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A Cross-cultural Examination of the Experiences in Close Relationships-Revised-General

Short Form in an Australian and a Chinese Sample

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Abstract

Attachment dimensions refer to how interpersonal emotion regulation strategies are utilised and have a profound impact in adulthood. Its measurement has attracted a large amount of research attention. The Experiences in Close Relationships-Revised (ECR-R) Questionnaire is one of the most widely used and researched self-report questionnaires to measure romantic attachment anxiety and avoidance in multiple language groups, despite inconsistent evidence regarding its factorial structure. The 20-item Experiences in Close Relationships-Revised-General Short Form (ECR-R-GSF) was developed based on the ECR-R to measure attachment experiences in all relationships (not just romantic ones) in an English-speaking sample. However, no short form of the ECR-R is available for the Chinese population. In order to cross-validate the first Chinese version of the ECR-R-GSF, specifically the proposed two-factor structure, against the English version, an Australian university student sample ($n = 426$) and a Chinese university student sample from China ($n = 626$) were recruited. The Anxiety and Avoidance scales were found to have good internal reliability in both samples. However, the proposed two-factor model only provided an acceptable fit even after adding modifications in the Australian sample, and the fit was not satisfactory in the Chinese sample. Multi-group confirmatory factor analysis (CFA) indicated that partial metric but not scalar invariance was achieved across cultures. Implications for relationship and cross-cultural research and practice were discussed.

Keywords: attachment anxiety, attachment avoidance, Experience in Close Relationship-Revised (ECR-R), cross-cultural, factorial structure, measurement invariance, Chinese, short form.

A Cross-cultural Examination of the Experiences in Close Relationships-Revised-General

Short Form in an Australian and a Chinese Sample

The Experiences in Close Relationships – Revised (ECR-R) Questionnaire is one of the most widely used self-report measures to capture romantic attachment anxiety and avoidance (Fraley, Waller, & Brennan, 2000). It has been used in different age groups (e.g., Brenning, Soenens, Braet, & Bosmans, 2011) and translated to different languages (e.g., Jin & Tang, 2007). Different short forms in languages other than English have been proposed to improve its factorial structure and psychometric abilities (e.g., Brenk-Franz et al., 2018). Attempts have also been made to expand its use to measure general (how one feels and behaves in close interpersonal relationships overall) as opposed to romantic attachment (Wilkinson, 2011). The Experiences in Close Relationships-Revised-General Short Form (ECR-R-GSF) was developed by Wilkinson as a modified version of the ECR-R to assess general attachment in Australian adolescents and young adults. It would be valuable to examine the degree to which researchers can use this form to assess general attachment in other language groups. For example, there has not been a short form of the ECR-R developed for use in Chinese-speaking communities. The aim of this study is to cross-examine the psychometric properties and the factorial structure of the ECR-R-GSF in two samples of emerging adults, one from Australia and another from China. We seek to establish measurement invariance between these two samples by conducting multi-group confirmatory factor analysis (CFA) so as to examine the validity of this measure in Chinese-speaking populations.

Attachment Theory

According to Bowlby (1988), the attachment system protects infants from danger by keeping them close to their caregivers (or attachment figures) to cope with stress and to manage fear. In adulthood, the attachment system is activated when the individual is in distress and is deactivated when the desired emotional support or protection has been attained to devote time to explore the environment (Bowlby, 1969; Mikulincer & Shaver, 2007). As a result of individual's manifold early attachment-related interactions, they develop expectations and beliefs about their caregivers' responsiveness and availability (Bowlby, 1973; Hazan & Shaver, 1987). Over time, these relationship expectancies result in a stable attachment style or orientation, characterised by an individual's typical emotion regulation strategies involving significant others, especially when in distress (Shaver & Mikulincer, 2002). Differences in attachment figure availability and proximity-seeking viability in childhood introduce individual differences in attachment styles (Ainsworth, Blehar, Waters, & Wall, 1978; Mikulincer & Shaver, 2007).

Partly based on the early psychometric work by Brennan, Clark, and Shaver (1998), Mikulincer and Shaver (2007) proposed a model of attachment styles in adulthood employing two orthogonal attachment dimensions: attachment anxiety and avoidance. They suggested that those exposed to a history of inconsistent and/or negative close relationship interactions, or the "insecurely" attached individuals, typically have less adaptive emotion regulation strategies. Individuals high on the attachment anxiety dimension have high self-doubt and are worried that their attachment figures may abandon them; thus they seek excessive reassurance (Brennan et al., 1998; Mikulincer & Shaver, 2007). Persons higher on avoidance have learnt to avoid rejection from attachment figures, thus experiencing a discomfort with closeness and dependence on others, as well as a desire to keep emotional distance (Bartholomew & Horowitz, 1991; Cameron, Finnegan & Morry, 2012; Mikulincer & Shaver, 2007). In contrast, positive relationship experiences will be internalised for the "securely"

attached individuals, so that when confronted with stress they are able to adaptively attend to and regulate their emotions (Shaver & Mikulincer, 2002). These individuals are said to be lower on both dimensions of attachment insecurities (Shaver & Mikulincer, 2002).

