



# Development and validation of the anger rumination scale

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## Abstract

The Anger Rumination Scale was constructed to measure the tendency to focus attention on angry moods, recall past anger experiences, and think about the causes and consequences of anger episodes. Principal axis analysis demonstrated a four factor structure of the scale, which was also supported with a subsequent confirmatory factor analysis. The Anger Rumination Scale was demonstrated to have adequate internal consistency and one month test-retest reliability. The convergent and discriminant validity of the scale were supported by an expected pattern of correlations between the Anger Rumination Scale and the measures of anger experience, anger expression, negative affectivity, emotional attention, satisfaction with life, and social desirability. Normative data is provided for a sample of 408 college-age men and women. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Emotions; Anger; Anger rumination; Aggression; Violence prevention; Scale; Measurement; Emotional control

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## 1. Introduction

Anger is a basic emotion (Oatley, 1992) that can be defined as a negative feeling state associated with specific cognitive appraisals, physiological changes and action tendencies (Kassinove & Sukhodolsky, 1995). It has been distinguished from related concepts of hostility and aggression (Friedman, 1992; Spielberger, Reheiser & Sydeman, 1995) and a substantial body of literature has been accumulated which necessitates a distinction between anger and anger rumination. Conceptualization of the anger rumination was influenced by the social-constructivist (Averill, 1983) and factor-analytical (Spielberger, 1988) models of anger. Anger rumination is considered as a relatively independent component within the sequence of broader anger phenomenology. Generally, if anger is viewed as an emotion, anger rumination can be defined as thinking about this emotion.

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The Anger Rumination Scale (ARS) was developed to assess cognitive processes that unfold after the emotion of anger has been triggered or generated. Deffenbacher (1999) explicated the difference between internal and external triggers of anger. External anger eliciting events include identifiable circumstances such as being cut off in traffic. Internal events that may trigger anger include thoughts and memories of prior anger-provoking events such as thinking about an ex-spouse. Anger experiences are further shaped by cognitive appraisals, specifically those of unfairness, blameworthiness, and intentionality (Kassinove & Sukhodolsky, 1995). Spielberger (1988) labeled the phenomenology of anger experience as state-anger, which was defined as a transient psychobiological feeling that varies in intensity from mild irritation to fury and involves the concomitant activation of the autonomic nervous system. Correspondingly, an individual's tendency to experience state-anger with higher frequency and in response to a wider range of situations is referred to as trait-anger. We propose that anger generation and anger experience processes are intertwined with anger ruminative processes, which can be responsible for sustaining and augmenting anger.

This paper is concerned with anger rumination, unintentional and recurrent cognitive processes that emerge during and continue after an episode of anger experience. In addition to anger literature, research on ruminative thoughts (Martin & Tesser, 1996; Trapnell & Campbell, 1999), self-focused attention (Ingram, 1990), emotion regulation (Gross, 1998), and counterfactual thinking (Roese, 1997) was reviewed during the stage of construct clarification (DeVellis, 1991). As a result, the construct of anger rumination was theoretically derived to include three different processes: memories of past anger experiences, attention to immediate anger experiences, and counterfactual thoughts about anger experience. To illustrate these dimensions, consider an inner monologue that might unfold in a person's head after being stood up by a date. The person might be thinking: "I can not believe I got stood up by this #\$\$@%! I am really mad now (i.e. attention to current experience). This is just the kind of thing my ex used to do (i.e. memories of similar anger provoking episodes). I could have been home watching television instead of waiting out here (i.e., counterfactual thinking)." Subsequently, it is suggested that memories of past anger episodes can trigger new episodes of state-anger, attention to anger experience can lead to amplification of its intensity and duration, and counterfactual thoughts may be related to action tendencies towards resolution or retaliation.

Based on subjective reports, anger is a frequently experienced and an easily identifiable emotion. On average, anger is experienced several times a week and typically lasts for half an hour (Averill, 1983; Kassinove, Sukhodolsky, Tsytsarev & Soloveyva, 1997). The relationship of anger to elevated blood pressure (Suls, Wan & Costa, 1995), social maladjustment (Deffenbacher, 1992), and aggressive behavior (Berkowitz, 1993) demonstrates the clinical utility of anger research. While anger has been connected to clearly detrimental outcomes, ruminative thoughts do not easily present with the obvious negative implications of the same caliber. However, ruminative thoughts were named as major contributors to unhappiness (McIntosh & Martin, 1992), depression (e.g. Beck, 1982), and the ability to solve problems (Carver, Scheier & Weintraub, 1989). Clearly, reoccurring thoughts of anger episodes would negatively contribute to subjective well-being and, therefore, merit investigation.

