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Anger rumination in Hong Kong and Great Britain: Validation of the scale and a cross-cultural comparison

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Abstract

English and Chinese versions of the Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2001) were distributed to 495 British and 453 Hong Kong Chinese participants. Confirmatory factor analysis verified factorial equivalence between the English and Chinese versions replicating the previously reported four factor structure of Angry Memories, Thoughts of Revenge, Angry Afterthoughts and Understanding of Causes. Internal reliability of the Chinese ARS ranged from .68 to .85. Chinese participants scored higher than British on all subscales, suggesting higher levels of anger rumination. The pattern of scores on the four scales was similar with highest endorsement of Understanding of Causes items and lowest for Thoughts of Revenge. It was concluded that the Chinese version of the Anger Rumination Scale may be useful for cross-cultural research.

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1. Introduction

Emotions can be triggered by a multitude of events that may occur externally or internally (Deffenbacher, 1999). Verbal abuse from a partner (an external trigger) may instigate feelings of depression, anger or fear (or even a mishmash of all three) and, subsequently, memories of the event (internal) may rouse the same emotions. The tendency to think over past events repetitively has been labelled rumination and is more often associated with negative thoughts (Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema, 1991; Watkins, 2004). Previous research has tended to focus on the interaction between rumination and sadness, depression or stress (Conway, Csank, Holm, & Blake, 2000; Martin & Tesser, 1996; Nolen-Hoeksema, 1991; Roger & Najarian, 1998). Rumination has been linked to depression exacerbation, onset, remission, chronicity and maintenance (e.g. Just & Alloy, 1997; Kuehner & Weber, 1999; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Parker, & Larson, 1994; Watkins, 2004).

Recently, there has been increasing interest concerning the relationship between rumination and high-activation moods, such as anger, which may not respond to rumination in the same way as low-activation moods such as depression (Rusting & Nolen-Hoeksema, 1998). Anger is defined as a subjective, negative emotion associated with threat, negative appraisal, activating physiological responses and engaging behavioural tendencies (Kassinove & Sukhodolsky, 1995). Anger is likely to involve beliefs of self-justification or blaming of others (Averill, 1982; Baumeister, Stillwell, & Wotman, 1990; Frijda, 1986; Rusting & Nolen-Hoeksema, 1998). Anger ranges in intensity from mild annoyance through to extreme rage depending on the situation and can be inflamed by a variety of provocations including memories of past anger. Anger rumination, therefore, is the tendency to think over and over anger inducing past events and may be employed in a conscious attempt to resolve negative feelings or may intrude despite the intentions of the individual to avoid such thoughts (Langlois, Freeston, & Ladouceur, 2000a, 2000b; Sukhodolsky, Golub, & Cromwell, 2001; Watkins, 2004; Wenzlaff & Wegner, 2000).

Evidence that anger rumination increases negative affect by 'feeding the flame' (Bushman, 2002; Bushman, Baumeister, & Philips, 2001), rather than cathartically releasing the negative emotion, has been provided by several researchers. For example, Rusting and Nolen-Hoeksema (1998) discovered that rumination following anger induction tended to increase experienced anger and that women were more likely to ruminate than were men. Distraction reportedly either had no effect or decreased angry feelings and was the preferred male strategy. In a similar study, Bushman (2002) had participants hit a punching bag after being angered by a negative appraisal. Participants were required to either ruminate about the person who had insulted them or think about getting fit (distraction). The rumination group were significantly angrier than the distraction group after the punch bag session and were more likely to respond aggressively when subsequently given the opportunity to punish the person who had angered them. Anger rumination, particularly thoughts of revenge, has also been associated with increased athlete aggression (Maxwell, 2004). Recent evidence suggests that anger rumination is also associated with suicidal ideation (Miros, 2000), ineffective coping (Stoeber, 2003), and elevated blood pressure (Hogan & Linden, 2004).

The content of ruminative thought is likely to affect subsequently displayed behavioural and physiological responses. For example, vengeful thoughts may increase cardiovascular activity or the probability of subsequent aggression. By contrast, attempts to understand the causes of

one's anger, may have a calming effect. In order to investigate these and similar associations, a measure of anger rumination, the Anger Rumination Scale (ARS), was developed by Sukhodolsky et al. (2001). Factor analysis of items related to the concept of anger rumination led to the development of a questionnaire with four subscales measuring Angry Afterthoughts (associated with recent/immediate events), Angry Memories (pertaining to distant events), Thoughts of Revenge, and Understanding of Causes. ARS subscales were positively correlated with anger experience, expression, and negative affectivity, and negatively correlated with anger control and adaptive mood regulation.

