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Brief State Rumination Inventory (BSRI): A Standardization Study for Turkish Speaking Populations

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Abstract

Rumination, which is a form of repetitive negative thinking, has been suggested as a variable associated with elevated risks for depression. Current research conceptualizes rumination as a dispositional entity but has neglected its more state-based forms, which may also be equally related to emotional disorders. Brief State Rumination Inventory (BSRI) is a psychometrically sound measure of state rumination, demonstrated to be sensitive to situational changes in rumination. The current study aims to examine the psychometric characteristics of the Turkish form of BSRI. Results of the first study replicated the single factor structure of the original version of BSRI in a group of 192 Turkish speaking adults between ages 18 and 65. Moreover, the Turkish version of BSRI yielded satisfactory levels of internal consistency and construct validity indicated by significant associations with measures of repetitive negative thinking, avoidant coping, and psychological distress. Study 2 examined the sensitivity of BSRI to momentary changes in rumination to assess the criterion validity of the Turkish form of BSRI, by examining its sensitivity to a rumination induction procedure in 66 university students (39 women). Together, these results suggest that the Turkish version of BSRI is a psychometrically reliable tool which is appropriate for the assessment of state rumination in Turkish speaking populations.

Keywords Brief State Rumination Inventory · Reliability · Validity

Rumination refers to a behavioral pattern that presents itself in the form of constantly and repetitively thinking about one's negative and dysphoric emotions with a specific focus on their possible causes and consequences (Nolen-Hoeksema et al. 1997). It is a repetitive negative thinking (RNT) pattern that is documented to be specific to mood disorders (McEvoy et al. 2013). Rumination is related with negative emotions and many affective disorders including depression (Nolen-Hoeksema et al. 2007), generalized anxiety disorder (Dar and Iqbal 2015), obsessive-compulsive disorder (Wahl et al. 2011) and post-traumatic stress disorder (Mayou et al. 2002) providing support for the conceptualization of rumination as a "transdiagnostic factor" (Harvey and Watkins 2004).

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Earlier research considered rumination as a trait and defined it as a tendency to engage in ruminative episodes following a stressor (Nolen-Hoeksema et al. 1997). However, this conceptualization did not cover the episodes of rumination that are triggered by being exposed to an acute stressor (LeMoult et al. 2013). Therefore, LeMoult et al. (2013) introduced the concept of state rumination, the ruminative response to a temporary stressor and reported it to be associated with short-lived fluctuations in intensity of ruminative thoughts (Puterman et al. 2010). Similar to trait rumination, state rumination has been reported to have a significant negative impact on mood, regulation of goal directed behavior, thought processes, and a vulnerability for affective disorders (Lyubomirsky et al. 2015). However, contrary to trait rumination, state rumination shows a greater sensitivity to both internal and external stressors and thus presents fluctuations across the day (Moberly and Watkins 2008; Takano and Tanno 2011). Moreover, state and trait forms of rumination have been found to predict different aspects of negative affect, with higher levels of state rumination being responsible for longer durations of negative mood (Hilt et al. 2015; Genet and Siemer 2012; LeMoult et al. 2013; Moberly and Watkins 2008), whereas high trait rumination only augmenting the

intensity of negative affect caused by stressful life events (Moberly and Watkins 2008). Studies also show a moderately strong relationship between trait and state rumination, arguing that dispositional inclination to ruminate also makes it easier for individuals to engage in ruminative states when they are exposed to negative life events (Moberly and Watkins 2008), highlighting the importance of investigating state rumination as well as trait rumination due to its unique connection to negative mood. Furthermore, a recent meta-analysis (Chiu et al. 2018) has shown that the effect of trait rumination on autobiographical memory in depression is very weak, therefore the authors suggest that the effect of state rumination should be examined to better understand the relationship between rumination and autobiographical memory in depression. Together, these results highlight the importance of assessing both trait and state rumination.

Although examining temporary variations in ruminative tendencies is important due to their significant interference with recovery from negative emotional states (Moberly and Watkins 2008), a glance at the literature indicates that most previous studies have utilized experience sampling method (ESM) to assess momentary changes in rumination (Genet and Siemer 2012; Moberly and Watkins 2008) with nearly no studies assessing state rumination through standardized self-report measures (Marchetti et al. 2018). Surprisingly, although there are many scales assessing ruminative tendencies and other forms of RNT (see Samtani and Moulds 2017, for a review), situational aspects of rumination have only been targeted by a few. Previous studies have assessed state rumination either through single items (Fatfouta et al. 2015; Puterman et al. 2010) or certain psychometrically inadequate measures with limited generalizability such as State Rumination Questionnaire (SRQ) (LeMoult et al. 2013), and Rumination about Interpersonal Offense Scale (RIOS, Wade et al. 2008) which are restricted to assessment of rumination only in certain situations (Marchetti et al. 2018). Recently Marchetti et al. (2018) developed the Brief State Rumination Inventory (BSRI) as an alternative due to its robust psychometric characteristics. BSRI was developed as a self-report measure of state rumination that requires the individual to focus on the current situation to evaluate the intensity of negative thoughts that appear in a repetitive and persistent way. BSRI focuses specifically on the intensity of current thoughts that involve the examination of current distress, negative views about the self, in addition to the perceived uncontrollability of such cognitions. It is a single factor scale that at the same time shows satisfactory levels of internal consistency in addition to convergent and divergent validity as indicated by its significant correlations with rumination, worry, maladaptive emotion regulation strategies, negative affect, anxiety and depression. The scale also demonstrated high sensitivity to short-lived changes in the intensity of rumination. This indicates that BSRI can be a strong alternative to less standardized measures of state rumination (Marchetti et al. 2018) and thus has the potential to be useful in studies that aim to detect short-lived increases and decreases in rumination as well as the factors that trigger such fluctuations.