The ECR-R and the ECR-R-GSF

Self-report questionnaires of the anxiety and avoidance dimensions, such as the Experiences in Close Relationships (ECR; Brennan et al., 1998) and its revised version the ECR-R (Fraley et al., 2000), have dominated social and personality psychology research on adult attachment in recent years. The ECR is a 36-item measure to assess the two dimensions of adult romantic attachment. It was developed from a sample of over 1,000 participants; the items were derived from a pool of 323 items from 60 subscales that measure attachment-related constructs. Also based on these 323 items, Fraley et al. developed the ECR-R using both factor analysis and an item response theory analysis. Similar to the ECR, the ECR-R includes 36 items which assess attachment anxiety and avoidance (Fraley et al., 2000). Compared to the ECR, the ECR-R is argued to capture the entire continuum of attachment (in)security better, although it is more prone to higher correlations between the two dimensions (Cameron et al., 2012). Recent years have witnessed an increase in its adaptation to different populations and different cultural contexts, making it one of the most widely used self-report measures (Cameron et al., 2012; Wilkinson, 2011). Studies conducted with both English-speaking and non-English speaking samples have demonstrated good internal reliabilities, with Cronbach's αs around or above .90, and good external validities (see Cameron et al., 2012; Mikulincer & Shaver, 2007; Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010, for reviews).

However, the proposed two-factor, non-orthogonal structure of the ECR-R (Sibley & Liu, 2004) has received inconsistent evidence. Sibley and Liu and Wongpakaran, Wongpakaran, and Wannarit (2011) respectively confirmed this structure in an English-

speaking (*n* = 199) and a Thai-speaking (*n* = 400) sample. However, Gray and Dunlop (2017) conducted a CFA and an exploratory structural equation modelling (ESEM) which allows item cross-loadings (e.g., items from the Anxiety scale load on the Avoidance scale) to test this structure in an English-speaking sample (*n* = 1291). They found that a model with cross-loadings from the ESEM produced a better fit than the original structure. Gray and Dunlop argued that having cross-loadings is an important and inherent feature of the ECR-R, like many other personality inventories (Hopwood & Donnellan, 2010), despite the oft-cited moderate correlation between the anxiety and avoidance dimensions (see Cameron et al., 2012 for a meta-analysis). Some individuals make a general negative evaluation about their relationships, and both dimensions were found to share some similarities such as negative mood (Gray & Dunlop, 2017; Wei, Vogel, Ku, & Zakalik, 2005). Interestingly, these empirical observations are in contrast to Mikulincer and Shaver's (2007) original orthogonal conceptualisation, which warrants further investigation.

Furthermore, Fraley, Heffernan, Vicary, and Brumbaugh (2011) contended that the ECR and the ECR-R are too long with some redundant items. Researchers should build on well-established measures, for methodological continuity and the accumulation of knowledge on the nature of adult attachment, to develop better and shorter measures (Fraley et al., 2011). There have been a few short forms of the ECR-R developed in Thai (Wongpakaran & Wongpakaran, 2012), Czech (Kaščáková et al., 2016), and German (Brenk-Franz et al., 2018) to measure romantic attachment experiences. Same as the ECR-R, this line of research yielded mixed evidence about the two-factor structure, with the CFIs (the robust comparative fit index; Bentler, 1990) ranging from .92 to .99 and the RMSEAs (the robust root mean squared error of approximation; Browne & Cudeck, 1993) from .014 to .076. However, the Cronbach's *α*s were generally acceptable, ranging from .84 to .89 for the Anxiety scale and from .73 to .90 for the Avoidance scale.

Both the ECR and the ECR-R are originally developed to assess romantic attachment and include items referring to romantic partners. However, researchers have been attempting to use them to measure general rather than romantic attachment (e.g., Fraley et al., 2011). Wilkinson (2011) developed the 20-item ECR-R-GSF to measure general attachment in an Australian, English-speaking sample. On a sample of high school and college students ($n = 698$), the ECR-R-GSF was found to have good internal reliability (Cronbach's $\alpha = .88$ for both dimensions). It also demonstrated good construct validity according to the correlations with other well-established attachment measures such as the Relationships Questionnaire and the Inventory of Parent and Peer Attachment (Wilkinson, 2011). Furthermore, the proposed two-factor model was supported by the CFA, although five pairs of correlated error were added to achieve an acceptable fit. All items produced satisfactory loadings on their expected factors except for item 11 (.33 on Avoidance; Wilkinson, 2011). To our best knowledge, ECR-R-GSF is the only English short form of the ECR-R, which provides a good reference point for short forms in other languages for cross-validation to retain the original meaning in English. It is also the only one that measures general attachment as opposed to romantic attachment, and thus would provide further insight into general attachment experiences (Wilkinson, 2011).

