**Background.** Few studies have explored the metacognitive components of anger, and at present, there is no metacognitive framework on anger incorporating both positive and negative beliefs about anger and distinct maladaptive processing routines, such as rumination.

**Aim.** The aim of the present preliminary studies was to apply a metacognitive framework to anger and put forward a new anger self-report scale, the Metacognitive Anger Processing (MAP) scale, intended as a supplement to existing measures of anger disposition and to enhance anger treatment targets.

**Method**. The new measure was tested in a non-clinical and a clinical sample together with measures of anger and metacognition to establish factor structure, reliability, concurrent, and convergent validity.

**Results**. The MAP showed a reliable factor structure with 3 factors, Positive Beliefs about anger, Negative Beliefs about anger, and Rumination, good internal reliability, and test-retest reliability. The subscales showed positive correlations with anger and the pattern of correlation with the general metacognitive measure supported the idea that the MAP represents dimensions of metacognition as it relates to anger.

**Conclusions**. The present data indicate that positive as well as negative beliefs are involved in the tendency to ruminate about angry emotions. Clinical interventions may benefit from an exploration of the patient´s experience of anger, as structured by the MAP’s factors and their interrelationships. The psychometric properties of the MAP should be further investigated in clinical samples using larger test batteries and objective measures of aggression.

 Like other emotions, anger has adaptive functions which are to signal that something needs to change and orient the organism to take action and overcome the adversity. As such, anger has a healthy potential resulting in adaptive and controlled anger processing. However anger presents itself as a clinical problem when it is triggered too frequent, too intensely, is prolonged in duration, or triggers excessive aggression.

 In problem anger, maladaptive cognitive processes have been evidenced (Denson, 2013; Owen, 2011; Wilkowski & Robinson, 2008). In particular, rumination[[1]](#footnote-2)is a process that has shown association with high trait anger(Denson, Pedersen, & Miller, 2006; Linden et al., 2003; Sukhodolsky et al., 2001; Wilkowski & Robinson, 2010).In two seminal studies, Bushman and collegues (Bushman, 2002; Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005) demonstrated that angry rumination increases anger and aggressive responding.

Anger has a duality in its associations. On the one hand, it is associated with eruptive and destructive feelings linked to madness, while on the other hand, anger is associated with energizing and empowering experiences linked to survival systems (Novaco, 2010). Positive beliefs about aggression/anger as a strategy to achieve a desired goal have been empirically associated with aggression (Huesmann, 1988; Huesmann & Guerra, 1997; Archer & Haigh, 1997a; Archer & Haigh, 1997b; Bellmore, Witkow, Graham, and Juvonen, 2005; Bailey & Ostrov, 2008). Negative beliefs about aggression/anger has been seen as a mental disturbance, a madness or an insanity with a general view that anger is an uncontrollable, diseased state of mind (Novaco, 2010; Potegal & Novaco, 2010). As such, anger is indeed believed to be experienced as a turbulent, powerful, and eruptive emotion. Individuals with prior experiences of intense anger may thus form beliefs in which they view anger as uncontrollable and negative. In examining the construct of anger, Novaco(1976; 2007; 2010; Potegal & Novaco, 2010) used the Roman Janus sculpture, which depicts two faces pointing in opposite directions, to illustrate the duality of anger. On one hand, anger is associated with eruptive and destructive feelings linked to madness. On the other hand, anger is associated with an energizing and empowering emotional experience linked to survival systems.

 Metacognition is a term referring to” knowledge or processes involved in the appraisal, monitoring, or control of cognition” (Harvey, Watkins, Mansell, & Shafran, 2004). It is a fundamental characteristic of human cognition based on three principles (Nelson, Stuart, Howard, and Crowley, 1999;Flavell 1979); cognition function on two or more interrelated levels, the meta level exerts control over the object level by use of a dynamic model, and information flow between the two levels (*control* occur from the meta level to the object level and *monitoring* occur from the object level to the meta level). A metacognitive approach to emotional disorder (e.g., problem anger) should specify the interaction between the different levels of cognitive function.

 No existing measures of anger specifies such interaction between different levels of cognitive function by assesses positive and negative beliefs about anger as well as processing routines such as rumination.Therefore, to improve understanding of problem anger, the present study attends to ruminative cognitions and higher level cognitive beliefs (metacognitive beliefs), including the duality of the anger experience. In doing so, it puts forward a new anger self-report scale concerning these factors, intended as a supplement to existing measures of anger disposition and to enhance anger treatment targets.