A plethora of anger measures is available in research literature. A recent review counted 63 published measurement instruments (Miller, Smith, Turner, Guijarro & Hallet, 1996). The present conceptualization of anger rumination suggests that it is related to the duration of anger experience

as well as to the tendency to dwell on one's anger experiences. The duration dimension of an anger episode has been relatively neglected in psychometrically developed anger scales. The Multidimensional Anger Inventory (Siegel, 1986) assesses duration of anger with two items which clustered together with the frequency and intensity of anger items, to form an anger arousal factor. The construct of anger rumination distinguishes the duration of the physiological arousal during the state-anger experience from the duration of cognitive activity related to a particular anger episode. After the initial provocation, an individual's attention and thinking can be continuously focused on, or will intermittently return to, the anger provoking event. This tendency to ruminate about the experience may be the mechanism partially responsible for the maintenance of anger.

At first sight, anger rumination appears to resemble the construct of suppressed anger. In the State-Trait Anger Expression Inventory (STAXI), Spielberger (1988) distinguished between the three modes of anger expression: anger-out, anger-in and anger-control. Anger-out refers to a tendency to express anger through either verbal or physical behaviors. Anger-in or suppressed anger refers to the tendency to hold one's anger on the inside without any outlet. Anger-control refers to the tendency to engage in behaviors intended to reduce overt anger expression. The construct of anger rumination attempts to illuminate what happens to anger after it has been suppressed. Thus, the suppression of anger (anger-in mode of anger expression) might provide the material for subsequent rumination. In addition, although it may be difficult to tease cognition and emotion apart, anger-in can be viewed as an emotional activity and anger rumination can be considered a cognitive activity.

A large scale, factor-analytical investigation on a sample of 2682 participants provided support for the independence and possibly complex structure of the anger rumination factor (Miller, Jenkins, Kaplan & Salonen, 1995). The data from Siegel's (1986) multidimensional anger inventory, Spielberger's, Johnson, Russell, Crane, Jacobs and Warden's (1985) anger expression scales, a Cook–Medley (Cook & Medley, 1954) hostility subscale, and hostility items from four Type A behavior scales yielded eight separate factors. These included hostile anger expression, perceived control over the expression of one's anger, ease of anger provocation, frequency of anger, brooding, hostile outlook, cynicism, and sullenness. Miller et al.'s study had two implications for the development of the ARS. First, a four-item brooding factor, which was interpreted as a measure of the duration of anger and difficulty in forgetting about anger, resembles the construct of anger rumination. Interestingly, the factor loadings of the two anger duration items were twice as high as those for the two items assessing the tendency to think about anger. This suggests that if more items were added, the construct of brooding might reveal a complex factor structure of its own. Second, the brooding items formed a factor separate from the sullenness factor which included four items from the Spielberger et al.'s anger-in scale. This empirical finding supports the assumption that suppressed anger and anger rumination are related but different phenomena.

Ruminative thoughts have been a subject of psychological investigation independently and as pertinent to emotional adjustment. Martin and Tesser (1996) defined ruminative thoughts as conscious thoughts that revolve around a common theme and reoccur without immediate situational demands. They posited that ruminative thoughts are triggered by the discrepancy between an individual's goal and perceived progress towards this goal. "Current concerns" theory (Klinger, 1977, 1996) asserted that ruminative thoughts are launched by emotional responses. The relationship between the strength of negative affect and the tendency to ruminate was also noted

by Horowitz (1986) and Rachman (1981). While the concept of rumination pertains to the reoccurring and unintentional thought processes, counterfactual thinking refers to thought content which is alternative to what has actually happened (Roese, 1997; Roese & Olson, 1995). The term “counterfactual thinking” is used here to refer to cognitions about antecedents and consequences of anger episodes. For example, an individual can have thoughts that an anger episode should not have happened. Regarding the outcomes of anger episodes, a person can consider outcomes that differ from actuality, e.g. thought of retaliation or regret. Counterfactual thoughts, however, do not have to be reoccurring and unintentional. Thus, when counterfactual thinking and rumination were operationalized as individual differences variables, they were found to be independent and differentially related to negative affectivity (Kasimatis & Wells, 1995).

