Repetitive thinking and depressive symptoms in a normal population:

Responses to normal negative events

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Abstract

Some theories view repetitive thinking as a maladaptive coping response that exacerbates depressive symptoms and explains the sex difference in depression. Other theories view repetitive thinking as the chief mechanism for solving complex social problems. A central theoretical assumption in evolutionary psychology is that psychological mechanisms are sensitive to modern cues to ancestral fitness-relevant contexts. The measures that are currently used to probe repetitive thinking does not reflect this context sensitivity. This study explores qualitatively different types of repetitive thinking after the most recent negative events in different social contexts. Data from a survey of 524 students were collected to test predictions from competing hypotheses derived from Response Style theory, Metacognitive therapy, Analytical Rumination theory, Rank theory, the Female Co-rumination for Bonding hypothesis, and the Male Options Rumination hypothesis. Multivariate analyses revealed that number of depressive symptoms after a negative event depends upon sex, social context, and the type of repetitive thinking. In consistence with previous research, females reported more repetitive thinking than males. However, the sex difference in repetitive thinking disappeared and even reversed after a loss in a competitive social situation. All measures of repetitive thinking predicted depression but there was significant differences in how much the respondents used the different types of thinking. These finding are relevant to theories about the nature of depression and repetitive thinking and for theories that might explain known sex differences in depression. Theories about the link between depression, sex and repetitive thinking should consider the effect of social contexts on the relationship between variables.

Sammendrag

Repeterende tenkning blir i noen teorier fremstilt som maladaptive mestringsstrategier som forverrer depressive symptomer og forklarer kjønnsforskjellen i depresjon. Andre teorier ser på repeterende tenkning som hovedmekanismen bak det å løse komplekse sosiale problemer. En sentral teoretisk antakelse i evolusjonspsykologi er at psykologiske mekanismer er sensitive for fitness relevant informasjon. Målene som i dag brukes til å forske på repeterende tenkning reflekterer ikke denne kontekst sensitiviteten. Denne studien utforsker kvalitativt forskjellige typer repeterende tenkning etter de siste negative hendelser i forskjellige sosiale kontekster. Data fra en undersøkelse av 524 studenter ble samlet for å teste prediksjoner fra konkurrerende hypoteser avledet fra Respons Stil teori, Metakognitiv terapi, Analytisk Ruminerings teori, Rank teori, Female Co-rumination for Bonding hypothesis, og Male Options Rumination Hypothesis. Multivariate analyser viste at antall depressive symptomer etter en negativ hendelse avhenger av kjønn, sosial kontekst og hvilken type repeterende tenkning det er snakk om. I samsvar med tidligere forskning rapporterte kvinner mer repeterende tenkning enn menn. Denne kjønnsforskjellen forsvant og til og med reverserte seg etter tap i en kompetitiv sosial situasjon. Alle mål på repeterende tenkning predikerte depresjon men det var signifikante forskjeller i hvor mye respondentene brukte forskjellige typer repeterende tenkning. Disse funnene er relevante for teorier om depresjon og repeterende tenkning og for teorier som forsøker å forklare kjente kjønnsforskjeller i depresjon. Teorier om sammenhengen mellom depresjon, kjønn og repeterende tenkning bør vurdere effekten av den sosiale kontekster kan ha på sammenhengen mellom disse variablene.

Sammendrag

Content

Introduction

All people experience negative events from time to time. How people react to those discomforts varies but a common response is to think about the event and things associated with the event repetitively (Nolen-Hoeksema & Morrow, 1991; S. E. Taylor, 1991). Repetitive thinking can take many forms and researchers have developed many different scales in their attempts to explore the subject (Watkins, 2008). A central finding is that brooding on the negative feelings associated with a negative event can exacerbate those feelings and potentially push an individual into an emotional disorder (Nolen-Hoeksema & Morrow, 1991, 1993; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). It has been proposed that women's use of repetitive thinking in the form of brooding as a coping strategy can explain the gender difference in prevalence of depressive disorders (Hopcroft & Bradley, 2007; Hyde, Mezulis, & Abramson, 2008; McGrath, Keita, Strickland, & Russo, 1990; Nolen-Hoeksema, 1987; Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema et al., 2008). This approach to repetitive thinking and emotional disorders has been inspired by the Response Styles theory of depression, which claims that the most important factor when explaining depression is not what happens to people but how they respond to it (Just & Alloy, 1997; Nolen-Hoeksema, 1987; Nolen-Hoeksema et al., 2008). In line with this research a promising intervention called Metacognitive Therapy tries to alleviate and cure depression partly by challenging the beliefs about the appropriateness of repetitive thinking as a coping strategy (Papageorgiou & Wells, 2001; Wells, 2011). Some evolutionary theories about depression claims that repetitive thinking could be part of an evolved strategy to solve complex social problems (Andrews & Thomson, 2009; Watson & Andrews, 2002). The function of ruminating on negative social events is thought to be enhancement of the capacity of analysis and increasing the probability of solutions to important social problems.