Cross-cultural differences and similarities in anger experience and expression have been studied extensively (Kassinove, Sukhodolsky, Tsytsarev, & Solovyova, 1997; Malgady, Rogler, & Cortes, 1996; Tanaka-Matsumi, 1995), but the study of anger rumination has been confined to Western, English speaking populations. It is possible that Western and Eastern cultures differ in terms of internal structure of the anger rumination construct as well as in terms of individual differences in self-reported anger rumination. Kövecses (2000) describes remarkably similar English, Chinese, Japanese and Hungarian metaphors depicting a 'filling up with [fluid] anger' and giving a sense of the graveness, controllability and intensity of the emotion. A metaphorical depiction of why continued rumination ('feeding the flames' or 'heating') can sometimes lead to an overflow of contained anger is also provided (i.e. when the 'fluid' is brought to boiling point). Some cultural idiosyncrasies do exist, for example, the English often refer to 'blood boiling' whereas Chinese refer to the flow of *qi*, an internal energy force that requires balance for the harmonious functioning of the body and mind, and often make no reference to heat. The existence of linguistic parity and disparity hints that a cross-cultural analysis, particularly between Western and Eastern cultures, may inform theories of cognitive, behavioural and emotional aspects of anger.

Several studies have examined anger in Asian cultures (e.g. Bishop & Quah, 1998; Lam, 1999). Lam (1999), for example, discovered a relationship between stress, trait anger, and anger expression amongst Hong Kong Chinese parents, particularly when coping with difficult children. Bishop and Quah (1998), however, reported no significant differences between Chinese, Malay and Indian groups on scores for the STAXI, but significantly lower scores for the Chinese on the Assault, Resentment and Suspicion subscales of the Buss–Durkee Hostility Inventory (Buss & Durkee, 1957), partially supporting the common belief that the Chinese tend to restrain aggressive expressions of anger (Tavris, 1989). However, the concept of anger rumination has not been studied across diverse cultures mostly due to a lack of theoretically driven measures that are comparable despite language differences. The aim of the current study was to address this shortcoming through the development of a Chinese version of the Anger Rumination Scale and to compare Chinese responses with those of British respondents.

2. Method

2.1. Participants and procedure

A total of 948 participants were recruited on a voluntary basis from two universities in the UK and two universities in Hong Kong. UK participants accounted for 495 of the total sample. Mean age was 21.54 (SD = 6.12) for the British sample, and 23.25 (SD = 7.58) for the Chinese sample.

Number of males was 267 and 223 for the British and Chinese samples, respectively. The study was approved by the institutional review board.

2.2. Materials

All British participants completed the Anger Rumination Scale (ARS; [Sukhodolsky et al., 2001](#)) and a short demographic questionnaire consisting of age and gender. The Chinese scale included the same questions as the English version, translated into Chinese. Questionnaires were completed in group settings during scheduled lectures or individually in the presence of one investigator. Participants in the group setting were not allowed to discuss their responses with other individuals.

The ARS was devised to measure individuals' tendency to focus attention on angry moods, recall past anger experiences, and think about the causes and consequences of anger episodes. The 19-item ARS was constructed after exploratory factor analysis of a pool of 25 items revealed four subscales: Angry Afterthoughts, Thoughts of Revenge, Angry Memories and Understanding of Causes. High internal reliability (Cronbach's $\alpha = .93$) and good test–retest reliability ($r = .77$) over a one-month period were reported for the total scale score. Participants responded to questions, such as 'I have long living fantasies of revenge after the conflict is over' and 'I ruminate about my past anger experiences', using a four-point Likert scale ranging from 1 (almost never) to 4 (almost always). High scores on the scale are purported to indicate a greater propensity towards anger rumination. [Sukhodolsky et al.](#), reported higher scores on the Thoughts of Revenge subscale for males (mean = 1.88, SD = .59) compared to females (mean = 1.57, SD = .52). All other scores were similar across gender.