Martin and Tesser (1996) addressed the issue of emotional valence in rumination by distinguishing between positive and negative rumination. For instance, anticipatory thoughts of high likelihood of goal attainment are viewed as positive rumination and thoughts of regret about unattained goals are viewed as negative rumination. The term rumination, however, is commonly used with the connotation of a negative phenomenological experience. Trapnell and Campbell (1999) elaborated the concepts of self-awareness (Duval & Wicklund, 1972) and self-consciousness (Fenigstein, Scheier & Buss, 1975), and proposed a distinction between ruminative and reflective self-focus. Ruminative self-focus was related to psychological distress and negative self-perceptions, while reflective self-focus was related to epistemic interests and accuracy of self-knowledge. The two processes were viewed as relatively independent from each other and differentially related to broader personality constructs of neuroticism and openness to experiences. Trapnell and Campbell’s understanding of self-reflection resembles the constructs of intrapersonal intelligence (Gardner, 1983) and emotional intelligence (Salovey & Mayer, 1990), which represent adaptive mechanisms of emotion regulation (Gross, 1998). Nolen-Hoeksema (1996) suggested distinguishing between rumination and problems solving. She used the term rumination to refer to thoughts that do not aid in the progress towards the goal. Correspondingly, reoccurring thoughts that are directed towards resolving some problem or reducing goal discrepancy are better referred to as problem solving. Unstructured rumination was found to interfere with the ability to solve interpersonal problems and to increase dysphoric mood.

Several research traditions suggest that rumination about anger episodes may increase the intensity and duration of the anger experience and, therefore, exacerbate the possible negative consequences of anger. In general, self-focused attention has been consistently found to be heightened in various clinical disorders (Ingram, 1990) and the ruminative response style has been associated with the increase in depressed mood, anxious states, and general negative affect (Roberts, Gilboa & Gotlib, 1998). Recent anger induction research demonstrated that self-focused rumination increased the intensity of the anger experience (Rusting & Nolen-Hoeksema, 1998). While several self-report measures to evaluate cognitive responses to emotional experiences have been developed in the context of self-regulation of depressed mood (Catanzaro & Mearns, 1990; Nolen-Hoeksema & Morrow, 1991; Salovey, Mayer, Goldman, Turvey & Palfai, 1995), only Caprara’s (1986) Dissipation-Rumination Scale directly targets cognitive responses to anger. However, the items of the Dissipation-Rumination Scale pertain more to retaliatory tendencies after an insult rather than to the cognitive processes of individuals experiencing anger.

The present ARS was constructed to measure the tendency to focus attention on angry moods, recall past anger episodes, and think over the causes and consequences of anger episodes. Anger

rumination was defined as a tendency to engage in unintentional reoccurring thoughts about anger episodes. The phenomenology of anger rumination also includes spontaneously reliving moments of anger and engaging in fantasies of retaliation. Angry rumination, or thinking about and mentally rehearsing one's anger episodes, was conceptualized as a multidimensional construct differentially related to the experience and expression of anger as measured by the STAXI (Spielberger, 1988) as well as to negative affectivity, satisfaction with life, emotional attention, and social desirability.

## **2. Method**

### *2.1. Participants and procedure*

The data were collected on three testing occasions within the classroom settings at the medium size suburban university. The participants received partial credit towards their next examinations. One group of participants was assessed on two occasions separated by a 1-month interval. On the first testing occasion 220 undergraduate students (153 women and 67 men with the mean age of 20.94 years, S.D. = 4.75) completed the Anger Rumination Scale. One month later 226 students in the same classes (these included 179 students who had participated in the first testing occasion) completed the Anger Rumination Scale together with the five questionnaires described in the Materials section. This sample consisted of 150 women and 76 men with the mean age of 21.28, S.D. = 4.60. A second independent group of 172 participants (102 women, 66 men, and 4 no response with the mean age of 19.2, S.D. = 2.30) completed the Anger Rumination Scale. It was assured that no one from the second group of students participated in the two previous testing occasions.