These approaches to depression and repetitive thinking leave us with a contradiction. In Response Styles theory and Metacognitive Therapy repetitive thinking is seen as a hindrance to effective problem solving (Nolen-Hoeksema et al., 2008). In the Analytic Rumination Hypothesis repetitive thinking is seen as the response that makes problem solving happen (Andrews & Thomson, 2009). One possible answer to this apparent paradox could be that different theorists focuses on different conceptualisations of repetitive thinking, conceptualisations that could capture constructive or unconstructive attributes (Watkins,

2008). It is also possible that repetitive thinking has different consequences in different social contexts. Most measures of repetitive thinking does not differentiate between the social contexts. The common approach is rather to divide people into "high" or "low" in repetitive thinking or put them on a continuum from high to low. A central thesis in evolutionary psychology is that psychological mechanisms are domain specific and modular (Barrett & Kurzban, 2006; Tooby & Cosmides, 1995). It is possible that asking the same questions trigger different psychological mechanisms when they are asked in different contexts (E. g. Cosmides & Tooby, 1992). To say that someone has a "disposition" for repetitive thinking could be problematic if the person only thinks repetitively after losses in board games but never after conflicts at work. Evolutionary psychological approaches to psychiatric conditions have not yet resulted in treatment protocols but the understanding that is drawn from the field might do so in the future (Kennair, 2003, 2014). Addressing the differences in understanding of the role of repetitive thinking in depression could help in this regard.

The goal of the study was to look at how respondents in a non-clinical sample use different types of rumination as a response towards negative events in different social contexts. We wanted to know how their response, their belief about the appropriateness of rumination as a response and motivations for co-rumination related to psychological symptoms of depression. We also wanted to see whether the social context in which the negative event took place had an effect on the amount of rumination the respondents reported. Next we wanted to see whether it was sex differences in rumination and whether context affected this as well. Last we wanted to see whether intentions to co-ruminate and beliefs about the appropriateness of rumination were related to any potential sex difference in rumination and depression. Another goal of this study was to check internal reliability of several scales for different types of rumination and related constructs that were created for or developed in this study.

Negative events

A negative event has been defined by S. E. Taylor (1991) as an event "…That has the potential or actual ability to create adverse outcomes for the individual...". Consistent with this definition an event becomes *negative* because someone subjectively evaluates the outcome of the event to be negative. In the study that is described below subjects was asked to remember events where "the result was not what you wanted" and it is assumed that these events would be defined as negative given this definition. We are interested in events that have activated the types of psychological mechanisms that goes under the label "repetitive

thinking" of our respondents, not events that are rated by any kind of objective criteria (E.g. the Holmes and Rahe stress scale (Holmes & Rahe, 1967)).

Definitions and types of repetitive thinking

Repetitive thinking is a concept that can be rudimentarily defined as "the process of thinking attentively, repetitively or frequently about one's self and one's world" (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 909). Within this general definition many concepts can find a place (Watkins, 2008). Martin and Tesser (1996b) define rumination as an ongoing thought that is focused on a special theme and continues even though there are no demands for the thought in the environment. Some view rumination to be a subcategory of repetitive thinking but it could be argued that their definition is general enough to apply for all kinds of repetitive thinking (Martin & Tesser, 1996a). Martin and Tesser (1996b) claim that rumination is instrumentally linked to the achievement of goals and proclaim that it is the amount and speed of progress towards a goal compared with expected progress that determines whether rumination happens.

A conceptualisation of rumination that focused on the negative aspects of repetitive thinking was named *depressive rumination* (Papageorgiou & Wells, 2004). Depressive rumination has been defined as "repetitively focusing on the fact that one is depressed; on one's symptoms of depression; and on the causes, meanings, and consequences of depressive symptoms" (Nolen-Hoeksema, 1991, p. 569). It was first defined in the light of Response Styles Theory and so focuses on the negative feelings that the individual currently is experiencing. This construct has been shown to be linked with clinical depression (Nolen-Hoeksema, 1991; Papageorgiou & Wells, 2004). In early formulations of the Response Styles theory (E.g. Nolen-Hoeksema, 1991), the term "rumination" was used to refer to what we now know as depressive rumination. This is a somewhat different definition than the more general definition of Martin and Tesser (1996b), which can make the literature confusing at times. According to Robinson and Alloy (2003) repetitive thoughts can cause negative feelings if they are focused on the inferences of a negative event. This aspect of the depressive rumination construct is known as stress-reactive rumination (Just & Alloy, 1997; Papageorgiou & Wells, 2004; Robinson & Alloy, 2003). The extended version of Response Styles theory thus view depressive rumination as a self-reinforcing process (Lyubomirsky & Tkach, 2004).

Depressive rumination is typically measured with the Ruminative Response Scale which is a part of the Response Style Questionnaire (Treynor et al., 2003). Factorial analysis of different

measures of rumination have revealed that they measure more than one construct (Siegle, Steinhauer, Carter, & Thase, 2000). This is also true for the Ruminative Response Scale where two factors have been revealed (Treynor et al., 2003). *Brooding* refers to the abstract and negative aspects of self-reflection and has a focus on the obstacles to overcoming the problem. *Pondering* refers to a process of self-reflection that does not have the negative valence that brooding have and does not contain the generalized self-critical "why me questions" (Nolen-Hoeksema et al., 2008). Pondering and brooding can be seen as types of repetitive thinking that differs along a continuum of valence, where brooding is more negative, and a continuum of concreteness, where brooding is more abstract (Nolen-Hoeksema et al., 2008; Trapnell & Campbell, 1999; Watkins, 2008). Both fit within the definition of depressive rumination but they relate differently to depression per se. Treynor et al. (2003) found that both brooding and pondering was positively correlated with concurrent depression, but pondering was correlated negatively with depression in the long term.

