ,

model fit information showed that CFI was .84, TLI was .81, with RMSEA being .10. For the

Chinese AAQ, CFI was .84, TLI was .80, with RMSEA being .08.

Because of the poor confirmatory factory analyses results, an exploratory factor analysis

was conducted in order to re-examine the fundamental factor structure(s) for the AAQ. All 17

items of the AAQ in both languages were included in the exploratory factor analyses, and models

of 1 to 5 factors were tested. Results in Table 2 showed that for the English scale administered to

a U.S. sample, the most appropriate model for these 17 items was in fact a 3-factor model, while

the most appropriate model for the Chinese scale administered to Taiwanese sample would be a

4-factor model. This is inconsistent with the original design of the English AAQ, as the 17 items

ought to have loaded onto 2 factors (namely anxious and avoidant attachment) according to

design. Particularly, when examining a 3-factor exploratory model to identify which items were

not loading well, it was found that item 3 in the avoidant attachment scale as well as items 10,

13, and 15 in the anxious attachment scale were not loading well with their designed factors. Item 3 of the avoidant attachment scale simply did not seem to load very well on any factor, while items 10, 13, and 15 were forming a separate third factor for both the English and the Chinese AAQ (see Table 3).

Based on the exploratory factor analyses outputs, it appeared that there was a need to re-examine the structure between the items and the factors for the English AAQ. A modified confirmatory factor analysis for the English AAQ (based on the suggestion of exploratory factor analyses) were performed, and models with and without the 4 problematic items (as revealed in exploratory factor analysis) were estimated. Results indicated that if the 2-factor structure as designed by Simpson and colleagues (1990, 1996) is to be maintained, the 4 problematic items with poor loadings would need to be eliminated from the avoidant and anxious attachment scales. Results showed that after the 4 items were removed, the revised English AAQ appeared to be much more ideal, CFI=.95, TLI=.94, RMSEA=.07 (see Figure 1).

The preliminary analyses showed that while the reliability tests did not manifest major problems, factor analyses demonstrated that some modifications to the original English AAQ structure were needed. After modifying the English AAQ by removing items 3, 10, 13, and 15, the instrument then appeared to support a good 2-factor structure as the instrument was originally designed.

Measurement Invariance Test

After the factor structure was finalized for the English AAQ, measurement invariance tests were conducted to see if the relationships between the individual items and the factors behaved similarly for both the English and the Chinese AAQ. Configural, metric, and scalar models were estimated, and chi-square difference tests for these models were also computed to

see if placing constraints would worsen the model fit. Table 4 lists the model fit information for the invariance tests.

The Chi-square difference between the configural and metric models was 32.6 (p < .01), with the CFI difference being -.007. Although the statistically significant Chi-square difference between the models would suggest that placing constraints resulted in worse model fit, as mentioned previously, CFI differences have been found to be more reliable than Chi-square indices, and not sensitive to sample sizes (Cheung & Rensvold, 2002; Meade et al., 2008; Putnick & Bornstein, 2016). However, because there are disagreeing opinions regarding what would be an appropriate CFI difference threshold (.01 as suggested by Cheung & Rensvold, .002 as suggested by Meade et al., and in between .01 and .002 as suggested by Rutnick and Bornstein), the CFI difference for the configural and metric model in this current study (-.007) fell right in between the two different recommendations, and could be interpreted either way.

Assuming then that there was a degree of invariance for the configural and metric models, the scalar model was then tested. Results showed that there was not only a statistically significant Chi-square difference of 176.18 (p < .01), but also a CFI difference of -.054. The CFI difference would suggest that scalar measurement invariance could not be established, according to both the Cheung & Rensvold and the Meade et al. standards. Based on the results, it was concluded that scalar invariance could not be established but that the results for metric invariance were mixed, and configural invariance was established.