The ECR-R in China

Bowlby's (1969) original theory emphasised the universality of the biological basis of the attachment system. Recent research suggests that attachment exists in all cultures, so do the differentiations between attachment orientations and dimensions in children and adults (see Mesman, van IJzendoorn, & Sagi-Schwarz, 1999; Schmitt et al., 2004, for reviews). However, adult attachment dimensions stem from early interactions with primary caregivers and are affected by societal factors such as economic burden, the harshness of the physical environment, and parenting styles, all varying across different regions (Schmitt et al., 2004).

Schmitt et al. compared data from 62 different cultures and reported that the secure type was more common in Western cultures whereas anxious attachment represented a larger proportion in East Asian cultures (i.e., Hong Kong and Taiwan), with this argued to be a result of their heavier reliance on other people's opinions. The original conceptualisation and operationalisation of (romantic) attachment avoidance may fail to address core avoidant behaviour in East Asian cultures, although this remains under-studied in Mainland China (Schmitt et al., 2004). Whilst individuals from these cultures value well-controlled composure and emotional restraint, which may lead to emotionally dismissive and withdrawal behaviour (Zhu, Wang, & Chong, 2016), they also value closeness and harmony (Friedman, Rholes, Simpson, Bond, Diaz-Loving, & Chan, 2010) which may decrease their interpersonal distance. However, this contradiction has not been addressed in the literature.

Although the ECR-R has been translated and used to understand attachment-related processes in Chinese populations (e.g., Xue et al., 2018) and to compare these processes between such populations and Western populations (e.g., Zhu et al., 2016), measurement invariance between these groups has not been demonstrated to ensure that the same process or construct is being captured in different language groups. Its utility in the Chinese culture has not been appropriately evaluated. The ECR-R was only introduced to China about a decade ago (Jin & Tang, 2007; Lu, Huo, Gao, & Cong, 2006). The two Chinese versions were shown to have good internal reliabilities, with Jin and Tang reporting a Cronbach's α of .94 for the Anxiety scale and .89 for the Avoidance scale, whereas Lu et al. reported .86 for Anxiety and .81 for Avoidance. Jin and Tang's version produced five factors in exploratory factor analysis (EFA). Only after removing six items (unspecified in the study) was the two-factor structure reproduced in EFA, suggesting that some items were problematic. Jin and Tang's CFA results of the two-factor structure also did not reach the cut-off value for a good model fit by traditional criteria.

To date, only one study on the cross-cultural validity of the ECR-R involving a Chinese sample could be located. Mastrotheodoros, Chen, and Motti-Stefanidi (2015) compared the ECR-R between a Greek sample and a Chinese sample. By conducting CFA using parcelling (clusters of items instead of individual items as indicators), they found the two-factor structure to have a marginal fit in their Chinese sample: CFI = .94, RMSEA = .080. They were only able to establish partial metric and scalar invariance across the two groups, suggesting that the items in their adapted ECR-R were understood and/or answered differently across their Greek and Chinese samples. Mastrotheodoros et al. concluded that the ECR-R could be used on the Chinese sample, but cross-cultural comparison should proceed with caution.

The Present Study

To our knowledge, no study has been conducted to examine the factorial structure of the ECR-R-GSF across an English-speaking sample and a Chinese sample. This would be important to further the application of the ECR family measures in Chinese-speaking populations, extending previous, limited research on their use in East-Asian cultures. This study sets out to examine the psychometric properties of the ECR-R-GSF in an Australian university student sample, in order to compare its factorial structure to a Chinese student sample from China. This will be achieved by the CFA, utilising individual items and not parcels, by investigating the measurement invariance between the two cultural groups. By investigating at an item not a parcel level, we hope to shed light on how each item may or may not work the same way across cultures.

Method

Procedure

Two convenience samples were recruited as part of a larger study on university adjustment in Australia and China through an online system for research participation,

Facebook, E-mails, short talks in lectures, and flyers. The Australian psychology students received course credit for their participation. Other students were given the option of being entered in a lottery for a $100 gift voucher (Australian participants), or a gift voucher worth 500 Chinese Yuan (Chinese participants). The study received approval from the University of Newcastle Human Research Ethics Committee and the Chinese Academy of Sciences. The questionnaires were administered via the Qualtrics platform. After giving informed consent, participants answered questions from five scales, along with demographic and background information. The completion time was 20-30 minutes.

Participants

The Chinese sample ($n = 626$) was recruited from two universities in China (Mainland), while the Australian sample ($n = 426$) was recruited from one university in Australia. Participation was restricted to domestic students aged 18 years or older. The majority of the Australian sample identified as ethnically Australian ($n = 209$, 49%), were females ($n = 301$, 71%), in a relationship ($n = 211$, 50%), and first year students ($n = 264$, 62%). Their mean age was 20.10 ($SD = 2.50$) years. Among those who were in a relationship, more than half ($n = 137$, 65%) have been in the relationship for longer than one year. For the Chinese sample, the majority were females ($n = 438$, 70%), second year students ($n = 428$, 68%), and with a mean age of 19.10 ($SD = 1.00$) years. The Chinese sample was approximately one year younger than the Australian sample: $t (1050) = 9.01$, $p < .05$. Most were not in a relationship ($n = 455$, 73%), and for those in a relationship, only 73 (43%) had been in the relationship for more than one year.