The major goal of the present research was to examine the Turkish form of the BSRI in terms of its psychometric characteristics in Turkish speaking populations, which will allow for examination of fluctuations in the intensity of rumination in both clinical and research settings. Two studies were conducted for this purpose. The aim of the first study was to examine the internal consistency, factor structure and convergent and concurrent validity, as well as the incremental validity of BSRI. The second study aimed to assess BSRI's sensitivity to momentary changes in rumination to examine the criterion validity of the Turkish form of BSRI.

In the first study, in addition to internal consistency and the factor structure, which were assessed with Confirmatory Factor Analysis (CFA), the convergent and concurrent validity of BSRI were tested. The hypotheses of the first study are as follows:

1. Notably, the Turkish version of BSRI is expected to replicate the one-factor structure that was also reported in the original study.
2. The Turkish version of BSRI is expected to be positively correlated with Penn State Worry Questionnaire (PSWQ), Ruminative Responses Scale (RRS), Perseverative Thinking Questionnaire (PTQ) and "keeping to self", "escape-avoidance", "refuge in fate", and "refuge in supernatural forces" dimensions of Ways of Coping (WOC) inventory.
3. Moreover, BSRI is expected to have an inverse relationship with "planned problem solving" and "seeking social support" subscales of WOC inventory which will provide evidence for divergent validity.
4. Next, BSRI scores are expected to show significant associations with Beck Depression Inventory (BDI) and Positive Affect Negative Affect Schedule (PANAS), which are measures of depression, negative affect, and positive affect, to provide support for the concurrent validity of the scale.
5. Lastly, the current study also focused on the association of BSRI with BDI and PANAS while controlling for the contribution of PTQ, RRS, and PSWQ with the aim of understanding whether BSRI is able to assess state rumination over and above such forms of RNT with the purpose of examining incremental validity.

Study 1

Method

Participants

Participants consisted of 219 individuals (142 women, 75 men, and 3 other) between the ages 18 and 65 years from a community sample. Twenty-seven of the participants were eliminated due to missing data. The remaining 192 individuals (107 (55.73 %) women, 82 (42.71 %) men, and 3 (1.56 %) other) were aged between 18 and 65 ($M = 31.65$, $SD = 10.55$). Overall, a majority of the participants (65.4 %) had at least a graduate degree and reported living in urban parts of Turkey (70.4 %).

Measures

Brief State Rumination Inventory (BSRI) The BSRI (Marchetti et al. 2018) is a self-report measure that consists of state level RNT that is composed of 8 items (i.e. Right now, I am thinking: "why do I have problems other people don't have?"). Participants report on a 100-mm visual analog scale where 0 is "completely disagree" and 100 is "completely agree". According to Marchetti et al. (2018) BSRI has satisfactory levels of internal consistency ($\alpha = .91$) and positive correlations with related constructs such as negative affect, trait rumination and depressive symptoms are reported.

Penn State Worry Questionnaire (PSWQ) PSWQ was designed with the purpose of assessing the intensity, controllability and the frequency of worry, through 16 items on a 5-Likert-Type scale (Meyer et al. 1990). The original version of PSWQ had satisfactory psychometric characteristics. Similarly, the Turkish version of PSWQ also has high levels of internal consistency ($\alpha = .91$) and construct related validity (Yılmaz et al. 2008).

Ruminative Responses Scale-Short Form (RRS-SF) It is a scale of trait rumination which is composed of 10, 4-Likert scale items (Treynor et al. 2003). The items were selected from a longer scale that was also designed to assess trait rumination. RRS has two subscales: reflection and brooding. Reflection refers to the tendency to think about symptoms of depression and negative life events with an attitude that leaves space for problem solving. However, brooding is associated with the individual's inclination to entertain extremely negative thoughts about current problems. Erdur Baker and Bugay (2012) translated RRS into Turkish and demonstrated RRS-SF to be reliable and valid. Acceptable internal consistency is reported with a total score of $\alpha = .72$. Positive correlations with the Brief Symptom Inventory has been reported ($r = .59$, $p = .00$).

Perseverative Thinking Questionnaire (PTQ, Ehring et al. 2011) PTQ is a scale that was developed to assess disorder non-specific forms of RNT. It is composed of 15 self-report items with each one evaluated on a 5-Likert-Type scale, elevated scores is indicative of experiencing RNT frequently. The scale has adequate reliability and concurrent validity. Turkish adaptation of PTQ was completed by Altan-Atalay and Saritas-Atalar (2018) which, comparable to the original version, yielded satisfactory levels of internal consistency ($\alpha = .95$) and significant correlations with scales assessing disorder specific forms of RNT (rumination, and worry), anxiety and depression.