Some further analyses were then conducted to identify the specific items that were contributing to the lack of invariance for the scalar invariance model. This was done by relaxing one parameter at a time and comparing model fit information to decide if partial invariance could be established. Results showed that the factor loading of item 1 was not invariant between the

English and the Chinese AAQ, and was largely contributing to the mixed findings of metric

invariance. Meanwhile, the intercepts of items 2, 4, and 16 accounted the most for the lack of

scalar measurement invariance. If the above said items were relaxed from the scalar model, it

would result in much more improved model fit of the Scalar model: CFI = .92, TLI = .91,

RMSEA = .07, with the Chi-square of 389.64, df = 143, instead of that which was listed in Table

4 before the items were relaxed from the model.

In summary, based on the finding that measurement invariance couldn't be established

for the Scalar model, it would be inappropriate to assume that the relationships between each

item and the factors were the same for both the English AAQ and the Chinese AAQ. However,

partial invariance could be established once the constraints placed on items 1, 2, 4, and 16 were

relaxed.

Finalizing the Chinese Adult Attachment Questionnaire

Once partial invariance was established, a final confirmatory factor analysis was

conducted for the 13 Chinese AAQ items (after removing the 4 items as mentioned previously).

The final CFA model for the Chinese AAQ was less ideal than that of the English AAQ, CFI

= .92, TLI = .90, RMSEA = .07 (see Figure 2). Overall, the Chinese AAQ items had weaker

loadings on the factors when compared with how the items loaded in the English AAQ.

Particularly, item 1 was behaving poorly for the Chinese AAQ with a factor loading of .21 onto

the Avoidant Attachment scale, which was not surprising since it was largely accounting for the

lack of metric invariance between the two groups. The rest of the items in the Chinese AAQ in

general appeared to have weaker loadings when compared with that in the English AAQ, but still

loaded on their designed scales.

Discussions

The ongoing adult attachment research often relies heavily on the instruments through which data are collected and analyzed. Using the etic approach, when these instruments are carried over to a different culture, the issues of universality and cultural-specificity are crucial and should not be neglected. That is, when adapting adult attachment instruments from one culture to another, it is important to first examine whether it is culturally appropriate to do so. In order to further the study of adult attachment in Taiwan, in the current study an adult attachment measurement was tested for its appropriateness for the Taiwanese culture. Simpson's (1996) Adult Attachment Questionnaire (AAQ) was translated into Chinese and administered to a group of Taiwanese participants. The results were evaluated to determine whether the English measurement that had been adopted and utilized repeatedly in the past 2 decades could also be useful for another culture. Specifically, as outlined in the research questions, measurement evaluation was done for the Chinese AAQ, and measurement invariance tests were performed. The results showed that: (1) surprisingly, the original AAQ appeared to have items (3, 10, 13, 15) which did not load well on the Avoidant and Anxious Attachment Scales according to their original design; (2) there was evidence that partial invariance could be established between the modified English and the Chinese AAQ; and (3) items 1, 2, 4, and 16 from the avoidant and the anxious scales were performing differently for the two cultures.

Modified English Adult Attachment Questionnaire

An unexpected and surprising finding of this study was that the AAQ contained problematic items that did not work well in measuring the designed latent constructs. Although a well-known and widely-used instrument, it did not appear to have been tested for its fundamental structure. Upon a thorough search, the author of this study could not identify any publications

that performed confirmatory factor analyses on the AAQ since it was first published. Most often, when utilizing this measurement, researchers adopted the AAQ and provided Cronbach's Alpha without further examining whether there was evidence that this measure was appropriate for their analyses (e.g., Assaad & Lemay, 2016; Szepsenwol, Simpson, Griskevicius, & Raby, 2015). However, the fact that the AAQ may have items that do not function well did not appear to be discovered prior to the current study. In a 25-year review of adult attachment measures, Ravitz, Maunder, Hunter, Sthankiya, and Lancee (2010) pointed out that the anxious indexes were not as reliable as hoped, and that the utilization of these scales should be done with caution. However, no further explanation or recommendations of how this measurement could be improved were provided in their article.

In this current study, exploratory and confirmatory factor analyses were conducted after initial evidence pointed out the structural flaws of the English AAQ. The results of the factor analyses suggested that at least 4 items should be removed from the scales in order to establish a reliable factor structure. Particularly, items 3, 10, 13, and 15 did not load well on neither the Avoidant nor the Anxious Attachment Scales. For statistical reasons, these items ought to be removed in order to maintain structural reliability. And from a validity point of view, although 4 items were removed, the remaining items still seemed to capture the latent concepts of both the avoidant and the anxious adult attachment styles. As a result, it is recommended that in future studies when the AAQ is utilized, researchers ought to removing these 4 items.