 The metacognitive framework by Wells and colleagues was chosen as guiding framework because at the time of the studies, that model offered itself as the most coherent and well-validated model of emotional disorder focusing on the interaction of different levels of cognitive function. Wells and colleagues articulated the self-reflective executive functioning model (S-REF model) (Wells & Matthews, 1994; Wells, 2000), which clarifies how regulation of cognitive activity is conducted as a result of the individual´s cognitive goals and the application of the different mental strategies implemented to reach that goal(Wells, 2008).In the metacognitive framework by Wells, the central motor in emotional disorder is the maintainance of negative and biased thinking styles, which are guided by specific positive and negative metacognitive beliefs. Whether the framework of Wells and his collegues that has proved well-suited for ”worry” might also apply to anger was the starting point for the present study. The literature on anger and metacognition is sparse, and in the clinical area there is only the interview study by Simpson and Papageorgiou (2003)with 10 patients referred for anger problems -- all of them ruminated, all held negative metacognitive beliefs about angry rumination, and 8 held positive beliefs about rumination.

 As discussed Positive Beliefs, Negative Beliefs and Rumination has been associated with anger, while other facets of the metacognitive framework by Wells and colleagues have not been tested on anger. The typical operationalization of the metacognitive model is the *MetaCognitive Questionnaire* (MCQ;Cartwright-Hatton & Wells, 1997). The tool assesses metacognition in relation to worry on the following 5 subscales:

1) Positive beliefs about worry (e.g., "Worrying helps me to solve problems")

2) Beliefs about uncontrollability and danger related to worry (e.g., "My worrying could make me go mad")

3) Evaluations of one's own cognitive function (e.g., "I do not trust my memory")

4) Negative beliefs about mental control, including themes about superstition, punishment and responsibility (e.g.," I will be punished for not controlling certain thoughts")

5) Evaluations of one's own awareness of cognition (e.g., "I am constantly aware of my thinking").

With the target population for this new questionnaire being clinical populations with anger problems including forensic patients, a qualitative pilot study with 12 forensic patients evaluating the applicability of the metacognitive framework on this population was conducted. The pilot study used the metacognitive profiling interview (Wells, 2000) focused on situations of experiencing anger. The forensic patients held both positive and negative beliefs about anger and reported experiences of getting stuck in ruminative processes with a tendency towards self-focused cognition; however they expressed confusion about the relevance of features concerning evaluations of general cognitive ability in regard to anger processing. Regarding worry, it makes sense that people may worry more if they do not have confidence in their abilities to remember things, but evaluations of general cognitive ability may be less relevant for a metacognitive framework aimed at understanding cognitive processing as it relates to anger.

As a result, 4 domains of the metacognitive framework by Wells and colleagues (Positive beliefs about worry, Beliefs about uncontrollability and danger related to worry, Negative beliefs about mental control, and Evaluations of one's own awareness of cognition)were deemed relevant for anger and should be included in the measure. The next step was to formulate the initial pool of MAP items and test the psychometric properties of the scale in a non-clinical population.

*Study 1*

 The aim of the first study was to explore factor structure and reliability as well as association with anger of the MAP in a non-clinical sample.

*Participants*

 A convenience sample of 192 Danish police students was recruited. The participants were assured that participation in the study was voluntary and anonymous. All available participants volunteered. To evaluate test-retest reliability, three groups (39 participants) were retested after 3-weeks. The average age was 28 (range 19-35, SD = 2.6); 44 (23 %) of the participants were male and 148 (77 %) were female. There were no significant gender differences in PI (*t* (190) = 1.73, *p* = .09) or for the MAP (*t* (190) = 1.86, *p* = .07). Thus, the data for both genders were pooled.

*Measures*

*The Metacognition and Anger Processing scale* (MAP). The initial pool was comprised of 57 items assessing metacognition in relation to anger on4domains: (1) General positive beliefs about the functions of anger (e.g. “Anger helps me solve problems”); (2) Uncontrollability of the experience of anger and anger-related thoughts (e.g. “I cannot let go of angry thoughts”); (3) Negative conceptions related to anger, particularly those focused on danger, harm and madness in association with anger (e.g. “Anger could make me go mad); (4) General evaluations of one's own cognitive awareness and monitoring processes (e.g. “I am constantly aware of my thinking”). MAP items were worded solely to assess anger, avoiding overlap with aggression. The items are rated on a 4-point scale (1 = never true, 2 = sometime true, 3 = often true, 4 = always true).