### *2.2. Measures*

The ARS was developed to measure the tendency to think about current anger-provoking situations and to recall anger episodes from the past. The original pool of 30 items for the ARS was rationally developed by the authors. Items consisted of statements hypothesized to be related to the anger rumination construct (e.g. "I re-enact the anger episode in my mind after it has happened" and "I keep thinking about events that angered me for a long time"). After the 30 items were discussed and examined for clarity of expression and ambiguities, a set of 25 items was retained for the subsequent steps of scale development. Following an exploratory factor analysis, 19 of the 25 items were retained and constitute the final scale (see Table 1). Participants were asked to rate each item on a 4-point Likert-type scale ranging from 1 = "almost never" to 4 = "almost always" in terms of how well the items corresponded to their beliefs about themselves. All items were phrased so that higher scores corresponded to greater levels of anger rumination.

The STAXI is a 44-item questionnaire extensively utilized in research on anger (Spielberger, 1988). The STAXI was used to obtain an index of the dispositional characteristic of anger experience and three indices of anger expression. Trait-Anger refers to the frequency of anger episodes across various situations. The three modalities of anger expression include Anger-Out, which is an overt manifestation of angry behaviors, Anger-In, which is a tendency to suppress

Table 1  
Exploratory (EFA) and Confirmatory (CFA) Factor Analyses loadings, and corrected item-total correlations of the Anger Rumination Scale (ARS)

Item No.	Items in the final version of the ARS	Corrected item-total correlations	EFA factor loadings	CFA factor loadings
<i>“Angry Afterthoughts”</i>				
24	I re-enact the anger episode in my mind after it has happened	0.70	0.77	0.83
19	When something makes me angry, I turn this matter over and over again in my mind	0.72	0.70	0.79
18	Memories of even minor annoyances bother me for a while	0.64	0.58	0.71
9	Whenever I experience anger, I keep thinking about it for a while	0.70	0.56	0.74
7	After an argument is over, I keep fighting with this person in my imagination	0.59	0.52	0.72
8	Memories of being aggravated pop up into my mind before I fall asleep	0.54	0.50	0.74
<i>“Thoughts of Revenge”</i>				
4	I have long living fantasies of revenge after the conflict is over	0.52	0.77	0.79
16	When someone makes me angry I can’t stop thinking about how to get back at this person	0.52	0.63	0.71
13	I have day dreams and fantasies of violent nature	0.39	0.49	0.66
6	I have difficulty forgiving people who have hurt me	0.42	0.40	0.53
<i>“Angry Memories”</i>				
2	I ponder about the injustices that have been done to me	0.64	0.69	0.77
3	I keep thinking about events that angered me for a long time	0.70	0.54	0.85
15	I feel angry about certain things in my life	0.56	0.49	0.74
1	I ruminate about my past anger experiences	0.63	0.47	0.67
5	I think about certain events from a long time ago and they still make me angry	0.69	0.44	0.79
<i>“Understanding of Causes”</i>				
12	I think about the reasons people treat me badly	0.58	0.65	0.62
17	When someone provokes me, I keep wondering why this should have happened to me	0.52	0.58	0.56
11	I analyze events that make me angry	0.56	0.52	0.71
10	I have had times when I could not stop being preoccupied with a particular conflict	0.63	0.31	0.76

overt behaviors while remaining angry inside, and Anger-Control, which is a tendency to engage in anger reduction activities.

The Trait Meta-Mood Scale (TMMS) is a 30 item questionnaire measuring an individual's ability to reflect on their emotions in general (Salovey et al., 1995). The scale consists of three subscales: "Attention to Feelings," which measures the degree to which individuals notice and think about their feelings, "Clarity of Feelings," which assesses the ability to understand one's mood and discriminate among moods, and "Mood Repair," which evaluates the tendency to repair unpleasant moods or maintain pleasant ones.

The Negative Affectivity Scale is a 21-item measure of a dispositional tendency to experience aversive emotional states (Stokes & Levin, 1990). The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985) is a five-item questionnaire that assesses global life satisfaction and does not tap the related construct of positive affect. Finally, the Marlowe-Crowne Social Desirability scale (Reynolds, 1982) was administered to assess the levels of social desirability and the tendency to present oneself in a favorable light.