Measure

The Experiences in Close Relationships — Revised General Short Form (ECR-R-GSF; Wilkinson, 2011) contains twenty items (*Appendix A*) with ten from each of the scales of Anxiety and Avoidance. The items are worded to address relationships in general. For

example, the original item from the ECR-R "I find it easy to depend on romantic partners" was adapted to "I find it easy to depend on other people". The questions were answered on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The Chinese measures were translated by the first author and back-translated by a professional interpreter who is bilingual and not familiar with psychology or the attachment theory (Brislin, 1970). Any differences were resolved by referring to dictionaries and professional translating material to ensure the original English meaning was retained. The translated version was piloted on a convenience sample before distribution (Brislin, 1970).

Data Analysis

The data were screened for univariate and multivariate outliers using the procedures outlined by Byrne (2012). SPSS version 24 was used to prepare the data. An EFA using Maximum Likelihood method with oblimin rotation was conducted (see *Appendix B* for results), followed by single group CFA using Mplus 8 (Muthén & Muthén, 2012). MLM estimation (maximum likelihood estimation with robust standard errors) was implemented as it adjusts for univariate and multivariate non-normality (Li, 2016). The tested models were evaluated using several fit indices, which included the CFI (Bentler, 1990), the RMSEA and its 90% confidence interval (Browne & Cudeck, 1993), and the Tucker-Lewis Index (TLI, Tucker & Lewis, 1973) along with factor weights and structural covariances. Hu and Bentler (1999) recommended cut-off values of .95 for the CFI and the TLI, and .06 for the RMSEA as indicating good fit. Browne and Cudeck recommended a less stringent standard of a CFI greater than .09 and a RMSEA lower than .08 as indicating acceptable fit. We applied the common employed guide that differences in fit-indices of > .009 for the CFI and TLI indicate meaningful differences in model fit (Byrne, 2012; Schermelleh-Engel, Moosbrugger, & Müller, 2003). We planned to test two models: a univariate model where all items load on one attachment insecurity factor as a baseline model for comparison; and a two-factor model,

in line with the original theoretical proposition, where the items load on their proposed factors and covariance is allowed between the factors. The best-fitting model was chosen based on its substantive meaning and the principle of parsimony, i.e., it is a model that provides the best fit to the data with minimal parameters (Byrne, 2010).

Multi-group CFA (Byrne, 2012) was conducted to compare samples using Mplus 8 (Muthén & Muthén, 2012). The comparison of competing models was carried out through a series of analyses by evaluating increasingly restrictive levels of measurement invariance (Byrne, 2008; Cheung & Rensvold, 2002). The first step evaluated evidence for configural invariance, the requirement of which is that the number of factors and the particular items that load on to each factor are similar across groups. The second step involved the evaluation of metric invariance, which involves comparing the fit of the configural invariance model to the fit of a nested model in which the factor loadings are constrained equal across groups. The absence of a meaningful decrement in fit between the configural invariance model and the more constrained metric invariance model would suggest metric invariance. In the third step, scalar invariance was evaluated by adding constraints on item intercepts and comparing model fit to the metric invariance model. Finding that the metric and scalar invariance models do not differ meaningfully in fit was taken as evidence in favour of scalar invariance. Finally, as the two-factor model of ECR-R-GSF involves a factor covariance between Anxiety and Avoidance, its invariance was tested by constraining it across groups and comparing model fit to the scalar invariance model. If researchers fail to find full metric or scalar invariance across groups, further analyses to identify whether a subset of items demonstrate invariance across groups is recommended (i.e., partial invariance; Byrne, 2010; Byrne, Shavelson, & Muthén, 1989; Steenkamp & Baumgartner, 1998).

Results

The means, standard deviations, skewness, and kurtosis of the un-recoded 20 items are in *Appendix A*. There was no serious departure from normality for the items. Table 1 shows the descriptive statistics for the two scales. The Cronbach's αs showed acceptable reliability, though appeared lower for the Chinese version. Neither scales showed a serious departure from normality. The correlation between the two scales was not significant in the Chinese sample ($r = .03$) and was significantly lower than that of the Australian sample ($r = .34$, $p < .05$): $z = 5.14$, $p < .05$.