For the Chinese sample, the ARS was translated into Chinese and then subjected to a blind back-translation procedure, which is considered a requirement for cross-cultural research that utilises more than one indigenous language ([Brislin, 1980](#); [Duda & Hayashi, 1998](#); [Sartorius & Kuyken, 1994](#)). The Chinese translation was then modified until the back-translation resembled the original questionnaire as closely as possible. This procedure was adopted so that a scale could be produced that was comparable with the original English version. It is often tempting to adjust translated questionnaires so that they are more easily accommodated within the language of the target population; however, this process can often alter the meaning of questions and impact upon the factor structure of the translated scale as well as preclude cross-cultural comparisons.

2.3. Analysis

Confirmatory Factor Analyses (CFA) were performed for the British and Chinese samples using AMOS 5.0 software ([Arbuckle, 2003](#)) for structural equation modelling. Structural equation modelling allows theoretical models to be tested against measurement models by providing an estimate of how well empirical data fit the theoretical model. The four factor model of the original ARS ([Sukhodolsky et al., 2001](#)) was tested for both the British and Chinese samples. Five indices were used to interpret the fit of the data with the proposed model: goodness of fit index (GFI), comparative fit index (CFI), root mean square error of approximation (RMSEA), standardised root mean square residual (SRMR), and chi-squared statistic. It is recommended that a good fit can be assumed if the GFI or CFI are greater than .9, RMSEA is below .08, SRMR is near

.08, and chi-square is non-significant (Bentler & Bonnett, 1980; Byrne, 2001; Hu & Bentler, 1999; when degrees of freedom are high, it is often necessary to interpret the relative, rather than absolute, chi-square (χ^2/df), which should be below 3; Carmines & McIver, 1983; Munro, 1997). For each latent variable, (i.e., four subscales of the ARS) lambda was fixed to 1 for the first observed indicator as were all error weights; all other parameters were freely estimated. Following CFA, Cronbach alphas, descriptive statistics, and inter-scale correlations were calculated. Multivariate Analysis of Variance (MANOVA) was used to identify gender and cross-cultural differences ($2 \times 2 \times 5$; Gender \times Culture \times ARS subscale and total score).

3. Results

3.1. British sample

Initial CFA using data obtained from the British sample produced goodness of fit indices that were below the traditionally accepted criterion values (Table 1). Modification indices were consulted to identify possible improvements to the model and errors 11 and 12, and errors 18 and 19 were allowed to correlate. The fit indices for the adjusted model are shown in Table 1. The cross-correlation of the errors suggests that questions may be similar. Inspection of the questions suggests that this is not the case for questions 11 and 12 but could be responsible for the correlation between questions 18 and 19; therefore, one might delete one of the latter two questions to remove redundancy and improve fit. However, deletion of either item failed to improve the model fit significantly, therefore, the revised model was accepted as a marginally adequate representation of the theoretical model.

Table 1

Selected statistics derived from the evaluation of the hypothetical model with data obtained from the British and Chinese samples

	Preliminary analysis	Modified model
<i>British sample</i>		
Standardised root mean squared residual	.05	.04
Goodness of fit index	.89	.93
Comparative fit index	.90	.95
Root mean square error of approximation	.07	.06
Chi-square (χ^2)	543.87	359.99
<i>df</i>	146	144
Relative χ^2	3.73	2.50
<i>Chinese sample</i>		
Standardised root mean squared residual	.07	.06
Goodness of fit index	.89	.91
Comparative fit index	.84	.88
Root mean square error of approximation	.07	.06
Chi-square (χ^2)	495.74	395.72
<i>df</i>	146	144
Relative χ^2	3.40	2.75

Table 2

Means, standard deviations, Cronbach alphas and Pearson's product moment correlation coefficients for all subscales of the Anger Rumination Scale (ARS), age and gender (correlation coefficients above the diagonal represent the British sample)