 The *Provocation Inventory* (PI; Novaco, 2003): The PI is a 25-item self-report instrument measuring anger intensity. It was chosen because it is brief yet has shown good psychometric qualities. The instrument describes situations that could potentially elicit anger, and the respondent rates anger intensity on a 4-point scale. The types of provocations concern disrespect, unfairness, frustration, annoying traits of others, and irritations. Stability and validity of the PI has been supported in a variety of different samples and using alternate anger measures(Baker, Van Hasselt, & Sellers, 2008; Jones, Thomas-Peter, & Trout, 1999; Moeller, Novaco, Heinola-Nielsen, & Hougaard, 2015)

*Results*

Provocation Inventory (PI)

The mean score of the PI Total was 51.1 (SD = 8.6). Compared to the Danish norms for the PI with non-clinical participants (*N* = 477, M = 53.5, SD = 10.3) (Moeller et al., 2015)the present sample of police students had a significantly lower mean PI (*t* (667) *=*2.90, *p <*.004).

Metacognition and Anger Processing scale (MAP)

 The MAP data met assumptions of normality, permitting a factor analysis of the scale. The MAP was not significantly correlated with age. A Principal Axis Factoring (PAF) was conducted with an oblique rotation using the Promax technique was chosen because the underlying factors were believed to be correlated. Based on theoretical relevance, a four-factor solution was considered optimal for this dataset. The solution accounted for 33.3 % of the variance with 34 items loading above .41 and only on the factor it belonged to theoretically. One item (item 50 “I am able to calm myself when angry”) loaded at .53, but was omitted due to, in reflection, not fitting with the theoretical model. The results are presented in Table 1.

In summary, 34 items on four factors remained. The first factor was Positive Beliefs about anger (9 items, alpha = .85), the second factor was Negative Beliefs about anger (14 items, alpha = .84), the third factor was Rumination[[2]](#footnote-3) (7 items alpha = .79) and the fourth factor was Cognitive Consciousness (4 items alpha = .61).

Table 1.

Factor loadings from Principal Axis Factoring with Promax rotation for police students, N = 192

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | PB | NB | Rum | CC |
| 3. | When I am angry I keep thinking about it |  |  | .47 |  |
| 4. | I cannot distance myself from angry thoughts |  |  | .61 |  |
| 6. | I am constantly aware of my thinking |  |  |  | .59 |
| 7. | I must be aware of unjust actions against me |  |  |  | .47 |
| 8. | I cannot let go of angry thoughts |  |  | .70 |  |
| 9. | Anger is hard to control; it controls you |  |  | .53 |  |
| 11. | My anger harms me |  | .47 |  |  |
| 12. | Anger helps me see things the way the really are | .54 |  |  |  |
| 14. | It is bad to have angry thoughts |  | .59 |  |  |
| 15. | When I start getting angry I cannot stop |  |  | .64 |  |
| 16. | Anger is bad for me |  | .49 |  |  |
| 17. | I can easily understand other people´s emotional reactions |  |  |  | .41 |
| 19. | Anger helps me solve problems | .68 |  |  |  |
| 21. | I must control my thoughts |  |  |  | .46 |
| 22. | Anger helps me handle things | .78 |  |  |  |
| 23. | Anger could make me go mad |  | .46 |  |  |
| 25. | I cannot ignore my anger |  |  | .45 |  |
| 26. | Anger keeps me safe | .66 |  |  |  |
| 27. | Anger will make other people reject you |  | .53 |  |  |
| 30. | My anger can harm other people |  | .64 |  |  |
| 31. | I do not think clearly when I am angry |  | .46 |  |  |
| 32. | Being angry will make me lose control and go mad |  | .55 |  |  |
| 33. | Anger is good for me | .70 |  |  |  |
| 35. | My anger is dangerous for me |  | .49 |  |  |
| 37. | I cannot distract myself from anger |  |  | .63 |  |
| 41. | Anger means loss of control |  | .48 |  |  |
| 42. | When I am angry I lose sight of different points of view |  | .49 |  |  |
| 43. | Anger protects me from being exploited by others | .50 |  |  |  |
| 45. | Anger makes me a strong and capable person | .66 |  |  |  |
| 48. | Anger makes me a bad person |  | .60 |  |  |
| 49. | Others will be judgmental of you for getting angry |  | .54 |  |  |
| 54. | Anger is necessary to get by in the world | .61 |  |  |  |
| 55. | Anger makes me insensitive to other people  |  | .46 |  |  |
| 57. | Anger keeps me alert | .53 |  |  |  |

Note. PB = MAP Positive Beliefs; NB = MAP Negative Beliefs; Rum = MAP Rumination; CC = MAP Cognitive Consciousness

Internal reliability analysis yielded an alpha of .85 for the remaining 34 items of the MAP after the first item selection. Test-retest reliability (Pearson) was .78, indicating very good stability for the new measure.