Beck Depression Inventory-II (BDI-II) It is a scale that measures symptom severity of depression for the last 2 weeks. It is composed of 21-self report items describing symptoms of depression from absent (0) to severe (3) on a four-point scale. Kapci et al. (2008) showed the Turkish version to have high internal consistency. Cronbach α coefficients of .90 and .89, for the nonclinical and clinical groups respectively, very similar to the values reported by Beck et al. (1996) (.92 for clinical and .93 for nonclinical college samples). Furthermore, the 2-week test-retest stability of the inventory was very high ($r = .94$, $p < .001$).

Positive Affect and Negative Affect Schedule (PANAS) PANAS was developed to assess the intensity of positive (PA) and negative affect (NA) (Watson et al. 1988). It is a 20-item scale (10 items for both PA and NA) with each item rated on a 5-point Likert-type scale. Both PA and NA subscales of PANAS were reported to have satisfactory levels of internal consistency (Cronbach's α of .88 and .87 for PA and NA, respectively). Its translation to Turkish language was completed by Gençöz (2000), who retained the same factor structure and once again provided acceptable levels of reliability (Cronbach's α's of .83 and .86 and test-retest reliability coefficient of .40 and .54 for PA and NA, respectively). The Turkish version also had significant correlations with measures of anxiety and depression with PA dimensions having significant negative associations and NA positive correlations, which is indicative of construct related validity.

Ways of Coping Questionnaire-Revised (WOC-R) Developed by Folkman et al. (1986), WOC is a scale assessing coping strategies through 42 items measured on a 4-point likert-type scale. The Turkish translation was performed by Siva (1991), but the items were re-examined and adapted to Turkish culture by Senol-Durak et al. (2011). The revised Turkish form is composed of 31, 5-point Likert type items loading to 7 distinct dimensions of coping as "planned problem solving", "seeking social support", "keeping to self", "escape-avoidance", "accepting responsibility", "refuge in fate", and "refuge in supernatural forces". The subscales have adequate

correlations with other measures of coping and Cronbach's alphas ranging between .67 and .84.

Procedure

Translation Prior to data collection, we obtained permission from the developers of the original form of BSRI for translation of the scale into Turkish. In the next phase, the items were translated into Turkish by two of the authors and another research assistant (fluent in both languages) independently. The three translations overlapped to a large extent and there was no significant disagreement on any specific test item. The quality of the translation was controlled through back translation method performed by two independent translators who were graduate students with double major degree in both psychology and translation/interpretation. Back translation was nearly identical with the original version.

Data collection phase started after we obtained approval from (Author Institution) University Institutional Review Board (IRB) and the data for Study 1 was collected through various social media websites and e-mail groups. Before the presentation of the test items, all participants read the informed consent form and filled out the questionnaires only after they consented to participating in the study. They were not provided with any incentives upon participation and the process lasted approximately 20 minutes.

Data Analysis

All analyses were conducted by using IBM SPSS version 23. To see whether the current data fit the original structure, Confirmatory Factor Analysis was performed using AMOS (Byrne 2016). Model fit was tested based on several criteria such as a chi-square/df ratio (CMIN/DF) below 3, goodness of Fit Index (GFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) scores above .95 (scores over .90 are also considered as acceptable), a root-mean square error of approximation (RMSEA) below .05 (scores below .08 are acceptable), and a standardized root means square (SRMR) below .10 (Hu and Bentler 1999; Kline 1998; Schermelleh-Engel et al. 2003; Tabachnick and Fidell 2007).

To examine the internal consistency and convergent validity, Pearson's correlation was used. Finally, for the incremental validity, hierarchical regression analyses were conducted to examine BSRI's association with other measures.

Results

Confirmatory Factor Analysis

AMOS (Byrne 2016) was used to perform Confirmatory Factor Analysis (CFA) to see if the current data fit the original factor structure reported by Marchetti et al. (2018). With that purpose, the single factor model that was suggested to have the best fit was tested. In this model all 8 items loaded under one single factor. The single factor model provided an acceptable fit to the data [χ^2 (20) = 80.03, $p < .001$, RMSEA = .14 (.11-.18), CFI = .91, SRMR = .05, GFI = .88, TLI = .87]. Also, the chi-square/df ratio of 4.30 appeared to be above the recommended criterion of 3 (Kline 1998; Tabachnick and Fidell 2007). Based on the modification indices, covariance errors were added (between items error terms of 1-2, and 2-3). This improved model yielded a good fit [χ^2 (18) = 50.20, $p < .001$, CMIN/DF= 2.79, RMSEA = .08 (.04 - .12), CFI = .96, SRMR = .04, GFI = .93, TLI = .93,] with a chi-square/df ratio of 2.79 appearing below the recommended cut-off. Overall, the modified model had a significantly better model fit than the original one [$\Delta\chi^2$ (2) = 29.83, $p < .001$] (see Fig. 1).