Insert Table 1 here

For the Australian sample, the one-factor model did not fit the data: RMSEA = .137 [.131,.143], CFI = .587, TLI = .538, nor did the two-factor model: RMSEA = .088 [.081,.094], CFI = .831, TLI = .810. Five modifications (one cross-loading: item 11 on Anxiety; four correlated error terms between items 13 and 19, 2 and 4, 7 and 17, and 8 and 20) were added step-wise based on both the modification indexes (MI) and their theoretical acceptability to achieve an acceptable fit: RMSEA = .068 [.061,.075], CFI = .901, TLI = .885. We termed this the best-fitting model for the Australian sample. The potential cross-loading of item 11 on Anxiety produced the biggest MI and also improved the model fit substantially (ΔCFI > .01). Items 13 and 19 both referred to depending on other people. Items 2 and 4 both involved worrying that other people don't care/love enough. Items 7 and 17 both involved discussing issues with others. Items 8 and 20 both referred to being close to others. Adding any further modifications did not bear significant theoretical meaning, nor did they improve the model fit by a significant amount. The factor loadings of this final model, all above .40, are presented in Table 2. The correlation between the two factors was .35. We concluded that the two-factor model with the added modifications was an acceptable fit.

Insert Table 2 here

For the Chinese sample, the one-factor model did not fit the data: RMSEA = .107 [.101,.112], CFI = .527, TLI = .472, nor did the two-factor model: RMSEA = .072 [.067,.078], CFI = .785, TLI = .759. Five modifications (one cross-loading: item 11 on Anxiety; four correlated error terms between items 13 and 19, 2 and 4, 13 and 3, and 3 and 19) were added step-wise based on both the MI and their theoretical meanings to achieve a marginal fit: RMSEA = .056 [.050,.061], CFI = .876, TLI = .857. This is the best-fitting model for the Chinese sample. Three of these modifications were the same as the Australian sample, while the remaining two, the correlated error terms between items 3 and 13 and between 3 and 19, referred to depending on other people. Adding further modifications did not bear theoretical meaning, nor did they improve the model fit significantly. In this final model, the correlation between the two factors was non-significant (*r* = .01). The factor loadings are presented in Table 2. As shown, items 3, 8, 11, 15, and 16 had low loadings on their expected factors. Another CFA was conducted with these five items removed, which we termed the 15-item reduced model. The model fit was unsatisfactory (RMSEA = .064 [.056,.072], CFI = .876, TLI = .854), before one pair of correlated errors for items 13 and 19 was added and the model fit was acceptable: RMSEA = .048 [.040,.056], CFI = .931, TLI = .918. The factor loadings in this model ranged from .44 (item 1) to .76 (item 17), with the correlation between the two factors being non-significant again: .06. We concluded that for the Chinese sample, the two-factor model with the five added modifications was a marginal fit, and the factor loadings suggested the existence of problematic items. The removal of these items produced an acceptable-fitting model.

For the multi-group analysis, the best-fitting models of the two samples were examined due to their better fit and simplicity (Table 3). The two unique error covariances in each sample (between items 7 and 17 and items 8 and 20 in the Australian sample, and between items 13 and 3, and 3 and 19 in the Chinese sample) were set as zero in the other sample. Shown in Table 3, the configural model was a marginal fit. Metric invariance was achieved, as the fit of the metric invariance model, Model 1, did not drop significantly from the configural model (ΔCFI < .01, Cheung & Rensvold, 2002). However, scalar invariance was not achieved, until six intercepts (items 20, 8, 11, 13, 2, and 1) were released to achieve partial scalar invariance. Finally, the covariance between the two factors was not significantly different, indicated by the non-significant drop of CFI of Model 3 from Model 2.

The best-fitting model from the Australian sample, as well as the 15-item reduced model from the Chinese sample, were also tested between the two groups. The outcome remained the same: metric but not scalar invariance was achieved, with the covariance between the two factors not significantly different across groups. Therefore, we concluded that there was only metric but no scalar invariance between the two samples on the ECR-R-GSF and that removing problematic items did not improve this outcome.

Insert Table 3 here

Discussion

To our best knowledge, the ECR-R-GSF was the first short form of the ECR-R developed on an English-speaking sample to measure general, instead of romantic, attachment. This study sought to examine its factor structure with an alternative Australian sample and to test its cross-cultural validity in a Chinese sample for the first time. Both scales of the ECR-R-GSF, Anxiety and Avoidance, demonstrated good internal reliability in the

Australian sample, similar to previous findings on Australian samples (Pepping & Duvenage, 2015; Wilkinson, 2011) and also to the two other short forms of the ECR-R developed on non-English speaking European samples (Brenk-Franz et al., 2018; Kaščáková et al., 2016). As the first study to examine the ECR-R-GSF in a Chinese sample, our Cronbach's αs indicated that it was a reliable measure. These are slightly less than Jin and Tang's (2007) 30-item Chinese ECR-R, but comparable to Wongpakaran and Wongpakaran's (2012) 18-item Thai ECR-R. Our lower Cronbach's αs could partially be explained by the shorter length of the ECR-R-GSF (similar to Wongpakaran and Wongpakaran's) compared to the ECR-R; there were also some problematic items revealed by the CFAs.