The consequences of repetitive thinking can vary with which type of definition one use when operationalizing it. We have seen that it is possible to separate repetitive thinking in more or less abstract types and to have a negative or positive valence (Watkins, 2008). It could also be useful to draw a distinction between active and passive forms of repetitive thinking. Inspired by the learned helplessness literature and Martin and Tesser's (1996b) definition of rumination Mikulincer (1996) provides a third dimension of repetitive thinking in his distinction between *action* and *state* rumination (Ciarocco, Vohs, & Baumeister, 2010; Kuhl, 1981; Kuhl & Kazen, 1994). He proclaims that action rumination is task oriented and that the focus of thought is on how one achieves a goal and how past missteps could have been rectified. This is contrasted with state rumination which focuses on the feeling one is experiencing and what the implications of a failure would be. Even though they differ in abstractness and valence both pondering and brooding could fit within this framework as types of state rumination because they both lack a focus on how to actively achieve a goal. Segerstrom et al. (2003) found a searching versus solving purpose in a multidimensional scaling of different measures of repetitive thought. This dimension of repetitive thinking could be what Mikulincer (1996) have captured with his construct of action rumination. To our knowledge there have not been any published attempts to make a questionnaire measure of the construct of action rumination. Ciarocco et al. (2010) have tried to induce action rumination experimentally, however in this study the participants were asked to list thoughts

and the thoughts were not reported. A successful questionnaire measure would be a valuable tool in researching the legitimacy of sorting repetitive thoughts according to this dimension.

Beliefs about rumination

According to the Self-Regulatory Executive Function model of emotional disorders the beliefs people have about rumination are important causal factors in depression and other emotional disorders (Wells & Matthews, 1996). The beliefs people have about the appropriateness of rumination have been termed *positive beliefs* about rumination. Furthermore, peoples beliefs about the negative consequences and uncontrollability of rumination have been termed *negative beliefs* about rumination (Papageorgiou & Wells, 2001). Measures of these metacognitive beliefs have been found to predict depression and this connection was mediated by rumination (Papageorgiou & Wells, 2002, 2003). In line with these research findings and in line with S-REF model, a part of the metacognitive treatment guide is to challenge the meta beliefs patients have about rumination (Papageorgiou & Wells, 2001; Wells, 2011). Some have also found that positive beliefs about rumination could explain the sex difference in depression (Watkins & Moulds, 2005).

Sharing problems and bonding

One of the defining features of rumination is that it is a private and internal process that is not shared with other people. Sometimes people do share their inner thoughts about negative events with others. When the conversation happens in a dyad and the focus is on the problems associated with a negative event it could take the form of *co-rumination*. Co-rumination has been defined as "extensively discussing and revisiting problems, speculation about problems and focusing on negative feelings" (Rose, 2002, p. 1830). The construct is operationalized with the validated Co-Rumination Questionnaire (Davidson et al., 2014). Co-rumination have been found to correlate with close friendships and to increase friendship quality and relationship satisfaction (Calmes & Roberts, 2008; Rose, 2002; Rose, Carlson, & Waller, 2007). It seems that co-rumination has a positive consequence in making people bond but it also has a negative consequence. Co-rumination was found to predict onset of depressive episodes in adolescents and is theoretically linked to internalization disorders (Rose, 2002; Stone, Hankin, Gibb, & Abela, 2011). The construct of Co-rumination is more than just doing depressive rumination with a friend as the co-rumination questionnaire has small correlations with the ruminative response scale and related measures of "private" repetitive thinking (Davidson et al., 2014). However, like the brooding factor of depressive rumination it has

been found to mediate the gender difference in depression (Davidson et al., 2014; Rose, 2002; Stone et al., 2011).

Evolutionary approaches to depression

A complete analysis of a psychological trait (e.g. an emotion) should include answers to both *how* questions which include questions of mechanism and development, and *why* question which include questions of function and phylogeny (Nesse, 1990; Tinbergen, 1963). The answers to the how and why questions can be called *proximate* and *ultimate* explanations (Mayr, 1993). Evolutionary psychology is the discipline that tries to answer what functions different psychological traits have and whether they are adaptions or not (Buss, 2015; Kennair, 2002; Tooby & Cosmides, 1995). Evolutionary approaches to psychopathology (i.e. Evolutionary psychopathology) tries to explain the ultimate reasons behind mental disorders (Kennair, 2003; Nesse & Williams, 1996; Wakefield, 1992a, 1992b). There are many theories that give ultimate answers to the why questions of depression only some of which have a focus on rumination (For a review of evolutionary theories of depression see Kleppestø, 2014).

Analytic Rumination Hypothesis

According to the Analytic Rumination Hypothesis depression is an evolved adaption (Andrews & Thomson, 2009). The syndrome of depression involves enhanced mental accessibility to negative events and processing of those, reduced desire to do joyful distracting activities and changes in psychomotor functioning that increase the probability that the individual will not be disturbed. These changes facilitates sustained analysis of a problem which the Analytic Rumination Hypothesis predict results in an increased understanding of the nature and cause of the problem and ultimately to finding solutions to the problems (Andrews & Thomson, 2009). Anhedonia and reduction in psychomotor activity may facilitate repetitive thinking trough fewer distractions. In addition these changes could also be interpreted as honest signals about need for help and so could serve the ultimate function of eliciting help from others (Frank, 1988; Watson & Andrews, 2002). According to the Analytic Rumination Hypothesis depression has evolved to solve social problems and the psychological mechanisms associated with depression should only be adaptive in response to

negative *social* events. Increasing the complexity of the problem should increase repetitive thinking (Andrews & Thomson, 2009).