Partial Measurement Invariance between English and Chinese AAQ

As shown in the results section, configural invariance was established, with chi-square and CFI differences likely suggesting mixed evidence for metric invariance and weak evidence for scalar invariance. Although measurement invariance could not be fully established, the

evidence of partial invariance was found. As pointed out by Chen (2008), the establishing of

configural invariance means that the construct of the scales is not different between the groups.

In other words, for both the English and the Chinese AAQ, adult attachment was best captured

by the anxious as well as the avoidant attachment factors. Also, the items loaded on each factor

in the same way for both of the two languages/cultures.

As also shown in the results section, the factor loading of item 1 was not invariant

between the English and the Chinese AAQ. When factor loadings are not invariant across

groups, it means the underlying factor construct is not the same between the two groups (Dyer,

2015). In this case, item 1 did not load on the Chinese avoidant attachment scale the same way it

did on the English avoidant attachment scale. Although they both loaded on the latent concepts

of avoidant attachment, the item in English had more weight in capturing the latent concept than

the Chinese item did. As also explained by Chen (2008), lack of factor loading invariance means

the concept does not carry over from one culture to another in the same way. It could be due to

cultural differences, but it can also commonly occur due to poor item translation, or the lack of

equivalent idiomatic expression. In this study, item 1 for the final CFA model for the Chinese

AAQ demonstrated poor loadings, and yet the author could not identify a likely cause for it

either culturally or through cross examining the translation. Item 1 appeared to be a poor item for

the scale regardless of the potential reasons behind it, and is recommended to be removed from

the Chinese AAQ.

Meanwhile, partial invariance influenced by varying intercepts between the groups

indicates that the groups score differently on the factor (Dyer, 2015). On this subject, Chen

(2008) also pointed out that a common explanation is the social desirability demonstrated in the

different cultures. Particularly, when study participants come from different cultural backgrounds

and have different belief systems, they may follow the social norm and prefer to answer an item or avoid answering an item in a certain way. This could have likely happened to items 2, 4, and 16, which accounted for much of the factor score differences between the English and the Chinese AAQ. These 3 items did not cover identical concepts. On the contrary, they all had different concepts when it came to capturing the different aspects of adult attachment. Although a theme could not be identified among these 3 items, they should be examined more closely in future studies, and tested for potential patterns of social norms.

Aside from the partial invariance, another trend to be noticed was that the Chinese AAQ items were in general producing weaker factor loadings than the English items did. When considering a possible explanation behind these results, one explanation and interpretation is that the items did not quite capture adult attachment the same way the items did in English. When reflecting back on the collectivism and Confucianism ideologies as mentioned in the introduction, it is important to remember that Taiwanese Asians have historically shown more need to suppress personal feelings or regulate personal emotions than individuals in other Western cultures (Bond, 1993; Huang & Gove, 2012; Zhang et al., 2005). Could it be that although individuals feel a need to regulate personal feelings and emotions towards others, it does not necessarily mean that they are more avoidant? On the other hand, because of the cultural requirement to suppress personal feelings, could it also be possible that even anxiously-attached individuals would suppress their urges for more closeness and dependence, therefore making anxious attachment more difficult to detect when compared with individuals from the western culture that are more individualistic? Regardless, it is important to note the pattern that individuals may consider the concept of closeness differently in the two cultures. Particularly, it

may be possible that for Taiwanese individuals, a lack of personal expression for closeness and dependence on others may not necessarily mean they are avoidantly or anxiously attached..

The results showed that configural invariance existed between the two groups, and that item 1 was primarily leading to the partial metric invariance, and that items 2, 4, and 16 contributed to the partial scalar invariance. Although only partial invariance was established, most of the items follow the factor construct fairly well. Consequently, it is recommended that the revised Chinese AAQ ought to be appropriate for use in future Taiwanese samples, with item 1 removed from the scale.