The ARS was administered on all testing occasions. The remaining scales were administered on the second testing occasion. All scales were demonstrated to have adequate reliability coefficients.

### 3. Results

Listwise deletion of cases with missing values was used for all analyses. The data collected on the first administration of the ARS ( $n = 212$ ) was used to evaluate the internal consistency and the factor structure of the scale. Reliability analysis of the 25 items yielded an internal consistency coefficient  $\alpha = 0.93$  with corrected item-total correlations ranging from 0.39 to 0.75. Kurtosis values for the distribution of responses to individual items ranged from  $-0.81$  to  $1.01$  and skewness values ranged from  $0.02$  to  $1.18$  indicating no significant deviations from normality. The Kaiser-Meyer-Olkin measure of sampling adequacy ( $0.92$ ) and the Bartlett test of sphericity ( $2390.28$ ,  $p < 0.00$ ) demonstrated adequate multivariate normality of the set of distributions, thereby permitting the Exploratory Factor Analysis (EFA) of the scale.

Principal axis analysis followed by the Oblimin rotation with Kaiser nomination yielded a four factor solution explaining 54% of the total variance. An examination of the initial eigenvalues of the reduced matrix and their corresponding estimated proportions of variance accounted for (Pedhazur & Schmelkin, 1991) suggested the retention of a four-factor solution. Table 1 displays factor loadings and corrected item-total correlations of the 19 ARS items retained after the analyses. The first factor, labeled "angry afterthoughts" ( $\lambda = 9.61$ ), meaningfully combined the items related to the cognitive rehearsal of recent anger episodes. The second factor, labeled "thoughts of revenge" ( $\lambda = 1.58$ ), included items that pertained to thoughts and ideas of retribution. The third factor, labeled "angry memories" ( $\lambda = 1.23$ ), included items related to thoughts about anger episodes from the past. The fourth factor, labeled "understanding of causes" ( $\lambda = 1.20$ ), included items that reflected thinking about the causes of an anger event. Six items failed to load clearly on these factors. The remaining 19 items had unique loadings on their respective factors ranging from  $0.31$  to  $0.77$ . This empirically derived four-factor structure differed from the hypothesized three component structure of the anger rumination construct. However, "angry afterthoughts" and "angry memories" factors meaningfully reflected the proposed temporal orientation of angry

rumination. It appears that the proposed element of counterfactual thinking was broken down into “fantasies of revenge” and “understanding of causes” factors.

The data collected on the second testing occasion was used to evaluate the test-retest reliability of the ARS and to evaluate the relationship of the scale with other self-report measures. The test-retest reliability coefficient of 0.77 was obtained for the total 19-item scale on a subsample of 179 participants who were present at both testing occasions. This coefficient is indicative of good stability of the anger rumination construct over a 1-month period.

The correlation coefficients between the ARS and other measures were computed using the data set from the second testing occasion and are reported in Table 2. The correlations of the total score of the 19 items of the ARS with the subscales of the STAXI were in the moderate range, significant at the 0.001 level, and were in the predicted direction: ARS and trait-anger ( $r=0.57$ ), ARS and anger-in ( $r=0.52$ ), ARS and anger-out ( $r=0.43$ ), ARS and anger-control ( $r=-0.35$ ). The ARS was also significantly related to the Measure of Negative Affectivity ( $r = 0.54$ ). The three variables that had the strongest correlations with the ARS (trait-anger, negative affectivity, and anger-in) were entered in a stepwise regression analysis. The overall analysis was significant,  $R^2=0.49$ ,  $F(3, 219)=69.70$ ,  $p<0.001$  and each predictor accounted for significant variance increments in the anger rumination score. Moderate and significant correlations were also found between the ARS and the TMMS mood repair subscale ( $r=-0.44$ ) and TMMS mood clarity subscale ( $r=-0.25$ ). Contrary to expectation, no relationship was found between anger rumination and the attention to feelings subscale of the TMMS. Finally, negative relationships were demonstrated between the ARS and the measures of life satisfaction and social desirability.