Reliability

Internal Consistency of the BSRI All 8 items of BSRI demonstrated significant inter-item correlations (all p's <. 001). The scale also had a Cronbach's alpha coefficient of .91 that is above the .60 criterion that was set by Nunnally (1967). Lastly, the split-half reliability of the scale was also within the acceptable range (r = .93).

Validity

Convergent and Divergent Validity As shown in Table 1. BSRI has moderate to strong correlations with measures of state rumination and worry. A closer look at the correlation coefficients indicate that BSRI total score has a stronger correlation with the brooding dimension of rumination which is argued as the dimension that consistently yields higher correlations with and is predictive of depression and dysphoria (Verstraeten et al. 2010). As expected, reflective pondering dimension had relatively weaker associations with BSRI. In addition to trait measures of rumination, BSRI also had significant associations with anxiety-specific (PSWQ) and disorder non-specific (PTQ) types of rumination.

Correlations between BSRI and dimensions of WOC were also examined to provide further convergent validity evidence for the Turkish version of BSRI. BSRI was not significantly associated with social support seeking, relying on false beliefs, and relying on supernatural forces. Escape avoidance, keeping to self, and accepting responsibility, however, had significant positive correlations with BSRI score, indicating that individuals that are more inclined to use these coping strategies had higher levels of state rumination. In contrast, planned problem solving, which is defined as the adaptive coping dimension of WOC (PSS) was significantly negatively correlated with BSRI, providing support for divergent validity of the scale.

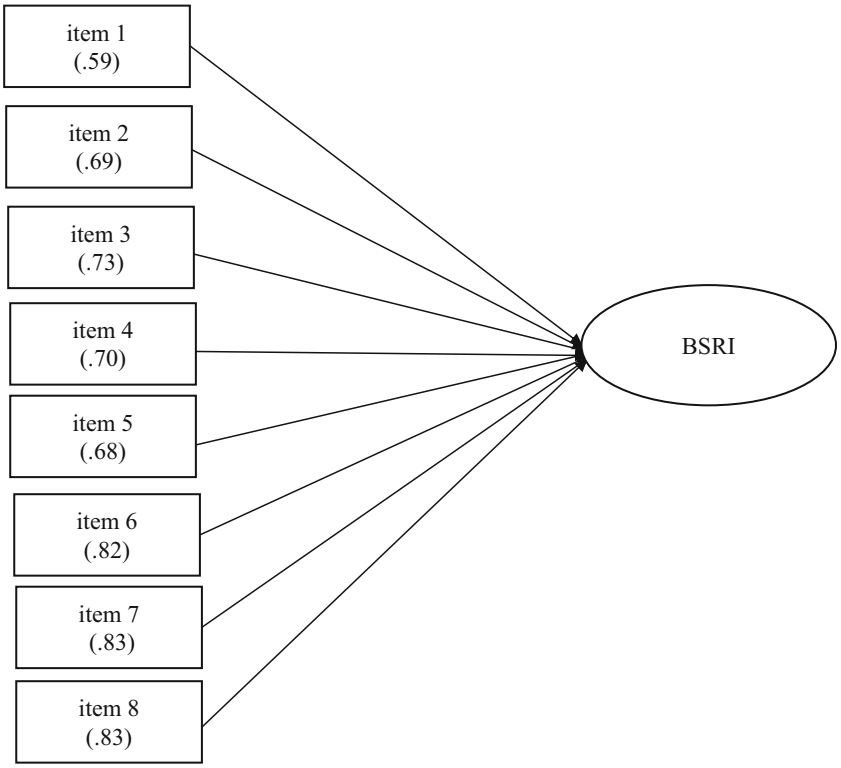

Fig. 1 CFA solution for BSRI with beta coefficients

Table 1 Descriptive statistics, internal consistency scores of study variables and their correlations with BSRI

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.BSRI	-														
2. PTQ	.71**	-													
3. RRS-B	.70**	.66**	-												
4. RRS-R	.60**	.57**	.64**	-											
5. PSWQ	.63**	.71**	.65**	.51**	-										
6. PA	-.38**	-.51**	-.34**	-.33**	-.35**	-									
7. NA	.63**	.68**	.73**	.58**	.63**	-.48**	-								
8. BDI	.57**	.60**	.68**	.54**	.54**	-.56**	.78**	-							
9. SSS	-.12	-.07	-.10	-.04	.02	.07	-.14	-.17*	-						
10. SRF	.10	.08	.17	.08	.07	-.05	.071	.10	.15	-					
11.SRSF	.12	.13	.19*	.08	.09	-.16	.21*	.29**	-.04	.66**	-				
12. EA	.25**	.32**	.28**	.31**	.29**	.02	.184*	.20*	.25**	.07	.01	-			
13. PPS	-.37**	-.45**	-.32**	-.20*	-.22*	.41**	-.42**	-.49**	.28**	-.04	-.16	-.15	-		
14. KS	.24**	.18*	.16	.09	.07	-.09	.147	.25**	-.50**	.08	.12	.03	-.07	-	
15. AR	.50**	.48**	.54**	.48**	.49**	-.14	.58**	.56**	-.02	-.02	.20*	.29**	-.16	.11	-
M	324.34	42.36	12.14	11.35	50.51	26.49	24.02	18.62	11.08	8.43	4.96	13.38	22.42	11.57	1.96
SD	219.16	12.68	3.87	3.38	13.70	7.72	9.39	14.76	3.23	3.75	1.55	3.39	4.49	4.32	2.66
alpha	.91	.95	.87	.86	.85	.86	.91	.81	.69	.82	.59	.70	.86	.90	.85