Subscale correlations

 Examination of the MAP showed significant positive inter-correlations between the subscales, ranging from *r* = .21 to .35, except for *r* = .02 between Negative Beliefs and Positive Beliefs. All MAP subscales were highly correlated with the MAP Total. Three of the four subscales had significant correlations with PI anger level, ranging from *r* = .21 to .37, whereas the correlation for the Cognitive Consciousness subscale was non-significant (*r* = .14). The MAP and the PI Total showed a correlation of *r* = .38, indicating a moderate relationship. These results are presented in Table 2.

Table 2.

Correlations (Pearson) between MAP subscales and anger level (PI Total) for police students, N = 192.

|  |  | MAP | PB | NB | Rum | CC |
| --- | --- | --- | --- | --- | --- | --- |
| PI  | Total | .38\* | .25\* | .21\* | .37\* | ns |
| MAP | PB | .52\* |  | ns | .21\* | .19\* |
|  | NB | .80\* |  |  | .35\* | .23\* |
|  | Rum | .68\* |  |  |  | .27\* |
|  | CC | .33\* |  |  |  |  |

Note. \* p< .01. PI = Provocation Inventory; MAP = PB + NB + Rum; PB = MAP Positive Beliefs; NB = MAP Negative Beliefs; Rum = MAP Rumination; CC = MAP Cognitive Consciousness

*Study 2*

The next step was to test the psychometric properties of the MAP involving a sample with a higher level of anger. To more fully address convergent validity, a general metacognitive measure was included.

Prior to study 2, the MAP was revised based on Study 1. The Cognitive Consciousness subscale was eliminated because its correlation with the anger criterion was non-significant. The remaining 30 items extracted from the factor analysis in Study 1 entailed positive beliefs, negative beliefs, and rumination. As there were comparatively few rumination items, five new items were constructed for that subscale capturing a sense of repetitiveness, prolongation and uncontrollability in the on-going processing of anger-related thoughts were constructed. The final measure thus had a total of 35 items.

MAP subscales were expected to show moderate positive correlations with the general Meta Cognitive Questionnaire (MCQ-30). Consistent with the metacognitive approach to emotional disorders, the inter-subscale correlations of the MAP were expected to be moderately positive, and all subscales of the MAP were expected to be positively correlated with anger.

*Participants*

 A sample of 167 male prisoners was recruited from 5 different prisons in Denmark (3 closed and 2 open). Participants gave their consent to participate. They received written information and were orally assured that they would remain anonymous and that the study was independent of their involvement with the prison system. The study was approved by the Danish Prison and Probation Service. The average age of the prisoners was 30.8 (range: 18-62, SD = 9.7); the average length of scholarly education was 9.2 years (SD = 2.2). Sixty-one percent of the participants had no education other than compulsory schooling and sixty-one percent of the participants were serving a sentence for a violent crime. The average length of the sentence was 3.1 years (range 1-13 years, SD = 3.1). To evaluate test-retest reliability, 17 participants were retested after 1-3 weeks.

*Measures*

 The *MAP revised* (35 items) as described above, the *Provocation Inventory* (PI) from Study 1, and The *Meta Cognitive Questionnaire* (MCQ-30;Wells & Cartwright-Hatton, 2004)was used. MCQ-30 is the revised and shortened version of the MCQ (Cartwright-Hatton & Wells, 1997).In the MCQ-30, factor analyses reproduced the original 5 subscales although they emerged in an alternate order. The psychometric properties of the MCQ-30 were addressed satisfactorily, including validation with other measures of worry and anxiety.

*Results*

Provocation Inventory (PI)

 The mean PI Total score was 65.4, SD = 14.0. Comparing the PI Total from the present study to that found by (Lindqvist, Dåderman, & Hellström, 2005) for Swedish violent prison inmates was non-significant.

Metacognition and Anger Processing scale (MAP)

 The MAP data met assumptions of normality, permitting factor analysis of the scale.