Rank theory

Rank Theory views depression as a human form of yielding behaviour (Price & Sloman, 1987; Price, Sloman, Gardner, Gilbert, & Rohde, 1994; Sloman & Price, 1987). In social vertebrae species one of the most important adaptive problems an individual face is advancing through the social hierarchy (Altmann et al., 1996). Hierarchy is a property of human society and probably has been through evolutionary time (Cummins, 2005; Magee & Galinsky, 2008). To fight for dominance can be a dangerous endeavour and yielding could be adaptive when chances for victory is low (Sloman & Price, 1987). Rank Theory proposes that the yielding behaviour is the result of an evolved, unconscious and involuntary psychological mechanism that is activated when individuals feels defeated and trapped (Gilbert & Allan, 1998; Siddaway, Taylor, Wood, & Schulz, 2015). There should be specificity in the types of events that would trigger the psychological mechanisms associated with the yielding behaviour and depression. Yielding is more beneficial in situations where the cost of losing a dominance struggle is higher and the reward of winning is lower. Rank Theory predicts that experiencing negative events in a context that is relevant for dominance would activate the yielding behaviour and associated depression more than negative events in contexts less relevant for a position in the dominance hierarchy.

Evolutionary approaches to sex differences in depression

The Male Options Rumination Hypothesis

The Male Options Rumination Hypothesis was originally developed as part of an attempt to explain gender differences in depression across cultures, with a focus on why men becomes much less depressed in western societies when compared with men and women in gender-unequal societies (Hopcroft & Bradley, 2007; Kleppestø, Kennair, & Buss, In prep). The claim is that in gender-unequal societies, access to the positions that signals dominance is skewed so that a few men and their relatives have the dominant positions. This leaves proportionally more men in positions where they feel hopeless and defeated, triggering the psychological mechanisms associated with depression. What differentiates this theory from Rank Theory is that the Male Options Rumination Hypothesis assumes that rumination is

engaged by some men when there are few options for behavioural problem solving available to them in their environment. The theory claims that there are more opportunities to advance in the social hierarchy in western societies, which means that rumination is less likely to be engaged by the lack of options. Even when behaviourally solving a problem in a dominance struggle is not possible, there could still be a motivation to advance in the dominance hierarchy which could result in rumination (Martin & Tesser, 1996b; Price & Sloman, 1987). The by-product of this goal related rumination could be depression (Nolen-Hoeksema, 1991).

Female Co-rumination for Bonding

The Female Co-rumination for Bonding Hypothesis was also developed to answer questions about gender differences in depression across cultures (Hopcroft & Bradley, 2007; Kleppestø et al., In prep). As discussed above co-rumination have been found to predict depression and to increase positive friendship quality, at least for adolescent girls (Rose et al., 2007; Stone et al., 2011). According to the Female Co-rumination for Bonding Hypothesis women have more often been in patrilocal environments throughout evolutionary time than men. The in-groups that young females have been part of have thus consisted of fewer members with close genetic ties than that of young males (Seielstad, Minch, & Cavalli-Sforza, 1998). Pregnancy could also have produced a selection pressure for bonding with same-sex peers in order to strengthen same-sex alliances during the crucial reproductive periods of pregnancy and postnatal childcare.

The Female Co-rumination for Bonding Hypothesis theorise that post-pubertal females have developed adaptations that allows them to bond emotionally and share fitness-relevant information with same-sex peers. For some women, this bonding process takes the form of co-rumination that maintains depressive symptomatology. Female bonding and co-ruminatory processes could be used as a tool for high-jacking other non-kin females' psychological mechanisms associated with altruistic behaviour. Psychological mechanisms involved in altruistic behaviour that probably evolved to solve problems associated with inclusive fitness (Dawkins, 1999; Hamilton, 1964; P. Taylor, 1992). If increased co-rumination in women increase depressive symptoms this could be a trade-off between the benefits associated with strengthening alliances and getting fitness relevant information about other group members and the risk of developing symptoms of depression for some at-risk women.

Predictions and hypotheses

In line with Response Styles theory we predicted that there would be a difference in the amount of repetitive thinking that each gender reported and that women would be the gender that scored highest in general (McGrath et al., 1990; Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Fredrickson, 1993). We further hypothesized that females would score higher on depressive symptoms and that brooding would be the "active ingredient" that mediated the gender difference (Armey et al., 2009; Hyde et al., 2008; Nolen-Hoeksema, 1987; Treynor et al., 2003). Because brooding have been found to be a better mediator of sex difference in depression and because the sex difference in depression are larger in western samples, we predicted that the sex difference would be greater in brooding than in other measures of repetitive thinking.

Hypothesis 1: Females score higher than males on measures of repetitive thinking (Nolen-Hoeksema, 1987).

Hypothesis 2: Females score higher than males on symptoms of depression (Nolen-Hoeksema, 1987).

Hypothesis 3: Brooding mediates sex differences in depression (Nolen-Hoeksema, 1987).