BSRI Brief state rumination inventory, *PTQ* Perseverative thinking qiuestionnaire, *RRS-B* Ruminative responses scale- brooding, *RRS-R* Ruminative responses scale-reflection, *PSWQ* Penn state worry questionnaire, *PA* Positive affect, *NA* Negative affect, *BDI* Beck depression inventory, *SSS* Seeking social support, *SRF* Seeking refuge in fate, *SRSF* Seeking refuge in supernatural forces, *KS* Keep to self, *EA* Escape avoidance, *PPS* Planful problem solving, *AR* Accepting responsibility

* $p < .05$, ** $p < .001$

Concurrent Validity BSRI also indicated a strong positive association with measures of depression and negative affectivity, in addition to a negative association with evaluations of positive affectivity, which provided evidence for the concurrent validity of the scale.

Incremental Validity Three hierarchical regression analyses were performed to see if BSRI was still associated with scales of depression, negative affect (NA) and positive affect (PA), over and above trait worry and rumination. On the first step, demographic variables such as age, and sex were entered, followed by worry, brooding and reflective pondering dimensions of RSS. On the last step, BSRI scores were included. In the three analyses, BDI scores, NA, and PA acted as the outcome variable, respectively. As presented on Table 2, BSRI remained significantly associated with BDI scores over and above RSS dimensions. However, neither trait-based, nor state RNT variables appeared to have a significant association with PA. Lastly, the significant association between NA and BSRI dropped to non-significant levels when the effect of trait-based RNT was controlled. Overall, results indicated that BSRI has a somewhat stronger association with depression than it has with NA.

Discussion

Study 1 was an initial attempt to check the psychometric qualities of the Turkish form of BSRI. The initial results indicated that the factor structure which was tested by CFA replicated the factor structure of the original version of BSRI as a scale assessing state rumination based on a single dimension.

Convergent and divergent validity of BSRI was tested by examining the correlation of the scale with measures of trait rumination (RRS), worry (PSWQ), disorder non-specific RNT (PTQ), and coping strategies (WOC). As expected, BSRI had elevated correlations with RRS, in addition to anxiety specific RNT and disorder non-specific forms of RNT. Quite interestingly, BSRI had significant correlations with brooding and reflective pondering dimensions of trait rumination. In line with the expectations of Marchetti et al. (2018), the relationship of BSRI with trait rumination seemed to be stronger than its association with depression scores indicating that BSRI measures a construct different from the symptoms of depression.

Subsequently, different coping methods appeared to have differential relationships with BSRI. More specifically, BSRI did not show significant correlations with social support, seeking refuge in faith or supernatural beliefs. On the contrary, it had modest correlations with maladaptive but at the same time more cognitive (internal speech) based forms of coping such as escaping avoidance and accepting responsibility (Senol-Durak and Durak 2017), which is in line with expectations.

Moreover, significant positive correlation of BSRI with both depression and positive affectivity provides evidence for the concurrent validity of the scale revealing that tendency to experience increased levels of state rumination is linked with elevated levels of depression in addition to higher frequency of experiencing negative affective states. On the contrary, people reporting high levels of state rumination reported experiencing significantly lower levels of positive affect.

Additional hierarchical regression analyses were conducted to provide incremental validity evidence. They were focused on the capacity of BSRI for predicting changes in depression and negative affect over and above the dimensions of trait rumination and worry, which is indicative of the critical role of state rumination on depression symptoms. Results showed that BSRI was significantly associated with BDI scores over and above RSS dimensions. However, a similar association was not observed for negative affect. This may be due the measure used in the present study. Previous studies

Table 2 Hierarchical regression analyses results with BDI, PA, and NA scores predicted by BSRI, worry, and rumination

	BDI						PA						NA					
	R^2	ΔR^2	ß	t	p	pr	R2	ΔR^2	ß	t	p	pr	R	ΔR^2	ß	t	p	Pr
Step 1	.05*						.06*						.10**					
Age			-.17	-1.93	.05	-.17			.18	1.98	.05	.17			-.22	-2.61	.01	-.22
Sex			-.12	-1.41	.16	-.12			.14	1.56	.12	.14			-.20	-2.30	.02	-.20
Step 2	.50**	.45**					.18**	.12**					.57**	.47**				
RRS-B			.48	5.09	.00	.40			-.19	-.76	.65	-.04			.59	5.12	.00	.43
RRS-R			.11	1.31	.19	.08			-.14	-1.25	.21	-.12			.08	.94	.35	.08
PSWQ			.19	2.32	.02	.14			-.20	-1.58	.09	-.15			.22	2.63	.01	.26
Step 3	.54**	.04**					.20**	.02					.58**	.01				
BSRI			.30	3.36	.00	.20			-.25	-1.90	.06	-.16			.14	1.50	.14	.09