The proposed two-factor model, including two modifications that were the same as Wilkinson's (2011; the error covariances between items 8 and 20 and between 7 and 17), was replicated in the current Australian sample. In line with previous findings on the ECR-R (Gray & Dunlop, 2017; Wongpakaran et al., 2011), cross-loadings and correlated errors were also found. This addition of the correlated error terms on the basis of the simplified, multi-factor model to fit real-life data has been widely reported on other well-established personality/attribute instruments such as Gignac, Bates, and Jang's (2007) and Aluja, Rolland, García, and Rossier's (2007) reports with the Revised NEO-Personality Inventory and the Rosenberg Self-Esteem Scale, respectively (cf. Hopwood & Donnellan, 2010). These correlated items are similar in their wording, we thus do not believe that this indicates serious violations to the hypothesised model. Rather, we concur with Gray and Dunlop and Hopwood and Donnellan in recognising that these items share some additional correlations above and beyond the underlying avoidance (anxiety) dimension. This could be an important feature of the ECR-R-GSF.

For example, the error covariance between items 13 and 19 was similar to Wilkinson's (2011) error covariance between items 3, 13, and 19 reported on a different

sample. Accordingly, the EFA (*Appendix B*) also suggested the possible existence of a third factor that included these three items and was highly correlated with the avoidance factor. Wilkinson proposed that the perception of a dependency on other people in relationships, measured by these three items, is perhaps qualitatively distinct from attachment avoidance. This pattern was not observed in previous studies using the ECR-R to measure romantic relationships (Gray & Dunlop, 2017; Sibley & Liu, 2004). It is possible that when referring to general relationships (e.g., item 13, "I find it easy to depend on other people"), these three items further tap into a sense of independence and individuality, beyond an avoidance of attachment-related information. This is consistent with the theoretical and empirical overlap between attachment avoidance and individualism – a stronger tendency to rely on oneself (Frías, Shaver, & Díaz-Loving, 2014; Lin, Chew, & Wilkinson, 2017). This also merits further investigation by linking the different aspects of attachment avoidance to individualism, before one can use the full score of this scale (cf. Hopwood & Donnellan, 2010).

The correlation between the two factors in the Australian sample (.35) was slightly lower than Wilkinson's (2011) report on the ECR-R-GSF (.48) and Sibley and Liu's (2004) report on the ECR-R (.42), both based on English-speaking samples. In the current study only, a cross-loading of item 11 on Anxiety was included in the final model, which could account for the lower correlation between the two factors. This moderate correlation was reported in previous studies addressing romantic relationships (e.g., Wei et al., 2005). Although the ECR-R was argued to be more prone to higher correlations between the two dimensions (Cameron et al., 2012), these empirical findings depart from the original theoretical proposal that the two attachment dimensions are orthogonal (Fraley & Shaver, 1997). In fact, both attachment insecurities are similar with regards to their relations with interpersonal problems (Wei et al., 2005), perceived social support (Vogel & Wei, 2005), and

self-esteem (Hao & Wilkinson, 2014), among others. Yet they are characterised by different patterns of emotion regulation strategies: attachment anxiety with hyper-activating strategies and attachment avoidance with deactivating strategies (Mikulincer & Shaver, 2007). These inconsistences raise the important question of what the nature of the relationship between these two "dimensions" of attachment insecurity really is and how this can be reconciled with the orthogonal theoretical propositions (Mikulincer & Shaver, 2007). Whether the differences in the correlation are due to the current sample or the ECR-R-GSF also warrants future replication.

With the Chinese data, the hypothesised two-factor model with five modifications only provided a marginal fit, with five items having low factor loadings. This is in concordance with Jin and Tang (2007) who removed six item only to achieve an acceptable fit for their Chinese ECR-R. The problematic items were reported in other non-English speaking samples. For example, Conradi, Gerlsma, van Duijin, and de Jonge (2006) found in a Dutch sample that item 3 (their item 21), "I find it difficult to allow myself to depend on other people", loaded on both factors. Item 11, "I am nervous when others get too close to me", showed cross-loading in our samples and Wongpakaran and Wongpakaran's (2012) Thai sample. The word "nervous" may be tapping into attachment anxiety. Echoing our previous argument, these frequently observed cross-loadings across the different language versions may be an inherent feature of the measure and may reflect the heightened interpersonal difficulties experienced by both anxiously attached and avoidantly attached individuals (Wei et al., 2005). However, avoidant individuals may have more troubles with relationships because of a reluctance to communicate, whereas anxious individuals have difficult relationships because it may be very demanding for others to meet their excessive need for attention. Future research should consider revising or even removing these items

from the ECR-R-GSF or the ECR-R to differentiate this aspect of attachment insecurities to improve their validity, especially for adaptations into other languages.

Multi-group CFA indicated the existence of substantial cultural differences at the scalar level, although at the level of the factor structure, factor loadings, and factor covariance, the measure was partially invariant across groups. A shared factor structure on the ECR-R-GSF meant that the construct of general attachment could be represented by the same two underlying factors in the two cultural groups. The invariance on the factor loadings suggested that the individual items were related to their underlying factors in a similar way across groups. The invariance on the factorial covariance indicated that the relationship between the two factors was also similar across groups. These findings are all in agreement with the universality of the attachment system (Mesman et al., 1999; Schmitt et al., 2004). However, it should be noted that when judging the significance of the decrease in model fit, we adopted a more liberal approach by focusing on the change in CFI instead of the more conservative and restrictive criteria employing the change in chi-square (Byrne, 2010). Besides, different pairs of error covariance were included in the two groups. Therefore, our results need future replication in alternative samples; researchers are encouraged to be cautious when comparing the ECR-R-GSF across different cultural groups as scale scores may not be directly comparable.