Analytical Rumination theory proclaims that slow, sustained and analytical processing is an adaption that substantiates solutions to social problems (Andrews & Thomson, 2009). The theory claims that depressive rumination (both brooding and pondering) are utilized by all people when they experience social problems. One of the requirements for something to be an adaption is that it is a species-typical trait (Tooby & Cosmides, 1995). Although depressive rumination certainly is common in clinical samples, it is not necessarily true that it is common in a normal population. We believe that action rumination as defined by Mikulincer (1996) is the type of repetitive thinking that are closest to an adaption because it has a stronger "solving purpose" and thus we predict that it is the most common type of repetitive thinking in a normal population.

Hypothesis 4: Action rumination is a more common type of repetitive thinking than state rumination in a normal population (Mikulincer, 1996).

Based on the general assumption that psychological mechanisms are domain specific and are sensitive to modern cues to ancestral fitness-relevant contexts we predicted that social context would influence the relationship between repetitive thinking, sex and depression (Barrett & Kurzban, 2006; Tooby & Cosmides, 1995). Further, based on Male Options Rumination Hypothesis and Rank Theory we predicted that the sex difference in rumination would be reversed (i.e. males ruminate more) in contexts where a negative event signals a loss in the struggle for dominance (Gilbert, 2000; Kleppestø et al., In prep; Price & Sloman, 1987).

Hypothesis 5: The amount of repetitive thinking after a negative event is dependent on the social context of the event.

Hypothesis 6: The direction of the sex difference in repetitive thinking is dependent on the social context in which the repetitive thinking occurs.

Hypothesis 7: Males score higher than females on measures of repetitive thinking after a loss in a competitive situation (Kleppestø et al., In prep).

Based on the Female Co-rumination for Bonding hypothesis we predicted that intentions to co-ruminate also would predict depression scores and mediate sex differences in depressive symptoms (Kleppestø et al., In prep). We also predicted that females, when compared with males, would be more interested in sharing a problem to bond with others than getting advice on how to solve the problem. The assumption is that a person who has an intention to bond when telling about a negative event would be disappointed getting an advice on how to solve the problem, since solving the problem would terminate the reason for the social contact and hence the bonding.

Hypothesis 8: Females are more interested than men in communicating their problem and bonding when sharing them with a friend (Kleppestø et al., In prep).

Hypothesis 9: Females are less interested than men in advice about their problems when they share them with a friend (Kleppestø et al., In prep).

Hypothesis 10. Scores on the intention to co-ruminate scale mediate sex difference in depression (Kleppestø et al., In prep).

In line with the theory behind metacognitive therapy we predicted that positive beliefs about rumination would predict depressive symptoms (Papageorgiou & Wells, 2001, 2003; Wells, 2011). Because earlier research in clinical populations have found a sex difference in positive

metacognitions about rumination we were interested to see whether we could replicate that in a normal population (Watkins & Moulds, 2005).

Hypothesis 11: There is a sex difference in positive beliefs about rumination (Watkins & Moulds, 2005).

Hypothesis 12: Positive beliefs about rumination predict depression scores (Wells, 2011).

Hypothesis 13: The effect of positive beliefs about rumination on depression is mediated by brooding (Wells, 2011).

Method

Participants

Data were collected from students participating in lectures at NTNU and constituted a convenience sample. 524 students aged 18 to 44 participated in the study, 327 women and 191 men whereas six respondents did not report their gender. The six students who did not report their gender were excluded from analysis regarding sex differences and included in other analysis if they had answered the relevant questions for those.

Data gathering

The questionnaire was given to students in the beginning of a recess in a lecture that they attended. The lectures that were chosen were first-year statistics, algorithms and data structures, bio-engineers, psychology, and community economics. The students were told to spread out before filling in the questionnaire and not to look at each other's answers or talk to each other before they were finished filling in the answers.

Measures

The participants were handed a questionnaire with four parts A, B, C and D. Part A consisted of questions about age and gender. Part C consisted of 13 items from Beck's depression inventory (BDI) (Beck, Ward, & Mendelson, 1961), and part D measured four items from the Positive beliefs About Rumination Scale (Papageorgiou & Wells, 2002). Part B was the main part of the questionnaire. In this section the participants were asked to remember the last times they encountered a result they did not like in five different social contexts. These contexts were in the family, competition in sports or games, dating situations, situations with

a romantic partner and work. For each of these situations participants were asked whether they agreed with sixteen statements about how they reacted. Eight statements were drawn from the ruminative response scales which is a scale in the Response styles questionnaire (Knowles, Tai, Christensen, & Bentall, 2005; Nolen-Hoeksema et al., 1993). The next four items were made to probe the construct of *action rumination* (Ciarocco et al., 2010; Mikulincer, 1996). The last four items were made with inspiration from the co-rumination literature (E. g. Rose, 2002). We wanted to ask participants about their motivation for engaging in co-rumination so before the last four items we instructed them to think about the last times they told a friend that they had experienced a failure in the given social context. The sixteen items were repeated for all five social contexts making it eighty questions in total.

Some of the scales (part C and D) in this study were imported from earlier research and the scale reliabilities are reported alongside the description of these measures below. Other measures (part B) have been constructed with the idea of comparing different social situations to each other and have thus been significantly changed from the original versions, or they have been constructed for the first time in this study. Scale reliabilities for those constructs will be reported in the result section. When a scale consist of less than eight items both Cronbach alphas and inter item correlations will be reported whereas only Cronbach alphas will be reported for scales with more than eight items (Briggs & Cheek, 1986; DeVellis, 2012). The questionnaire can be seen in appendix B.