Given the mixed findings regarding the original English Adult Attachment Questionnaire as well as the measurement invariance test between the English and Chinese AAQ, it is first suggested that for future adult attachment studies, researchers who adapt AAQ use the revised version. Although after the revision there are fewer items in the scale, the revised AAQ captures the two distinct factors much better. Similarly, due to what was found in measurement invariance study, it is also recommended that for the Chinese AAQ, researchers adapt the scale with item 1 further removed.

Culturally speaking, the finding of partial invariance indicated that there could potentially be cultural differences between the U.S. sample and the Taiwanese sample in terms of adult attachment. Though as indicated previously, this outcome could be due to an array of other possibilities such as translation issues and patterns of answering survey questions, it is nonetheless also very likely that culturally the two samples were demonstrating differences in their adult attachment manifestations. While not enough evidences merged in the current study for the author to speculate the most likely reason behind the potential cultural differences, it is a beginning and researchers ought to pursue it in future studies.

Limitations and Future Directions

It is important to note that the design of this current study has limitations. First, the samples used in this study were convenient samples. These individuals were primarily recruited from university settings, which means that these individuals were in general well educated. This may influence their beliefs and behaviors regarding communication and interaction with others, thus influencing the representativeness of the study outcomes and how they can apply to other populations. Inevitably, if measurement invariance was established, we could have concluded that the existing evidence suggests that adult attachment was equivalent both for the scales and for the culture. However, since only partial invariance was established, the lack of invariance could in fact be attributed to the lack of scale invariance (such as improper translation, nonequivalent meaning of words or expressions in the two languages, etc.), or to cultural factors (such as the concept of adult attachment not being equivalent in the two cultures). It is impossible to clearly determine which explanation is responsible for these results.

However, despite the limitations, it is nevertheless evident that partial invariance exists. As a result, when using adult attachment measurements developed in western cultures and then translated and adopted by a different culture (particularly Taiwanese culture), researchers should not assume that adult attachment representations or patterns are the same as they would be in an American Caucasian culture. Specifically, while the items were able to capture the latent concepts in both cultures, it was evident that the Chinese AAQ had weaker factor loadings in general, suggesting that the items did not capture the idea of avoidant and anxious attachment quite as strongly as the English items did.

In summary, this study made contributions to the literature of adult attachment both in the United States and in Taiwan. For future research, it is important that this study be duplicated so

that the structural reliability of the English AAQ may be tested with different samples. Also, while the Chinese AAQ provided a good foundation to measure adult attachment, it is highly possible that the instrument designed in a western culture may not capture all the cultural nuances of the Taiwanese sample. In order to explore the various possibilities of adult attachment beliefs, behaviors, and manifestations in the Taiwanese culture, qualitative studies will be needed in order to explore ideas that may be unique to Taiwan. Secondly, the Chinese AAQ introduced in this study was an example of testing procedures of reliability as well as cultural appropriateness. It is recommended that for future studies on adult attachment conducted across cultures, researchers should only use measurements that have been tested for reliability and specifically measurement invariance. When drawing conclusions based on a western-developed measures, researcher should interpret their results with caution.

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Table 1

Descriptive Statistics and Correlations among Study Variables for both U.S. and Taiwanese Samples