Table 2

Inter-correlations between Anger Rumination Scale (ARS) factors and validity measures<sup>a</sup>

	Total ARS Scale	ARS Factor 1: Angry Afterthoughts	ARS Factor 2: Thoughts of Revenge	ARS Factor 3: Angry Memories	ARS Factor 4: Understanding the Causes
TMMS Repair	-0.44**	-0.36**	-0.42**	-0.38**	-0.33**
TMMS Attention	-0.08	-0.02	-0.11	-0.02	-0.15*
TMMS Clarity	-0.25**	-0.17*	-0.29**	-0.24**	-0.15*
MNS Total	0.55**	0.43**	0.53**	0.53**	0.29**
SWLS Total	-0.38**	-0.30**	-0.41**	-0.35**	-0.25**
MCSD Total	-0.37**	-0.29**	-0.35**	-0.26**	-0.41**
STAXI Anger-In	0.52**	0.46**	0.50**	0.47**	0.36**
STAXI Anger-Out	0.43**	0.36**	0.40*	0.33**	0.45**
STAXI Anger-Control	-0.35**	-0.26**	-0.37**	-0.29**	-0.29**
STAXI Trait-Anger	0.57**	0.41**	0.54**	0.48**	0.55**
ARS Factor 1	0.91**				
ARS Factor 2	0.91**	0.76**			
ARS Factor 3	0.84**	0.72**	0.68**		
ARS Factor 4	0.71**	0.56**	0.65**	0.43**	

<sup>a</sup> TMMS = Trait Meta-Mood Scale; MNS = Measure of Negative Affectivity; SWLS = Satisfaction with Life Scale; MCSD = Marlowe-Crowne Social Desirability Scale; STAXI = State-Trait Anger Expression Inventory.

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).



To further investigate the relationship between anger rumination and Spielberger's modes of anger expression, the anger-out, anger-in, and anger-control scales data were entered in the Principal Component Analysis together with the first factor of the ARS. The choice of using only the first Anger Rumination factor, "angry afterthoughts", was dictated by the sample size ( $n = 219$ ) available for this analysis. Principal Component Analysis with Varimax Rotation yielded eight factors which explained 63% of the total variance. While this analysis did not replicate the original structure of the STAXI's anger expression items, all six of the Anger Rumination Items loaded on one (first) factor, which accounted for 23% of the variance. In this analysis, the Anger Rumination items factor loadings ranged from 0.86 to 0.63. These results lend support to the discriminant validity of the ARS.

The data collected from the third sample ( $n = 172$ ) was used for the Confirmatory Factor Analysis (CFA), which was performed using the Amos statistical software, version 3.6 (Arbuckle, 1997). To maintain consistency with the EFA, the correlation matrix and the standard deviations of the 19 ARS items retained after the EFA were used for this analysis. For each latent variable, the lambda of the first related indicator was fixed to 1.00 and all error weights were also set equal to 1.00. Assuming independence of errors, the first CFA yielded  $RMR = 0.04$ ,  $GFI = 0.85$ ,  $AGFI = 0.81$ ,  $IFI = 0.91$ , and  $CFI = 0.92$ . Next, based on the resulting modification indices, errors 8 and 9, and errors 11 and 12 were allowed to correlate, and the second CFA resulted in  $RMR = 0.04$  and  $GFI = 0.87$ , and  $AGFI = 0.83$ ,  $IFI = 0.95$ , and  $CFI = 0.95$ . Goodness-of-fit indices greater than 0.9 indicate adequate fit and lower than .9 indicate possibilities for improvement (Bentler & Bonett, 1980).

Because the empirically derived four-factor structure did not receive adequate support with two of the four goodness-of-fit indices, it was decided to evaluate an a priori, conceptual three factor structure (factors 2 and 4 were combined). Resulting CFA yielded goodness-of-fit indices ( $RMR = 0.03$ ,  $GFI = 0.83$ ,  $AGFI = 0.80$ ,  $IFI = 0.90$ , and  $CFI = 0.92$ ) that were all lower than those in previous analysis. Since  $\chi^2$  criterion is sensitive to sample size, it's significance level is less useful for the interpretation of goodness-of-fit (Schumacker & Lomax, 1996). However, the decrease in the  $\chi^2$  values may be used for statistical comparison of two models (Pedhazur & Schmelkin, 1991). The decrease in the  $\chi^2$  for the four-factor model ( $\chi^2 = 243.28$ , d.f. = 142) compared to the three-factor model ( $\chi^2 = 307.04$ , d.f. = 162) was statistically significant ( $\chi^2_{\text{dif}} = 63.76$ , d.f. = 20,  $p < 0.01$ ). Therefore, a four-factor model of the ARS was retained for the final 19-item version of the scale.