Items from the Ruminative Response Scale. Eight items from the Ruminative Response Scale were included in the questionnaire (Nolen-Hoeksema & Morrow, 1991). The items were the same as those that Treynor et al. (2003) found loaded on the two factors; *brooding* and *pondering*. Since a major purpose of this study was to examine the relation between rumination and depressive symptoms the two items that included the word "depression" was removed because of possible confounding problems with depression (Armey et al., 2009). The included Items from the Ruminative Response Scale were translated to Norwegian and then reverse translated back into English to ensure reliability. One of these items was changed after retranslation. Item 13, "think about a recent situation, wishing it had gone better" were first translated into Norwegian so that the reverse translation became "Thought about a previous situation and wished that it had gone better". Since "recent" and "previous" does not constitute the same meaning it was changed so that the translation and reverse translation became "Tenkte på en tidligere situasjon og ønsket at det hadde gått bedre" and "Thought about a recent situation and wished that it had gone better" respectively. For a list of the

translations and reverse translation of all items from the Ruminative Response Scale see appendix A.

The Ruminative Response Scale is a measure of rumination as a response to depressed mood in general and the aim for this study is to research rumination as a response to specific negative events. The introductory text from the Ruminative Response Scale was therefore adapted so that the items were suggestions on what the respondent did after specific situations instead of what the respondent generally does when feeling sad. Because of this change the items worked like suggestions for what a respondent did or thought after the last specific situations that he or she could remember. Accordingly the answers were also adapted to fit with a situational approach. In the Ruminative Response Scale respondent rate how often they do or think what the item suggest, from almost never to almost always. In our study this would not be comprehensible since answering that one "almost never" or "almost always" does something after a specific episode that one thinks about does not make sense. Instead the answers were rated for how much the respondent agreed with the statement, from agreed completely to do not agree. Like in the original Ruminative Response Scale each item had four options. Of the eight items from the Ruminative Response Scale three where supposed to probe *pondering* and five were supposed to probe *brooding*. The items were listed in the same order in relation to each other as in the original Ruminative Response Scale and repeated for every social context.

Action and state rumination. Because of the similarities of the construct of depressive rumination and state rumination described in the introduction we operationalize *state rumination* with the full score of the items from the Ruminative Response Scale that we included in this study. For the operationalization of action rumination we invented four statements that theoretically would fit as examples to Mikulincer's definition. The statements were created in Norwegian and can be found in appendix B as item nine to twelve. The English translation is as follows; "*Thought about what I could have said differently to get a better result*", "*Thought about what I would say the next time I get in a similar situation*", "*Went through the incident mentally in order to find something I could improve with my own behaviour*" and "*I thought many times about what I should do to solve the problem if it were to happen again*". Like the items from the Ruminative Response Scale the answers were rated for how much the respondents agreed with the statements on a scale from "do not agree" to "agree completely".

Co-rumination and intention to co-ruminate. The construct of co-rumination has been operationalized with the validated Co-Rumination Questionnaire (CRQ) (Davidson et al., 2014). Co-rumination have been found to correlate with close friendships and has theoretically been linked to the making of friendships and relationship satisfaction (Calmes & Roberts, 2008; Rose, 2002). However, none of the items in the 27 items in CRQ explicitly asks about the intentions that co-ruminating people have for telling other people about their problems. According to the Female Co-rumination for Bonding hypothesis the function of co-rumination is to strengthen bonds between the co-ruminators (Kleppestø et al., In prep). We wanted to see whether that function was reflected in the intentions that people give when telling a friend about a negative event.

To test people's intentions for sharing with a friend we made four statements about intentions to tell a friend about a social problem. The statements were created in Norwegian and can be found in appendix B as item thirteen to sixteen. The English translation is as follows; *I told about the problem because I wanted advice about how to solve it"*, *"I got good advice from my friend about how I should solve the problem"*, *"I was more concerned with communicating the problem than to get advice on how to solve it"* and *"I did not tell about the problem because I wanted advice but because I wanted to come closer to my friend".* An introductory text instructed the respondent to remember the last times they told a friend about a social situation that did not go as they wanted and the text was repeated for every context. Like the other twelve items in this questionnaire the answers were rated on a four point scale from "do not agree" to "agree completely".

Our expectations was that the intention "to get advice" and how pleased one was with the advice would be negatively correlated with the intention "to communicate problem" and "to get closer to my friend". This mean that the two first items in an "intentions to co-ruminate" scale would be reverse scored.

Beck's depression inventory (BDI). Part C of the questionnaire consisted of a Norwegian translation of the BDI (Beck, Steer, & Carbin, 1988; Beck et al., 1961). There does exist a validated short version of the BDI (Beck, Rial, & Rickels, 1974). This version has fewer of the items that does not reflect core symptoms of depression and fewer redundant items. There was one problem with the use of this version in our study. Item number nine asks about thoughts and intentions about taking one's own life. Normally BDI would be administered in a clinical setting and the person who answers this question would be relatively isolated when

answering the question. Also the answers they give would be followed up clinically. This is in contrast to our study where students are sitting in close proximity to each other and their answers were not followed up clinically. We believe that to ask such an intrusive question in this setting would not be ethical and therefore chose to take this question out of the questionnaire.