		British mean (SD)	Chinese mean (SD)	1	2	3	4	5	6	7
1. Gender	M	<i>n</i> = 267	<i>n</i> = 223	–	.02	.00	–.14**	–.15**	–.08	–.12**
	F	<i>n</i> = 228	<i>n</i> = 230							
2. Age	M	22.65 (7.32)	23.04 (9.85)	–.20**	–	.20**	.33**	.02	.03	.19**
	F	20.25 (3.95)	23.45 (9.26)							
3. Angry Afterthoughts British α = .86 Chinese α = .75	M	1.78 (.61)	2.08 (.57)	–.02	–.09*	–	.60**	.55**	.53**	.86**
	F	1.76 (.55)	2.08 (.61)							
4. Thoughts of Revenge British α = .73 Chinese α = .70	M	1.66 (.65)	1.92 (.64)	–.13**	–.07	.67**	–	.44**	.25**	.75**
	F	1.51 (.50)	1.75 (.60)							
5. Angry Memories British α = .80 Chinese α = .68	M	1.86 (.61)	2.17 (.56)	–.05	–.08	.71**	.65**	–	.48**	.78**
	F	1.80 (.53)	2.00 (.49)							
6. Understanding of Causes British α = .73 Chinese α = .69	M	1.86 (.56)	2.62 (.64)	.02	–.08	.66**	.49**	.58**	–	.73**
	F	1.89 (.57)	2.51 (.56)							
7. ARS total British α = .92 Chinese α = .85	M	1.76 (.51)	2.19 (.47)	–.05	–.10**	.90**	.82**	.88**	.78**	–
	F	1.73 (.45)	2.08 (.43)							

* $p < .05$.

** $p < .01$.

Table 2 reports internal reliabilities, inter-scale correlations and means for each of the four ARS subscales as well as the overall ARS score. The pattern and statistic sizes are very similar to those reported for the original ARS adding support to the scale's validity. Cronbach alphas range from satisfactory to good (Loewenthal, 2001) and inter-scale correlations are moderate and broadly in line with those published previously.

3.2. Chinese sample

The same CFA procedures were applied to the data from the Chinese sample. Initial fit indices are presented in Table 1 and indicate a less than ideal fit of the data to the model. Modification indices again suggested cross-correlations between errors 1 and 2 and between errors 5 and 6. These errors were allowed to correlate and the analysis was re-run. Comparisons of the CFA statistics from the Chinese translation with the original English version suggest a slightly poorer fit of the data to the model for the former. Fit indices are generally lower and chi-square is higher (although not significantly). In addition, the correlation between errors 5 and 6 may be problematic because they load on different factors and should be uncorrelated. For this reason it may be

acceptable to delete one of these items from the scale; thus, improving the fit of the data to the model and preventing cross-loading. Consequently, question 5 was deleted (to maintain the number of items loading on the Thoughts of Revenge subscale) and the analysis re-run still allowing errors 1 and 2 to correlate. The removal of question 5 failed to significantly improve the fit of the model; therefore, the original structure (with errors 1 and 2 and errors 5 and 6 allowed to correlate) was accepted.

Mean and standard deviation values as well as Cronbach alpha and correlation coefficients of the Chinese version of the ARS are reported in Table 2. Means were similar to the English version as were inter-scale correlations adding support to the validity of the Chinese version. Internal reliability tended to be lower for the Chinese version than for the English suggesting that some improvements to the scale could be accomplished.

3.3. Cross-cultural comparisons

Mean and standard deviation values and reliability statistics for both the British and Chinese samples are reported in Table 2. Alpha coefficients were in the same adequate range for each subscale. A Gender \times Culture (2×2) MANOVA (Wilk's Lambda) with total ARS and four subscale scores as dependent variables, revealed significant main effects of Gender ($F(5, 940) = 6.70$, $p < .001$, $\lambda = .97$, $\eta^2 = .03$) and Culture ($F(5, 940) = 87.75$, $p < .001$, $\lambda = .68$, $\eta^2 = .32$) but no interaction ($F(5, 940) = 1.68$). Univariate analyses were employed to evaluate the main effects for each dependent variable (alpha was set at 1% to account for multiple comparisons across each independent variable).

Males scored significantly higher than females on the Thoughts of Revenge ($F(1, 944) = 17.22$, $p < .001$, $\eta^2 = .02$) and Angry Memories subscales ($F(1, 944) = 9.57$, $p < .01$, $\eta^2 = .01$). Males also scored higher on total ARS score ($F(1, 944) = 7.19$, $p < .01$, $\eta^2 = .01$). The effect of Gender for Thoughts of Revenge replicates earlier findings (Sukhodolsky et al., 2001). Scores on all four subscales and total ARS score differed across culture with Chinese scoring higher than British for each dependent variable ($p < .001$ in all cases, η^2 ranged from .04 for Thoughts of Revenge to .26 for Understanding Causes), suggesting, that Chinese ruminate more about past anger experiences.