Our failure to find scalar invariance is not wholly unexpected. The independent sample *t*-test showed that the Chinese sample scored higher on attachment anxiety but not avoidance. Previously, Mastrotheodoros et al. (2015) failed to find either metric or scalar invariance on the ECR-R between their Greek and Chinese samples. Schmitt et al. (2004) reported samples from Hong Kong and Taiwan to score higher on (romantic) attachment anxiety than their Australian counterparts. More importantly, Australia and China differ on a range of broader cultural dimensions including individualism/collectivism (Hofstede Insights,

2018) and parenting style at the individual level (Robinson et al., 1996). It is possible that participants from the collectivism- and Confucianism-based cultures are more concerned with others' opinions, compared to Australian students. Naturally, their greater tendency towards self-monitoring (Hamid, 1994; Oyserman, Coon, & Kemmelmeier, 2002) could lead to higher scores on items such as "I find that other people don't want to be as close as I would like" (item 20). The Chinese sample was also younger than the Australian sample, making them more subject to others' influences. However, whether this is equal to an exaggerated emotional need to be loved and accepted (attachment anxiety) remains to be examined.

Further, a majority of the millennials in China are the only child in their family due to the one-child policy (e.g., 77%; Shi, Wang, Yao, Su, Zhao, & Chen, 2017). The only children have parents who were reported to demonstrate excessive affection and overprotection towards them (Fan, 2016). This could subject them to an over-reliance on others for both practical and emotional help in adulthood, hence higher attachment anxiety. The traditional Chinese culture also puts less stress on the expression of negative emotions, out of the concern that it will disrupt group harmony, compared to Western cultures such as North American and Australian (Bond, 1993; Wang et al., 2016). This highly valued composure and emotional restraint (Zhu et al., 2016) could be one driving force for their higher scores on items such as "I prefer not to show others how I feel deep down" (item 1). The Chinese sample, who reported less experiences with romantic relationships, could also be less willing to and less skilful at communicating with others in close relationships (Stanton, Campbell, & Pink, 2017).

During the measure translating process, it was challenging for us to find a direct, one-to-one translation in Chinese for words pertaining to some emotional experiences, such as "affectionate" (item 15). Similarly, Mallinckrodt and Wang (2004) who translated the ECR into Chinese, also reported difficulties in finding a single Chinese referent for affect

descriptions such as "feel bad". It is unclear whether Chinese genuinely experience less emotions or they are just not used to overtly expressing them. These gaps between the original version and the Chinese translations could reflect differences in the languages, an understanding about the attachment concept, the cultures, and/or all of these. More studies that compare the attachment construct between samples from China and Western samples are needed.

We caution future researchers against comparing scores of the ECR-R-GSF, or even the ECR-R, across different language versions when metric and scalar invariance are not demonstrated. The current multi-group CFA results, combined with previous results from non-English speaking samples, suggest that in order to develop a Chinese, or any language other than English, version of the ECR-R-GSF with demonstrated measurement invariance, future researchers need to select better performing items from the ECR-R or even the ECR. In fact, an emic approach, to define the functional equivalence of "attachment anxiety and avoidance" in a Chinese culture: the pre-existing, naturally occurring attachment insecurities in a Chinese culture, as opposed to a translation of the Western measure could be more appropriate (Berry, 1969). The mere translation of an existing measure, even a well-established one like the ECR-R, does not guarantee the same meaning of a construct in a different culture.

Limitations and Future Directions

The present study is not without limitations. First, the nature of the two convenience samples indicated that the readers should be cautious with generalising the results outside the current context, for example, to the two cultures in general. On a similar note, the Australian sample had more experiences with romantic relationships and were older compared to the Chinese sample. These warrant future replications with two samples from Australia and China, respectively, that are more similar with regards to their relationship status and age.

Second, whether the students were the only child in their family was not assessed because it was not the focus of the current study. Considering that the only-child status may affect relationship-specific attachment, it could be promising for future researchers to study attachment to mother/father in only-children across different cultural groups. It may also be worthwhile to compare attachment to siblings in non-only-child families across Australia and China; or to investigate sibling's attachment to each other across cultures using the actor-partner interdependence model (Whiteman, McHale, & Soli, 2011). Second, we established the initial psychometric and measurement (non)invariance evidence of the ECR-R-GSF in emerging adult population across two selected cultures. Its utility could be extended by future studies to other age groups such as middle-aged and older adults and to other Asian (e.g., Korea) and Western (e.g., the U.K) cultures. Given the implication attachment has for psychopathology (Mikulincer & Shaver, 2012), it will also be useful to follow up if there are cultural differences on the ECR-R-GSF in clinical groups, such as those with an Axis I or II diagnosis, to examine its clinical utility. These efforts will extend previous literature as most of the existing attachment measures capture romantic as opposed to general attachment.