In our study a major goal was to look at the connection between rumination and psychological symptoms of depression in a normal population. Item number twenty in the original BDI asks about worrying about health. This item has not been a part of the normal 13 item version of BDI. Given our interest in psychological symptoms we included item number twenty in our questionnaire. This made our short version of BDI somewhat different from what has been typically used in the literature but it still consisted of 13 items. Cronbach's alpha coefficient for the shortened version of the BDI was .83 in this study. Even though the included item that assessed worrying about health had the lowest inter-item correlations of all the items the Cronbach's alpha if item deleted was not higher than the alpha in the whole scale (.825 versus .827.).

Positive beliefs about rumination scale. Part D consisted of four questions from the Norwegian translation of the Positive Beliefs about Rumination Scale (Papageorgiou & Wells, 2002; Watkins & Moulds, 2005). The normal version of this questionnaire has nine items but five of these items have the word "depression" in them. Because of the possible confounding effect of the word depression with measures of the concept of depression those items was dropped in the same manner as the items from the Ruminative Response Scale (Armey et al., 2009). The four remaining statements was rated for how much the respondents agreed on a four point scale from "do not agree" to "agree completely". In the current study Cronbach's alpha coefficient was .81. The mean Inter-item correlation was .51 ranging from .42 to .70.

The Positive Beliefs about Rumination Scale had a somewhat high mean inter-item correlations (Briggs & Cheek, 1986). This could be due to the fact that some of the items was removed because of concerns about the use of the word "depression" in the excluded items (Armey et al., 2009). The author does not have any knowledge about any use of the Positive Beliefs about Rumination Scale in this way prior to this study. Future use of the Positive Beliefs about Rumination Scale should consider the problem of reduced internal reliability against the problem of possible confounding effects of the word depression.

Results

Scale reliabilities across situations

Every scale in part B of the questionnaire was measured across five social contexts. Scale reliabilities are reported for type of rumination with one reliability statistic for every social context.

Depressive rumination/state rumination. In the family context Cronbach's alpha was .77, in the competition context alpha was .77, in the dating context alpha was .88, in the partner context alpha was .88 and in the job context alpha was .82.

Pondering. In the family context Cronbach's alpha was .71 and the mean inter-item correlation was .32 ranging from .17 to .58. In the competition context alpha was .58 and the mean inter-item correlation was .30 ranging from .11 to .56. In the dating context alpha was .72 and the mean inter-item correlation was .44 ranging from .29 to .75. In the partner context alpha was .73 and the mean inter-item correlation was .46 ranging from .30 to .75. In the job context alpha was .67 and the mean inter-item correlations was .38 ranging from .18 to .70.

Brooding. In the family context Cronbach's alpha was .71 and the mean inter-item correlation was .32 ranging from .17 to .58. In the competition context alpha was .69 and the mean inter-item correlation was .32 ranging from .21 to .55. In the dating context alpha was .83 and the mean inter item correlation was .50 ranging from .40 to .64. In the partner context alpha was .85 and the mean inter-item correlation was .53 ranging from .39 to 74. In the job context alpha was .77 and the mean inter-item correlation was .40 ranging from .28 to .59.

Action rumination. In the family context Cronbach's alpha was .85 and the mean inter-item correlation was .58 ranging from .50 to .72. In the competition context alpha was .86 and the mean inter-item correlation was .60 ranging from .47 to .75. For the dating context alpha was .92 and the mean inter-item correlation was .73 ranging from .69 to .84. In the partner context alpha was .92 and the mean inter-item correlation was .73 ranging from .69 to .77. In the job context alpha was .89 and the mean inter-item correlation was .66 ranging from .59 to .73.

Intention to co-ruminate. In the family context Cronbach's alpha was .49 and the mean inter-item correlation was .20 ranging from -.06 to .72. In the competition context alpha was .42 and the mean inter-item correlation was .16 ranging from -.11 to .76. In the dating context alpha was .39 and the mean inter-item correlation was .13 ranging from -.14 to .77. In the partner context alpha was .35 and the inter-item correlation was .11 ranging from -.22 to .79.

In the job context alpha was .54 and the mean inter-item correlation was .21 ranging from -.05 to .82.

Both the low Cronbach's alpha coefficient and the inter-item correlations for the intention to co-ruminate scale reveal that something has gone wrong with this measure (Briggs & Cheek, 1986). We hypothesised that the intention to get advice and the degree to which one was pleased with the advice was negatively correlated with the intention to get closer to a friend and the intention to communicate the problem, that it was an either/or relationship. Because of this the two first items was reversed before the reliability analysis. As the result shows the inter-item correlations range from small negative to highly positive. Negative correlations persisted even after reversal of the two first items, suggesting that something else is going on.

The intentions to co-ruminate scale

Further analysis was done to reveal the structure of this scale. To simplify the analysis we treated the means from each item across situations as one variable. The same question that was asked in five different social context s was treated as one question with a mean score. When we looked at the correlation between each variable we found that intention to get advice was greatly positively correlated with how pleased one was with the advice (.84, p < .01). There was also small but positive correlations between how pleased one was with the advice and the intention to co-ruminate to get closer to a friend (.14, p < .01) and intention to communicate the problem (.17 p < .01). Intention to get advice was not significantly correlated with intention to get closer to a friend and weakly correlated with intention to communicate the problem (.11 p < .05). Intentions to get closer to a friend and intentions to communicate the problem did correlate positively (.36 p < .01).