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
(Mean)	4.85	3.56	4.97	3.15	3.95	4.17	3.88	3.82	4.34	4.17	3.47	4.23	3.34	4.05	4.11	4.38	4.83
(SD)	1.24	1.47	1.28	1.32	1.35	1.68	1.40	1.24	1.51	1.30	1.56	1.59	1.44	1.53	1.46	1.53	1.38
Item 1	-	.05	.39*	.22*	.09	.26*	.11	-.05	.13*	-.10	.02	.20*	-.03	.20*	-.23*	.25*	.36*
Item 2	.18*	-	.09	.33*	.30*	.30*	.26*	.26*	-.14*	-.03	-.01	-.05	.05	-.04	.03	-.11*	.01
Item 3	.31*	.15*	-	.24*	.08	.13*	.05	-.01	.00	-.29*	-.02	.14*	-.04	.19*	-.26*	.15*	.27*
Item 4	.47*	.41*	.26*	-	.47*	.36*	.43*	.36*	.00	-.02	.18*	.09	.11	.03	-.12*	.09	.22*
Item 5	.47*	.26*	.25*	.64*	-	.29*	.67*	.27*	-.03	.04	.11	.04	.06	.12*	-.03	.07	.06
Item 6	.43*	.34*	.21*	.54*	.47*	-	.26*	.26*	-.07	.08	.26*	-.07	.13*	-.10	.03	-.16*	-.16*
Item 7	.46*	.25*	.28*	.67*	.71*	.46*	-	.21*	.00	.10	.17*	.08	.12*	.14*	.05	.09	.07
Item 8	.39*	.20*	.23*	.53*	.46*	.42*	.43*	-	-.04	.20*	.14*	.01	.17*	-.01	.14*	.05	.00
Item 9	.17*	.08	.19*	.25*	.16*	.34*	.27*	.10*	-	.04	.33*	.43*	.24*	.42*	.06	.54*	.18*
Item 10	.15*	.11	.08	.10	.17*	.26*	.20*	.09*	.07	-	.15*	.06	.34*	-.02	.60*	.07	-.03
Item 11	.22*	.06	.19*	.29*	.31*	.39*	.35*	.23*	.45*	.24*	-	.29*	.46*	.30*	.24*	.45*	.28*
Item 12	.24*	.00	.13*	.25*	.25*	.32*	.32*	.15*	.50*	.15*	.52*	-	.16*	.56*	.10	.63*	.39*
Item 13	.01	.05	.11	.06	.11*	.19*	.17*	.01	.20*	.46*	.32*	.18*	-	.18*	.47*	.29*	.07
Item 14	.29*	.07	.21*	.21*	.23*	.33*	.28*	.13*	.45*	.17*	.47*	.65*	.20*	-	.02	.62*	.32*
Item 15	-.11*	.09	-.04	-.12*	-.10	.09	-.05	-.16*	.04	.48*	.11*	.06	.55*	.03	-	.07	-.11*
Item 16	.28*	.03	.19*	.21*	.21*	.40*	.29*	.13*	.52*	.28*	.53*	.61*	.32*	.69*	.18*	-	.42*
Item 17	.28*	.09	.25*	.33*	.34*	.39*	.36*	.21*	.39*	.30*	.67*	.49*	.27*	.55*	.12*	.49*	-
(Mean)	5.14	4.31	5.70	2.82	3.06	3.60	2.90	2.98	4.38	3.09	3.04	4.63	2.90	4.28	3.50	4.32	5.09
(SD)	1.46	1.65	1.10	1.45	1.52	1.74	1.57	1.54	1.80	1.46	1.67	1.80	1.55	1.86	1.54	1.77	1.52

Note. N = 330 for the U.S. Caucasian sample and 320 for the Taiwanese Asian sample. *p < .05. Values above the diagonal are correlations for the Chinese items administered to Taiwanese participants; values below are for the U.S. participants. For the item details please see Appendix 1.

Table 2

Exploratory Factor Analysis and the Number of Factors for the Two Samples

Number of Factors	U.S. Sample					Taiwanese Sample				
	Eigenvalue	CFI	TLI	RMSEA	SRMR	Eigenvalue	CFI	TLI	RMSEA	SRMR
1	5.62	.57	.51	.16	.12	3.87	.51	.44	.21	.17
2	2.46	.83	.78	.10	.07	2.67	.63	.51	.19	.11
3	1.72	.94	.91	.07	.03	2.47	.91	.86	.10	.05
4	.91	.96	.92	.06	.03	1.11	.96	.92	.08	.04
5	.89	NA	NA	NA	NA	.90	.97	.94	.07	.03

Note. $N = 330$ for the U.S. Caucasian sample and 320 for the Taiwanese Asian sample. The 5-factor EFA model could not converge for the U.S. sample.