BSRI Brief state rumination inventory, *PSWQ* Penn state worry questionnaire, *RRS-B* Ruminative responses scale-brooding, *RRS-R* Ruminative responses scale-reflective pondering, *BDI* Beck depression inventory, *PA* Positive affect, *NA* Negative affect

that found an association between state rumination and negative affect only looked at sadness, anxiety and irritability (Hilt et al. 2015; Moberly and Watkins 2008) whereas we used PANAS (Watson et al. 1988), a scale that measures 6 additional negative affect including guilt and shame to assess negative affect. Our results may suggest that state rumination has different associations with different forms of negative affect.

Study 2

The second study was designed to assess the sensitivity of BSRI to momentary changes in rumination, which also serves to examine the criterion validity of the Turkish form of BSRI. With that purpose, participants were assigned to two different groups. In the first group rumination was induced, and the second group was the control group composed of participants that did not receive any form of rumination induction. BSRI scores were collected from all participants both at the beginning (Time 1) and at the end of the experiment (Time 2). The hypotheses of study 2 are as follows:

1. The BSRI scores of the rumination group were expected to be higher at Time 2 than at Time 1.
2. The BSRI scores of the rumination group at Time 2 were expected to be higher than the BSRI scores of the control group at Time 2 and the difference between scores was expected to remain significant even when the trait-based rumination and depression levels were controlled for.

Method

Participants

Seventy-nine university students participated in the study. However, the procedure was discontinued for 13 of them due to either having been diagnosed with a psychological disorder (major depression, bipolar disorders, and anxiety disorders) or having experienced a traffic accident recently. The remaining 66 participants (39 women, 54.55%) were between the ages of 18 and 31(M = 20.77, SD = 1.95), 27 (16 women, M_{female} = 21.03 and SD_{female} = 1.45 and 13 men, M_{male} = 21.00 and SD_{male} = 1.62) of which were assigned to the rumination condition and the remaining 29 (23 women M_{female} = 20.61, SD_{female} = 2.61 and 9 men, M_{male} = 20.22 and SD_{male} = .97) formed the control group.

Instruments

All the participants completed BSRI, BDI-II, and RRS-SF in addition to Visual Analogue Scale (VAS) that assessed the intensity of negative affect (sadness, anxiety, distress, and fear) on a 1-to-5- scale with higher scores indicating more intense negative affect.

Procedure

The participants were recruited through invitations posted on the subject pool of the author institution. Prior to the procedure the participants were provided with a personal data sheet and screened for the presence of a psychiatric diagnosis, medication, and history of serious traffic accidents. The participants without a psychiatric diagnosis and history of traffic accidents were randomly assigned to rumination or control groups. At the beginning, both groups were provided with the informed consent form followed by the first set of questionnaires (BDI-II, and RRS). After the completion of the questionnaires, all participants were exposed to a set of neutral movie clips that lasted around 5 minutes (Samson et al. 2016) based on the procedure described by Marchetti et al. (2018) with the purpose of neutralizing the current mood state. Following the induction of neutral mood, the participants were administered BSRI for the first time followed by the momentary assessment of sadness, anxiety, distress, and fear through visual analogue scales. Next, participants in rumination group were provided with a scenario and instructions asking them to form a vivid representation of the situation (a fatal car crash) in their minds, as if they were the ones having this experience. The scenario is a modified version of the scenario used by Grol et al. (2015). Certain details were changed ('mother and child riding a bike' which is a very uncommon encounter for Istanbul, was replaced by a bike messenger, who are generally perceived as people jeopardizing driving safety and commonly encountered in daily life in Turkey) with the purpose of adapting the scenario to the life conditions of Turkish individuals (a copy of the scenario can be found in appendix 1). This was followed by the presentation of six questions such as "why is this happening to me?" "why is everything so bad?" to induce a ruminative state based on Grol et al. (2015) and Watkins (2016). The control group participants were asked to wait for 7 minutes doing nothing following the presentation of the neutral videos. Both groups were asked to fill out the BSRI and the VAS for a second time. During the next phase, all participants were presented with a series of positively valenced movie clips with the purpose of increasing positive mood and erasing the negative effects of the experimental manipulation. The last phase of the procedure involved administration of the debriefing form. All participants, including the ones that were excluded at the beginning of the process received course credit in return for their participation.

Table 3 Means and standard deviations of BSRI and NA scores of rumination induction and control groups at time 1 and time 2

	Rumination						Control					
	Time 1			Time 2			Time 1			Time 2		
	M	SD	Range	M	SD	Range	M	SD	Range	M	SD	Range
BSRI	209.39	153.36	20- 580	340.59	192.09	70-677.14	217.66	141.57	0-500.71	236.60	143.47	13.57-560
NA	1.59	.54	1- 3.38	2.56	1.16	1-5	1.73	.65	1-3.25	1.68	.66	1-3.63

BSRI Brief state rumination inventory, *NA* Negative affect composite score

Data analysis

All analyses were conducted using IBM SPSS version 23. A series of mixed ANCOVA's were conducted to see the effect of rumination induction on BSRI scores and thus examine if BSRI was sensitive to temporary changes in rumination.