There was no interaction between Gender and Culture; therefore, samples were pooled for the analysis of subscale differences. Angry Afterthoughts, Angry Memories and Total ARS score did not differ significantly from each other; all other comparisons were significant ($p < .03$ in all cases). Understanding of Causes received the greatest endorsement followed by Angry Memories, Angry Afterthoughts and finally Thoughts of Revenge received the lowest support (Table 2). This pattern of results is similar to that reported by Sukhodolsky et al. (2001) and did not differ across cultures or gender, supporting the contention that the construct of anger rumination is a robust phenomenon.

4. Discussion

Two confirmatory factor analyses were carried out on English and Chinese versions of ARS. Both analyses provided evidence for an adequate fit between the observed data and a hypothet-

ical four factor anger rumination model based on specific criteria. More stringent cut-off points for fit indices have been proposed that would suggest marginal adequacy of the ARS model, particularly the Chinese version (Beauducel & Wittmann, 2005; Hu & Bentler, 1999). Hu and Bentler advocated use of the standardised root mean square residual (SRMR) in combination with one other index (e.g. CFI or RMSEA). A SRMR close to .08 and CFI above .95 or RMSEA below or equal to .06 were recommended; both the British and Chinese models partially fulfil these criteria (Table 1). However, Marsh, Hau, and Wen (2004) noted that Hu and Bentler's criteria may be overly demanding and rarely achieved when validating most psychological scales with complex factor structures. Marsh et al. recommended that validation take into account the theoretical development of the scale and that suitable cut-off points for indices be judged on the basis of repeated confirmatory analyses. The ARS was developed using a sound theoretical motivation; as such, the results reported here support the validity of both English and Chinese versions. This conclusion was supported by the similar pattern of mean scores for both populations.

The Chinese tended to score significantly higher than the British on all subscales of the ARS suggesting that they engage in anger rumination more frequently. Careful consideration of the meaning of the translated scale labels by several bilingual graduate students and staff ruled out the possibility of differing intensity interpretations, suggesting that the differing scores reflect a true cultural difference either in amount of rumination or willingness to report. This finding parallels recent reports of Chinese and Caucasian women's felt anger and anger expression (Pan, 1999). Pan reported lower trait anger and anger expression scores for Caucasian American women compared with Chinese American and Taiwanese women. After expressing anger, Caucasians were also more likely to express guilt than were Chinese. Gender differences were apparent in both samples and were independent of cultural differences. Males scored higher than females on the Thoughts of Revenge and Angry Memories subscales and also reported higher total ARS scores. These differences are consistent with reports of higher trait anger and more frequent expression of anger in males. Future studies should examine cross-cultural and gender differences in anger rumination after controlling for trait anger.

4.1. Limitations, implications and future research

The development of appropriate measurement tools is an essential component of cross-cultural research. The Chinese version of the ARS demonstrated adequate psychometric properties and may be useful for future research. As an assessment of anger rumination, however, it almost stands alone in the Chinese language; relationships between anger rumination and other psychological and behavioural factors will remain difficult to determine because of the paucity of other Chinese language scales.

Hong Kong Chinese are rather more westernised than their mainland counterparts, due in part to the influence of 150 years of British occupation and Hong Kong's status as an international finance centre, and may display patterns of behaviour that are also more westernised than the behaviours displayed by mainland Chinese. Thus, generalisations from the research presented here remain tentative and may be totally inappropriate for other Chinese populations. Comparisons of mainland and island Chinese are required to further evaluate the effects of culture on psychological factors and behaviour.

The properties of the Chinese version of the ARS were deemed as adequate but were not without criticism. Correlations between items and possible cross-loading were discovered that may impact upon interpretation of the scale's psychometric properties. The addition of further items may improve the quality and cultural relevance of the scale; however, the practice of adding items to scales on an ad hoc or intuitive basis and declaring cultural differences without cross-comparisons with other cultures should be discouraged. The need to find common ground rather than identify cultural idiosyncrasies that go unmeasured in other populations is of major importance for cross-cultural research; therefore, additional items would require validation in both English and Chinese versions if valid cross-cultural comparisons are to be made.

The ARS has the potential to further our understanding of rumination, its connection with anger and behaviour, and further develop theoretical models of emotion. The development of the Chinese version of the ARS allows cultural aspects to be incorporated into these observations and theoretical models, hopefully, improving our understanding of universal human behaviour.

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