A Principal Axis Factoring (PAF) using Promax rotation was conducted. Three factors were fixed, resulting in a solution accounting for 44.2 % of the variance with 31 items loading above .40 and only on the factor it belonged to theoretically. One item, 23 “Anger could make me go mad” loaded on a different factor than expected, but was kept on the factor it theoretically belonged to. One item, R2 “If I just let go of my anger, people will not understand that they went too far” loaded on the Positive Beliefs subscale, and was kept there. One item, 55, “Anger makes me insensitive to other people” was kept due to theoretical relevance even though it loaded below .40.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Rum  | NB | PB |
| 3. | When I am angry I keep thinking about it | .50 |  |  |
| 4. | I cannot distance myself from angry thoughts | .50 |  |  |
| 8. | I cannot let go of angry thoughts | .84 |  |  |
| 9. | Anger is hard to control; it controls you | .51 |  |  |
| 11. | My anger harms me |  | .58 |  |
| 12. | Anger helps me see things the way they really are |  |  | .50 |
| 14. | It is bad to have angry thoughts |  | .46 |  |
| 15. | When I start getting angry I cannot stop | .80 |  |  |
| 16. | Anger is bad for me |  | .58 |  |
| 19. | Anger helps me solve problems |  |  | .58 |
| 22. | Anger helps me handle things |  |  | .48 |
| 23. | Anger could make me go mad | (.52) | .27 |  |
| 25. | I cannot ignore my anger | .70 |  |  |
| 26. | Anger keeps me safe |  |  | .68 |
| 27. | Anger will make other people reject you |  | .59 |  |
| 30. | My anger can harm other people |  | .40 |  |
| 33. | Anger is good for me |  |  | .67 |
| 35. | My anger is dangerous for me |  | .50 |  |
| 37. | I cannot distract myself from anger | .81 |  |  |
| 41. | Anger means loss of control |  | .57 |  |
| 42. | When I am angry, I lose sight of different points of view |  | .42 |  |
| 43.  | Anger protects me from being exploited by others |  |  | .44 |
| 45. | Anger makes me a strong and capable person |  |  | .67 |
| 48. | Anger makes me a bad person |  | .75 |  |
| 49. | Others will be judgmental of you for getting angry |  | .73 |  |
| 54. | Anger is necessary to get by in the world |  |  | .60 |
| 55. | Anger makes me insensitive to other people  |  | .30 |  |
| 57. | Anger keeps me alert |  |  | .53 |
| R2. | If I just let go of my anger, people will not understand that they went too far | .42 |
| R3. | It is impossible not to think about anger | .44 |  |  |
| R4. | When I am angry, I can only think about that | .76 |  |  |

 The first factor of the analysis was Rumination (9 items, alpha = .88), the second factor was Negative Beliefs (12 items, alpha = .86), and the third factor was Positive Beliefs (10 items, alpha = .85). The results of the factor analysis are displayed in Table 3.

Table 3.

Factor loadings of the Principal Axix Factoring with Promax rotation for prisoners, N = 167.

Note. Brackets indicate deviations from the expected loadings. Rum = MAP Rumination; NB = MAP Negative Beliefs; PB = MAP Positive Beliefs.

Internal reliability analyses for the MAP yielded an alpha coefficient of .91 for the 31 items. The test-retest (Pearson) correlation was .67, indicating good stability for the MAP.

 MAP inter-subscale correlations

 The Pearson inter-correlations among the subscales of the MAP are available in Table 4. All subscales of the MAP were highly correlated with the MAP Total and with the exception of Negative Beliefs with MAP Total, the MAP subscale inter-correlations had increased over those of Study 1.

Convergent validity

 To examine the theoretically expected relationship between the general metacognitive measure and this new measure of metacognition that specifically targets anger, the inter-correlations between the two metacognitive measures were computed. Results showed moderate correlations between several of the subscales on the MCQ-30 and the MAP, supporting the MAP as a metacognitive measure. The MCQ-30 subscale regarding Uncontrollability/Danger in relation to worry was highly correlated with both MAP Rumination (*r* = .48) and MAP Negative Beliefs about anger (*r* = .45). In addition, the MCQ-30 Negative Beliefs about the Need to Control thoughts was highly correlated with MAP Negative Beliefs about anger (*r* = .47) indicating similarity between the constructs. The MCQ-30 Positive Beliefs and Cognitive Self-Consciousness showed only a significant correlation with the MAP Negative Beliefs about anger.

Concurrent validity

 To examine the concurrent validity correlations for the MAP and MCQ-30 with PI Total were computed. Overall, the MAP was more strongly correlated with anger level than the MCQ-30. The Uncontrollability/Danger subscale of the MCQ-30 was the most highly correlated with PI (*r* = .26) of any of the subscales in the general metacognitive measure.