Third, the ECR family of measures may not address attachment security adequately given their focus on insecurity. Interested researchers could translate the Attachment Style Questionnaire (Feeney, Noller, & Hanrahan, 1994) and the revised version of the Relationship Scales Questionnaire (Scharfe, 2016), for instance, to Chinese and assess general (as opposed to romantic) attachment security as well as attachment insecurities in Australia and China, since cross-cultural evidence on attachment security has mainly been collected from infants and children (Mesman et al., 1999). Finally, one further step could be taken to adapt and administer the alternatives to self-report attachment measures such as the Adult Attachment Interview (George, Kaplan, & Main, 1985) to measure general attachment in both cultural groups. Considering the long-standing critiques of using self-report measures

to assess attachment because they fall short of detecting unconscious defensive responses (Ravitz et al., 2010), another venue for future research is to combine both self-report and interviews (Shaver, Belsky, & Brennan, 2000) to capture general adult attachment.

Conclusion

In conclusion, this study broadens the application of the ECR-R-GSF, but also highlights the pitfalls that may occur when applying measures cross-culturally. The replication of the factor structure and scale characteristics results in a young adult, Australian sample, was generally successful, with some caveats, such as the cross-loading of some items and some correlated error terms, consistent with previous findings. As the first study to examine a Chinese short form of the ECR-R, we found the ECR-R-GSF to have good internal reliability in our Chinese university student sample. The use of the ECR-R-GSF in China and/or Chinese speaking populations is promising. However, as full scalar invariance across the two cultural groups was not supported, the comparisons of the scores of the ECR-R-GSF across the cultures is not encouraged at this stage. The use of translated measures can be problematic when there is no attempt to verify that they are in fact measuring the same construct or that the underlying constructs have similar meanings across language/cultural groups. The widespread use of the ECR based measures may, to some extent, be another example of the influence of WEIRD science (Henrich, Heine, & Norenzayan, 2010) given the predominance of western samples in attachment research. While the universality of broad attachment concepts is not being questioned here, their manifestation and impact across cultural groups may not be as universal as we think and will be hard to estimate if more appropriate measures are not developed.

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Table 1

Descriptive Statistics for the Two Scales for the Two Samples

Subscale	Mean		Standard Deviation		Cronbach's α		Skewness		Kurtosis	
	Aus	Chi	Aus	Chi	Aus	Chi	Aus	Chi	Aus	Chi
Anxiety*	2.62	2.74	.84	.75	.90	.82	.25	.10	-.39	-.34
Avoidance	2.89	2.86	.71	.65	.86	.75	-.01	.16	.19	.14

Note. Aus: the Australian sample, Chi: the Chinese sample; *Independent sample *t*-test suggests that the means on Anxiety are different across the two groups: $t(1050) = 2.35$, $p < .05$, but not different for avoidance: $t(1050) = .52$, $p > .05$.

Table 2

Factor Loadings of the Final Two-Factor Model in Both Samples

	Anxiety		Avoidance	
	Aus	Chi	Aus	Chi
Items				
1.			.59	.45
2.	.71	.54		
3.			.59	.30
4.	.71	.66		
5.			.73	.49
6.	.64	.54		
7.			.63	.50
8.	.59	.43		
9.			.48	.47
10.	.70	.64		
11.*	.32	.40	.41	.27
12.	.75	.56		
13.			.60	.46
14.	.74	.59		
15.			.70	.41
16.	.63	.44		
17.			.71	.73
18.	.66	.63		
19.			.60	.55
20.	.72	.55		

Note. *item 11 showed cross-loadings in both samples; Aus: the Australian sample, Chi: the Chinese sample; the modifications in the Australian sample: item 11 cross-loads on Anxiety; the correlated error terms between item 13 and 19: .57, between item 2 and 4: .30, between item 7 and 17: .27, and between item 8 and 20: .24; The modifications in the Chinese sample: item 11 cross-loads on Anxiety; the correlated error terms between item 13 and 19: .45, between item 2 and 4: .26, between item 13 and 3: .36, and between item 3 and 19: .27.

Table 3

Multi-group CFA Results of the Final Two-Factor Model

	RMSEA (90%CI)	*p* RMSEA	CFI	TLI	ΔCFI
Model					
Model 0: configural model	.061 (.057–.066)	.000	.890	.873	-
Model 1: metric invariance	.062 (.057–.066)	.000	.881	.870	.009
Model 2: scalar invariance	.069 (.065–.073)	.000	.844	.837	.037
2a: release 20, 8, 11, 13, 2, 1	.062 (.058-.067)	.000	.875	.868	.006
Model 3: factor covariance	.063 (.059-.067)	.000	.871	.864	.004