Table 3

Factor Loadings of Exploratory Three Factor Model for Both U.S. and Taiwanese Samples

Item	U.S. Sample			Taiwanese Sample		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
1	.59	.08	-.10	.13	.32	-.31
2	.40	.03	.03	.49	-.17	.02
3	.27	.15	-.03	.13	.23	-.36
4	.82	-.06	.00	.67	.06	-.11
5	.83	-.07	-.02	.78	-.03	-.02
6	.49	.25	.05	.41	.14	.02
7	.81	-.02	.03	.71	.02	.07
8	.57	.03	-.09	.41	-.04	.20
9	.01	.66	.04	-.24	.63	.03
10	.10	.06	.62	.02	.01	.67
11	.16	.52	.21	.05	.48	.26
12	-.04	.79	-.01	-.17	.75	.00
13	-.01	.09	.66	.02	.29	.52
14	-.01	.81	-.05	-.12	.74	-.07
15	-.09	-.02	.80	-.09	.01	.86
16	-.04	.86	-.03	-.20	.92	.00
17	.13	.54	.13	.01	.52	-.20

Note. N = 330 for the U.S. Caucasian sample and 320 for the Taiwanese Asian sample.

Table 4

Goodness-of-Fit Statistics for Measurement Invariance Models

Invariance Models	χ^2	df	$\Delta\chi^2$	CFI	TLI	RMSEA
Configural Invariance	329.006	124	-	.934	.916	.071
Metric Invariance	361.606	135	32.6*	.927	.915	.072
Scalar Invariance	537.781	146	176.175*	.873	.864	.091

Note. $N = 330$ for the U.S. Caucasian sample and 320 for the Taiwanese Asian sample.
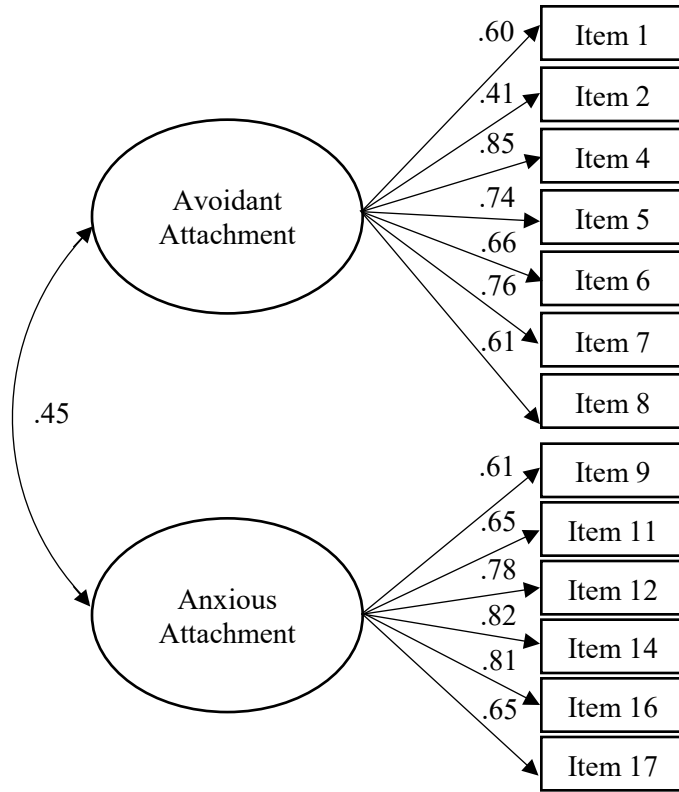*$p < .01$.