 As in Study 1, the subscales of the MAP were positively correlated with PI Total and the same pattern of correlations emerged as in Study 1, only stronger. The correlation between PI Total and the MAP subscales increased supporting the scale revisions and signifying the relevance of using the measure in an anger-prone sample.

 In summary, the subscale inter-correlations and the correlations with PI Total support the MAP as a metacognitive measure that has specific relevance to anger. Results of these correlations are available in Table 4.

Table 4.

Correlations (Pearson) between the MAP subscales and measures of metacognition and

anger level for prisoners, N = 167.

|  | MAP |  |  | MCQ-30 |  |
| --- | --- | --- | --- | --- | --- |
|  | Rum | NB | PB | 4 | 5 | 6 | 7 | 8 | Total | PI Total |
| PI Total |  |  |  | ns | .26\* | .20\* | .22\* | ns | .22\* |  |
| MAP Total | .87\* | .79\* | .72\* | ns | .51\* | .33\* | .44\* | ns | .46\* | .61\* |
| Rum |  | .55\* | .57\* | ns | .48\* | .31\* | .33\* | ns | .37\* | .63\* |
| NB |  |  | .22\* | .21\* | .45\* | .27\* | .47\* | .33\* | .49\* | .34\* |
| PB |  |  |  | ns | .26\* | .21\* | .23\* | ns | .20\* | .53\* |

Note. p < .01.PI = Provocation Inventory; MAP: Rum = Rumination, NB = Negative Beliefs, PB = Positive Beliefs. MCQ-30: 4 = Positive Beliefs, 5 = Uncontrollability/Danger, 6 = Cognitive Confidence, 7 = Need to Control thoughts, 8 = Cognitive Self-Consciousness, 9 = MCQ-30 Total.

 To further examine the relationship between the MAP subscales and anger level (PI), a hierarchical regression with forced entry was conducted with PI Total as the criterion variable and age, verdict length, MCQ-30 Total and MAP subscales as the predictors. On the first step, age and verdict length were entered as background covariates. To explore whether the MCQ-30 is related to anger level, the MCQ-30 Total was entered on the second step. The intention was both to test its contribution to and control for its effects when testing the MAP subscales entered on step 3.

 For the first step, age and verdict length entered alone were significantly associated with anger level (PI), adjusted R² = .054 (*p <* .01). When the MCQ-30 Total was added to this equation on the second step, an additional 6% of the variance in the criterion variable was explained, producing a significant increase (ΔR² = .058; *p* = .002). Entering the MAP subscales on the third step explained an additional 35% of the variance in the criterion variable (ΔR² of .346, *p*< .000). The final model was significant, adjusted R² = .45, *F* (6,157) = 22.37, *p*< .000. In the final model, Rumination (*p*< .000) and Positive Beliefs (*p*< .000) from the MAP subscales were significantly associated with anger level measured by the PI Total, whereas the MAP Negative Beliefs (*p* = .605) and the MCQ-30 Total (*p*= .587) was no longer significant.

 The data suggest that the MAP subscales were more closely associated with anger than the MCQ-30.

*Discussion*

The aim of the present studies was to develop a new anger measure including metacognitive components of anger to guide clinical case conceptualization and improve outcome of treatment of problematic anger. As the metacognitive components of anger have not prior been conceptualized, it was considered helpful to apply a relevant existing metacognitive framework. Because the Wells conceptualization of metacognition in relation to emotional disorder offers a coherent and validated clinical framework it was chosen as the template for exploring the metacognitive components of anger. First, the metacognitive framework was pilot tested for applicability in the target population by conducting a qualitative pilot study where 12 forensic patients were interviewed using the metacognitive profiling approach. This process revealed that some of the features of the model seemed more relevant to the patients than others; e.g. positive and negative beliefs about anger, experiences of getting stuck in unhelpful thinking styles, and increased self-focused cognition, while other features concerning evaluations of general cognitive ability in regard to anger processing were more confusing to the patients. Because face validity is essential in a clinical tool to inform collaborative case conceptualization we decided to omit the subscale regarding evaluations of general cognitive ability.

Next, we tested the initial factor structure of this new measure on a non-clinical and a clinical sample. The three subscales of the MAP that showed reliable and significant correlations with the anger measure were kept. The Positive Beliefs subscale contained items reflecting general positive beliefs about the functions of anger. The Negative Beliefs subscale contained items regarding negative conceptions related to anger, particularly those focused on danger, harm and madness in association with anger. The Rumination subscale reflected items regarding experiences of prolonged processing of anger-related thoughts and experiences of anger. The Cognitive Consciousness subscale which was omitted due to a non-significant correlation with the anger measure, contained items reflecting general evaluations of one's own cognitive awareness and monitoring processes.