Results

The first mixed ANCOVA involved group (rumination vs. control) as the between-subjects variable and BSRI scores at T1 and T2 as the within-subjects variable. Also, age, gender, trait rumination scores and depression scores were added as covariates. The results revealed that time did not have a significant main effect $F(1,51)= 1.20$, $p = .37$, $\eta_p^2 = .02$. However, the main effect of group was significant $F(1,51) = 4.66$, $p = .04$, $\eta_p^2 = .09$, as well as the significant interaction between time and group $F(1,51) = 14.23$, $p < .001$, $\eta_p^2 = .23$ (See Table 3). Post-hoc tests that were run to further explore the nature of this interaction indicated that the rumination and control groups were not significantly different from one another in terms of BSRI scores before experimental manipulation, $t(54) = -.21$, $p = .84$, $d = .06$. However, the difference between the two groups became significant following the rumination induction $t(54) = 2.28$, $p = .03$, $d = .61$. Additional post-hoc analyses also revealed that BSRI scores of the control group did not differ across two administrations $t(28)= -1.19$, $p = .25$, $d = .13$, but the BSRI score of the rumination group increased significantly following the rumination induction manipulation, $t(26)= -4.24$, $p < .001$, $d = .76$. The findings indicate that BSRI is able to discriminate changes in the level of state rumination even when gender, age, and levels of depression and trait rumination are controlled.

Next, another mixed ANOVA was conducted this time with the purpose of tracking the changes that took place in the intensity of negative affect before and after rumination induction. The results revealed a significant effect of group $F(1, 52) = 12.12$, $p = .001$, $\eta_p^2 = .21$ and time (Time 1 and Time 2) x group (rumination vs control) interaction effect $F(1, 52) = 27.04$, $p < .001$, $\eta_p^2 = .38$. However, the main effect of time was not significant $F(1, 52) = 4.08$, $p = .06$, $\eta_p^2 = .08$. Probing of the significant interaction indicated that although the two groups were not different from one another at T1 $t(54) = -.98$, $p = .38$, $d = .24$, the negative affect reported by the rumination group became significantly higher than the control group following the manipulation $t(54) = 3.40$, $p = .01$, $d = .94$. Further probing of the interaction revealed that the negative affect reported by the control group did not change in time $t(26) = .89$, $p = 38$, $d = .08$. On the contrary, self-reported negative affect of the rumination group increased significantly after the manipulation $t(25) = -4.47$, $p < .001$, $d = .106$, indicating that the rumination induction used in the present study was successful.

Discussion

The findings of study 2 provide information regarding the criterion validity of the Turkish translation of BSRI by showing that BSRI scores change following a rumination induction procedure, whereas a similar change was not observed in participants who did not receive any manipulation. The rumination induction procedure used in the current study also led to significant increases in self-reported negative affect. A similar effect was not observed in the control condition. The results were significant even when the levels of trait rumination and severity of depressive symptoms were controlled.

General Discussion

The two studies reported had the major goal of evaluating the psychometric qualities of BSRI, which is a new scale that is designed to measure state related changes in the level of rumination, in a group of Turkish speaking individuals. The findings revealed that BSRI is composed of a single factor, which fits the original version of BSRI (Marchetti et al. 2018).

Moreover, BSRI yielded adequate internal consistency demonstrating the Turkish version's consistency and reliability. In the first study, BSRI's correlations with measures of depression, coping, negative-positive affect, in addition to disorder-specific and non-specific forms of RNT were checked with the purpose of collecting evidence for both convergent and divergent validity. The analyses revealed that elevated scores on BSRI are associated with increases in repetitive negative thinking patterns (as measured by PTQ, RRS,

and PSWQ), and maladaptive coping styles such as escape avoidance, keeping problems and worries to self, and accepting responsibility for the negative aspects of one's life. The current study also yields evidence for satisfactory concurrent validity based on the significant associations between BSRI and measures of depression, positive, and negative affect. In line with expectations, elevations in state rumination were connected with more negative life outcomes (in the form of depression and negative affect) as well as more problems with RNT, independent from disorder specificity. Moreover, BSRI showed significant associations with changes in depression scores over and above trait measures of RNT, which indicates that not just trait rumination, but also momentary increases in the intensity of ruminative thoughts are linked with the severity of depressive symptoms.

Although the results of the regression analysis in the first study found BSRI was not associated with negative affect, results of the second study revealed that rumination induction led to an increase in negative affect. This result is in line with the idea that state rumination may have different associations with different forms of negative affect. Notably, in the first study, negative affect was assessed using PANAS which measures 10 different forms of negative affect (hostile, irritable, ashamed, guilty, distressed, upset, scared, afraid, jittery, and nervous) and state rumination was not found to be associated to negative affect. However, the studies that report an association between state rumination and negative affect focused on only three forms of negative affect, namely sadness, anxiety, and irritability (Hilt et al. 2015; Moberly and Watkins 2008). Similarly, in the second study, the negative affect was evaluated based on their responses to visual analogue scales on 4 different types of negative affect (sadness, anxiety, distress, and fear). Thus, significant findings regarding the association between state rumination and negative affect may be due to the specific focus on these forms of negative affect, rather than the ones that are included in NA dimension of PANAS. Together these results may also suggest that state rumination is more related to certain negative emotions than others.