In order to provide normative information for the resulting version of the ARS, all cases, excluding those obtained for the re-test, were merged together. The resulting sample of 408 participants consisted of 138 men and 270 women with mean age of 20.32, S.D. = 3.93. To obtain more robust estimates of internal consistency, Cronbach alpha's were recalculated for the entire sample. Table 3 contains  $\alpha$ -coefficients for the total sample as well as means and standard deviations of the ARS factor scores and total scores by gender. A small negative correlation was obtained for age and the angry memories factor ( $r = -0.12$ ). Gender differences were observed for the thoughts of revenge factor  $t(406) = 5.37$ ,  $p < 0.001$ .

#### 4. Discussion

Anger rumination was defined as an unintentional recurring cognitive process related to anger experience and expression. A 19-item ARS was developed to measure attention to current anger experience, the tendency to recall previous anger episodes, and the tendency to engage in

Table 3

Alpha coefficient for the total sample; means and standard deviations of the Anger Rumination Scale (ARS) factor scores and total scores by gender

	Total sample ( <i>n</i> = 408)	Men ( <i>n</i> = 138)		Women ( <i>n</i> = 270)	
	$\alpha$ -coefficients	Mean	S.D.	Mean	S.D.
Angry Afterthoughts	0.86	1.94	0.61	1.88	0.65
Thoughts of Revenge	0.72	1.88	0.59	1.57	0.52
Angry Memories	0.85	2.04	0.58	2.04	0.65
Understanding of Causes	0.77	2.17	0.59	2.12	0.67
ARS total	0.93	1.99	0.51	1.91	0.54

counterfactual thinking about one's anger experience (what might have happened instead of what actually happened). Exploratory factor analysis yielded four factors: angry afterthoughts, angry memories, fantasies of revenge, and understanding of causes. The first two factors corresponded to the a priori consideration that angry rumination may involve thinking about a recent episode or recalling and getting angry about a distant episode. The predicted construct of counterfactual thinking was divided into two empirical components: thinking about causes and thinking about revenge. Reasoning about the causes of one's anger can be viewed as the process of working through and trying to achieve a meaningful understanding of an anger episode. Fantasies of revenge may be viewed as action tendencies and attempts to achieve closure to the conflict (Ornstein, 1999).

The ARS was demonstrated to have adequate internal consistency and test-retest reliability. The convergent and discriminant validity of the ARS was demonstrated in the pattern of correlations between the anger rumination factors and measures of related characteristics. The ARS correlated highest with the measures of anger experience, anger expression, and negative affectivity. Although trait-anger, anger-in and negative affectivity all correlated with anger rumination in a similar moderate range, each of the variables accounted for a significant increase in the anger rumination score. Correlations of the ARS with the measures of emotion clarity, emotion repair, subjective well-being, social desirability, and anger-control were notably smaller than its correlations with measures of anger expression and experience.

Contrary to expectation, the ARS did not correlate significantly with the tendency to attend to one's emotional states as measured by the TMMS scale. This may be explained by the distinction between ruminative and reflective self-focus (Trapnell & Campbell, 1999). The TMMS attention to feelings subscale may measure the aspect of reflective self-focus which is different from ruminative self-focus. Finally, high intercorrelations among the ARS factors may be responsible for the inadequacy of the two goodness-of-fit indices in the CFA. This suggests the possibility that anger rumination is a unidimensional construct. As such, it would resemble a general ruminative response style implicated in mood and anxiety disorders (e.g. Davey, 1995; Ehlers & Steil, 1995; Lyubomirsky & Nolen-Hoeksema, 1993).

The ARS can be used in clinical practice with individuals who present with anger related problems. It is not unusual in psychotherapy to address anger-provoking memories or current events from which a client might have difficulty disengaging. The scale can help in understanding cognitive mechanisms in excessive or inappropriate anger experience.

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