The general idea of a metacognitive perspective on anger, highlighting the link between metacognitive beliefs and specific strategies for processing information, were supported by the high inter-correlations between the MAP subscales. Thus, in accordance with the preliminary evidence reported by Simpson &Papageorgiou(2003), the present data indicate that positive as well as negative beliefs are involved in the tendency to ruminate about anger. Furthermore, this new tool showed potential clinical relevance as its subscales were significantly correlated with self-reported anger level (PI). Others have developed tools to measure rumination as it relates to anger (e.g. Angry Rumination Scale ARS; Sukhodolsky et al., 2001)however, these scales have not attempted to integrate the tendency to ruminate with the associated belief structures that drive the selection of this processing strategy as was done in the MAP.

The findings of the studies presented here do not support the relevance of a general maladaptive cognitive self-focus as the Cognitive Consciousness subscale showed unacceptable concurrent validity. This finding may be due to inconsistencies in the operational use of the intended construct with items containing conflicting content that intertwined themes of cognitive awareness, attempts at thought control, regulation skills and threat detection. However, it may also signify that the quality of the cognitive self-focus is essential in understanding cognitive processing in maintenance of clinical conditions (Watkins, 2008)and anger (Denson, 2013). This is also supported by the non-significant association between the corresponding subscale of the MCQ-30, the Cognitive Self-Consciousness subscale. In the generic metacognitive framework, no distinction between benign and malignant self-focus is specified. The rationale for considering a general heightened tendency to monitor and focus on inner experiences as malignant is the risk of developing the Cognitive Attentional Syndrome (CAS). However, because anger is an emotional response that may arise quickly and relatively automatically with limited cognitive processing, an elevated tendency to monitor and focus on inner experiences may, in fact, enable cognitive modification of the anger response (Denson, 2013; Wilkowski & Robinson, 2010). In conclusion, the findings from these two studies involving the MAP Cognitive Consciousness subscale support the idea that self-focused attention may not be malignant in relation to anger per se*,* but the type and quality of the self-focus is critical in regard to anger regulation.

Regarding the subscale correlations between the MAP and the general metacognitive measure (MCQ-30), the moderate correlations between several of the subscales and the MCQ-30 and the MAP supported the idea that the subscales are meaningfully related and represent dimensions of metacognition as it relates to anger.

The MCQ-30 Cognitive Confidence subscale also showed a positive correlation with anger as measured by the PI. This positive association may indicate that individuals with actual limited cognitive abilities also have limitations in regulating anger as anger regulation requires executive functioning (e.g. Denson, DeWall & Finkel, 2012). The relationship between the Cognitive Confidence subscale (MCQ-30) and anger should be further explored.

 The two studies presented have several limitations. First, a substantial weakness regarding the factor analyses conducted in these studies was sample size with ratios of respectively 3.4and 4.8participants per item. Usually, a ratio of 5 participants per item is recommended (Gorsuch, 1983) to ensure stability of the factor structure. However, the stability of the factor structure in two different samples compensate for this limitation. Secondly, the studies are cross-sectional and rely on correlational statistics, meaning that a causal relationship cannot be inferred. Another limitation is the limited assessment battery in both studies and that anger was measured with only the PI.The PI measures the degree to which an individual is provoked by different situations, and as such it does not directly measure the anger construct experientially. Finally, relying on self-report of anger and no measures of aggression is a limitation. Future studies refining the scale will benefit from expanding the test battery and include observer or behavioral measures of aggression, allowing for more precise investigation of the psychometric properties of the MAP. Using clinical samples would also be valuable in future validations of the scale.

In regard to clinical implications, the Positive Beliefs subscale represents cognitive networks that increase the risk of an anger-related response because anger is conceived as a problem solving strategy for dealing with perceived unpleasantness, adversity, danger and ill-will.

In this proposal, positive beliefs are associated with anger through their activation of rumination, which in turn maintains negative affect and strengthen negative beliefs. Negative beliefs motivate the individual to control anger arousal by suppression, however that may back-fire and paradoxically result in increased anger processing, and decreased control which again strengthen negative beliefs about anger.

 For example, an individual holding a belief about anger as a survival strategy may overinvest energy resources into anger experiences and thus have a tendency to ruminate. Furthermore, the experience of the ruminative process may strengthen beliefs about the uncontrollability of anger which decrease the possibility of successfully interrupting the ruminative process. This proposed mechanism of anger processing is consistent with the metacognitive model by Wells advocating that the central motor in psychopathology is the maintainance of negative and biased thinking styles guided by specific positive and negative metacognitive beliefs.