Higher levels of state rumination as measured by BSRI also showed associations with the tendency to frequently use maladaptive coping strategies and using planful problem solving (which is an adaptive coping strategy) less frequently as indicated by the negative correlations between BSRI and PPS subscale of coping scale. The findings become more meaningful when the models that perceive rumination as a coping strategy are considered (Papageorgiou and Wells 2003). There is a chance that experiencing momentary increases in ruminative thoughts may become more intense by less frequent utilization of adaptive coping strategies and by relying on more avoidance based and maladaptive coping strategies.

Also, as shown by the findings of study 2, BSRI was successfully able to detect the effects of a rumination induction procedure, which by itself provides further criterion-related validity evidence for the Turkish version of BSRI.

As stated by Marchetti et al. (2018) BSRI meets the need for a psychometrically sound measure that can be used in the assessment of momentary changes in the levels of rumination and the current results reveal that similar to its English and Dutch versions, the Turkish version of BSRI is also a robust measure of state rumination. A glance at previous studies that examined state rumination indicate that most of them used unstandardized or unreliable methods for assessment of state rumination. BSRI is quite promising, showing potential to fill this gap in empirical research on rumination.

The current studies have significant strengths, such as collecting data from a community sample and involving both correlational and experimental assessment of the validity of BSRI. In addition to this, the current research, different from Marchetti et al. (2018), involved assessment of both disorder specific (RRS and PSWQ) and disorder non-specific (PTQ) forms of RNT, which shows that, increases in state rumination is at the same time associated with a difficulty in controlling the negative thoughts that are intruding into the mind in a repetitive way, independent from their content. Furthermore, the additional analyses also showed that the experimental manipulation was effective since it appeared to lead to higher levels of negative affect in addition to elevations in state rumination.

The study is not free from significant limitations, with the first one being the sample characteristics. The individuals that participated in the first study were recruited through different internet websites and both age and level of education indicates that they may not be representative of the Turkish population. Also, lack of additional filler items that are designed to control the participants authentication and reliability can be interpreted as another limitation of the study. Next, participants of the second study were university students, restricting the generalizability of the findings to broader populations. Furthermore, state rumination is associated with vulnerability for affective disorders (Lyubomirsky et al. 2015). Therefore, further studies should be conducted to evaluate the psychometric qualities of BSRI in a clinical population. Another limitation of the study comes from the methodology. In the first study, the order of the scales administered was not counterbalanced which may have caused a contamination across ratings of different scales. Moreover, in the second study BSRI was administered before evaluations of negative affect in both rumination induction and control groups. This may have influenced the ratings of negative affect in both groups. Finally, in study 2, the absence of a neutral task for the control groups can be considered as an additional limitation. In the present

study, the experimental group was exposed to the negative scenario followed by questions for rumination induction. However, the control group was exposed to neither the scenario, nor the questions to eliminate the risk of triggering ruminative processes. This procedure may have led to another significant limitation since it is impossible to track and control the thought content of the control group during the same 7-minute period. Further studies controlling these factors will contribute to the literature.

In conclusion, despite these limitations, the Turkish version of BSRI is a scale with sound psychometric characteristics and thus, can be used with Turkish populations in research settings with the purpose of monitoring changes in the level of rumination in response to both internal and external stimuli. The Turkish version of BSRI has potential for being used also in clinical settings with the purpose of monitoring the intensity of ruminative thoughts before and after certain in session demonstrations with the purpose of socializing the clients to the rumination focused interventions (Watkins 2016), which are used more frequently in Turkey every passing year. The current results indicate that BSRI can be used for research purposes, however further studies are needed to check its suitability for clinical settings.

Compliance with ethical standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Prior to participation in the study, all participants provided informed consent.

Conflict of Interest Authors declare that they have no conflicts of interest in the publication of this work

Appendix 1: The Scenario Presented to the Rumination Induction Group

You get in your car after a long and busy day and start driving home. You are stuck in the middle of traffic jam and your car moves very slowly. The weather is too hot, and you feel overheated. As you drive nothing on your mind, and feeling a little dazed, you realize that you received a text message. This text might be that very important message that you have been waiting for since the morning. You reach to your phone that sits far away from you on the right seat. Right at that moment, you realize that your foot is slightly off the breaks and your car slowly goes forward. Suddenly, along with a loud crashing sound and your seat jolting, you realize that your car hit something. You shake due to the crash as well and you feel like you are harshly stuck on the driver's seat. As you get out of your car in a shock to see what happened, you realize that you hit a motorcycle driver. The driver is lying on the ground, you realize that there is blood everywhere. The situation does not seem good. The driver seems to have been seriously injured.

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