Figure 1. Final CFA models of the revised Adult Attachment Questionnaire for the U.S. sample. $N = 330$, $\chi2 = 154.85$, $DF = 62$, $p < .01$; $CFI = .95$, $TLI = .94$, $RMSEA = .07$
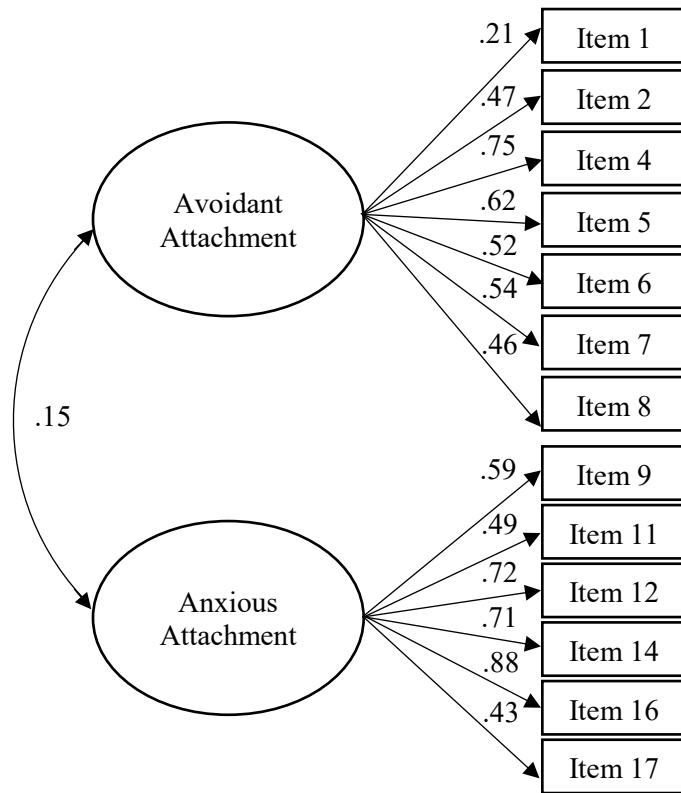
Figure 2. Final CFA models of the revised Chinese Adult Attachment Questionnaire for the Taiwanese sample. $N = 320$, $\chi2 = 153.51$, $DF = 62$, $p < .01$; $CFI = .92$, $TLI = .90$, $RMSEA = .07$

Appendix

A Detailed List of Items Used in Current Study

Avoidant Attachment Scale (Original English Version)

1. I find it relatively easy to get close to others.

2. I'm not very comfortable having to depend on other people.*

3. I'm comfortable having others depend on me.

4. I don't like people getting too close to me.*

5. I'm somewhat uncomfortable being too close to others.*

6. I find it difficult to trust others completely.*

7. I'm nervous whenever anyone gets too close to me.*

8. Others often want me to be more intimate than I feel comfortable being.*

Avoidant Attachment Scale (Mandarin Chinese Translation)

1. 相較之下，我發現我比一般人更能夠和別人關係親密。

2. 如果要我依賴別人，我會感到不太自在。*

3. 如果有人依賴我，我會感到很自在。

4. 我不喜歡人們跟我太過親密。*

5. 如果和別人太過親密，我會有點不自在。*

6. 我發現要完全信賴別人是一件困難的事。*

7. 不論何時，如果有人和我太過親密，我會感到緊張。*

8. 別人想要跟我有親密關係的程度通常超過我覺得我想要的程度。*

Anxious Attachment Scale (Original English Version)

9. I rarely worry about being abandoned by others.

10. Others often are reluctant to get as close as I would like.*

11. I often worry that my partner(s) don't really love me.*

12. I rarely worry about my partner(s) leaving me.

13. I often want to merge completely with others, and this desire sometimes scares them away.*

14. I'm confident others would never hurt me by suddenly ending our relationship.

15. I usually want more closeness and intimacy than others do.*

16. The thought of being left by others rarely enters my mind.

17. I'm confident that my partner(s) love me just as much as I love them.

Anxious Attachment Scale (Mandarin Chinese Translation)

9. 我很少擔心自己會被別人拋棄。

10. 在面對我所想要的親密關係時，別人通常比較遲疑。*

11. 我常常擔心我的伴侶其實不愛我。*

12. 我很少擔心我的伴侶會離開我。

13. 我常常會想要和別人變得非常親密，而這樣的期望通常會把他們嚇跑。*

14. 我確信別人不會突然結束我們的關係來傷害我。

15. 我想要親近與親密的程度通常比別人想要的多。*

16. 我很少有「他會離開我」的念頭。

17. 我確信我的伴侶愛我就像我愛他一樣多。

* Items 2, 4, 5, 6, 7, 8, 10, 11, 13, and 15 were reverse-coded in all of the analyses.