 Clinical interventions may benefit from an exploration of the patient´s experience of anger, as structured by the MAP’s factors and their interrelationships. As anger is often embedded in other troublesome emotions like sadness, anxiety or disappointment, and may sometimes function as a secondary emotional response with the function of escaping from these other troublesome emotions; attending to and regulating the primary emotion might alternate positive beliefs and the tendency to engage in angry rumination in situations involving distressing emotions. Psychoeducation about emotion regulation including the natural course of emotions and in-session practicing progressed relaxation and shifting the attention from arousal-producing cognitions to soothing images may lower physiological arousal and target negative beliefs by providing a sense of control over the emotional experience and the ruminative process.

In conclusion, the MAP is a promising new measure to assess and formulate metacognitive anger processing in individuals with anger problems and may inform the development of interventions for problematic anger.

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**Metacognitive Anger Processing (MAP)**

### The statements below describe beliefs that people have about own thoughts and emotions.

### How true are they for you?

### For each statement please indicate whether is (1) never true, (2) sometimes true, (3) often true, (4) always true. Use the scale at your right to circle the answer that best describes how true the statement is for you

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Never true | Sometimes true | Often true | Always true |
| 3. | When I am angry I keep thinking about it | 1 | 2 | 3 | 4 |
| 4. | I cannot distance myself from my angry thoughts | 1 | 2 | 3 | 4 |
| 8. | I cannot let go of angry thoughts | 1 | 2 | 3 | 4 |
| 9. | Anger is difficult to control; it controls you | 1 | 2 | 3 | 4 |
| 11. | My anger harms me | 1 | 2 | 3 | 4 |
| 12. | Anger helps me see things the way they really are | 1 | 2 | 3 | 4 |
| 14. | It is bad to have angry thoughts | 1 | 2 | 3 | 4 |
| 15. | When I start getting angry, I cannot stop | 1 | 2 | 3 | 4 |
| 16. | Anger is bad for me | 1 | 2 | 3 | 4 |
| 19. | Anger helps me solve problems | 1 | 2 | 3 | 4 |
| 22. | Anger helps me handle things | 1 | 2 | 3 | 4 |
| 23. | Anger could make me go mad | 1 | 2 | 3 | 4 |
| 25. | I cannot ignore my anger | 1 | 2 | 3 | 4 |
| 26. | Anger keeps me safe | 1 | 2 | 3 | 4 |
| 27. | Anger will make other people reject you | 1 | 2 | 3 | 4 |
| 30. | My anger can harm other people | 1 | 2 | 3 | 4 |
|  |  | Never true | Sometimes true | Often true | Always true |
| 33. | Anger is good for me | 1 | 2 | 3 | 4 |
| 35. | My anger is dangerous for me | 1 | 2 | 3 | 4 |
| 37. | I cannot distract myself from anger | 1 | 2 | 3 | 4 |
| 41. | Anger means loss of control | 1 | 2 | 3 | 4 |
| 42. | When I am angry, I lose sight of different points of view  | 1 | 2 | 3 | 4 |
| 43. | Anger protects me from being exploited by others | 1 | 2 | 3 | 4 |
| 45. | Anger makes me a strong and capable person | 1 | 2 | 3 | 4 |
| R2 | If I just let go of my anger, people will not understand that they went too far  | 1 | 2 | 3 | 4 |
| R3 | It is impossible not to think about anger | 1 | 2 | 3 | 4 |
| 48. | Anger makes me a bad person | 1 | 2 | 3 | 4 |
| 49. | Others will be judgemental of you for getting angry | 1 | 2 | 3 | 4 |
| R4 | When I am angry, I can only think about that | 1 | 2 | 3 | 4 |
| 54. | Anger is necessary to get by in the world | 1 | 2 | 3 | 4 |
| 55. | Anger makes me insensitive to other people | 1 | 2 | 3 | 4 |
| 57. | Anger keeps me alert | 1 | 2 | 3 | 4 |

1. Angry rumination is the process of recurrent negative thinking focused on angry moods, past experience of anger, and thinking about the causes and consequences of anger episodes (Sukhodolsky, Golub, & Cromwell, 2001). [↑](#footnote-ref-2)
2. The domain of experiencing uncontrollability in regard to anger arousal and letting go of anger-related thoughts was labelled rumination. [↑](#footnote-ref-3)