Since the intention to co ruminate scale did not work like predicted this scale was excluded from further analysis. Instead the intention to get closer to a friend and intention to communicate the problem are treated as one factor. We call this factor "intention to bond" throughout this study. The other factor is intention to get advice and how pleased one is with the advice. However further analysis revealed that these two items loaded in different directions on the depressive symptoms scale which is the dependent variable in this study and brooding which is a proposed mediator. This is hard to interpret because there is such a high positive correlation between intention to get advice and how pleased one is with the advice. Because individual items in a Likert scale often have low reliability when used as predictors,

and the items cancelled each other out when combined, these two items was dropped from further analysis (Gliem & Gliem, 2003).

Positive belief about rumination

The mean score on the Positive Beliefs about Rumination Scale was 2.16 in the whole sample. A mean score of 2 on this scale means that one "somewhat agrees" with the beliefs about rumination. There was no gender difference in positive beliefs about rumination in this sample, disconfirming hypothesis 11.

Correlations between different measures of repetitive thinking

To check whether the different measures of rumination differentiates from each other a bivariate correlational analysis was performed between action rumination across all situations, pondering across all situations and brooding across all situations. For Pondering and brooding Pearson's r was .65. For Action rumination Pearson's r was .61 and .57 for brooding and pondering respectively. All correlations was significant at 0.01 level (two tailed). Correlations ranging from .57 to .65 means that these constructs overlap but are not the same thing.

Differences in means of types of repetitive thinking

Three paired samples t-tests were conducted to evaluate whether there was a difference in how much respondents agreed with the different types of repetitive thinking after negative events in general. There was a statistically significant difference between action rumination across all situations (M = 2.47, SD = .63) and brooding across all situations (M = 1.86, SD = .50), t (523) =26.99, p < .0001 (two tailed). The Cohen's D was 1.06 indicating a large effect size. There was also a statistically significant difference between action rumination across all situations (M = 2.47, SD = .63) and pondering across all situations (M = 1.72, SD = .47), t (523) =32.33, p < .0001 (two tailed). The Cohen's D was 1.34 indicating a large effect size. Last there was a statistically significant difference between brooding across all situations (M = 1.86, SD = .50) and pondering across all situations (M = 1.72, SD = .47), t (523) =8.25, p < .0001 (two tailed). The Cohen's D was .29 indicating a small effect size. Action rumination was the most common response to after a negative event, confirming hypothesis 4.

Symptoms of depression

The mean score on the short version of the BDI for the whole sample was 0.40 which mean that the respondents reported few symptoms of depression in general. The maximum mean score possible is 4 and the highest mean score in the sample was 2.58. Females had a mean

score of 0.43 and men had a mean score of 0.34. There was a significant difference in depression scores $t(452,784) = 2.960$, $p < .01$ with an effect size of Cohen's $d = 0.28$. This is generally regarded as a small effect size in social science (Cohen, 1992). It does however confirm hypothesis 2 that there is a sex difference in depressive symptoms.

Amount of rumination across social contexts

The mean and standard deviations for type of rumination across situations are reported in Table 1. To test whether social context significantly affected h ow much people agreed with statement about rumination a between measures ANOVA was conducted for each type of rumination. For brooding $F(4) = 94.797$, $p < 001$. For pondering $F(4) = 133.548$, $p < 001$. For state rumination $F(4) = 132.748$, $p < 001$. For action rumination $F(4) = 116.057$, $p < 001$. And last for intention to bond $F(4) = 33.545$, $p < 001$. This shows that there was a significant difference between the amounts of rumination people reported engaging in after a negative event in different social contexts, confirming hypothesis 5. An examination of Table 1 does suggest that the respondents report lower levels of agreement with the statements about rumination when asked about the competition situation. Pairwise comparisons confirm that there was a significant difference between the competition context and the other contexts for all types of rumination. For action rumination the competition context is the only social context that is different from the others ($p. < 001$ for all comparisons). For the other rumination types there was no significant difference between the family, dating and the partner context. The job and competition context were significantly different from each other and from the family, dating and partner contexts ($p. < 001$ for all comparisons). For the intentions to co-ruminate things was a little different. The partner, job and competition contexts did not differ from each other in how much the respondents agreed with the intentions to co-ruminate. These social contexts differed significantly from the family and dating contexts ($p. < 001$ for all comparisons) that did not differ significantly from each other. All pairwise comparisons were calculated with the Bonferroni correction.

In Table 2 and Table 3 the mean and standard deviation for type of rumination across situations is reported for each sex and the number of respondents for each sex are reported in Table 4. In order to test whether there was a sex difference in level of rumination and whether this was dependent on type of rumination and social context multiple independent t-test was conducted. The results of those t-tests can be seen in Table 5.

Table 1

Mean and standard deviation for type of rumination across situations (hole sample)					
Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	2 (0.64)	1.89 (0.63)	1.96 (0.57)	2.67 (0.78)	1.96 (0.75)
Competition	1.48 (0.5)	1.28 (0.44)	1.4 (0.43)	1.86 (0.8)	1.67 (0.74)
Dating	1.99 (0.78)	1.9 (0.75)	1.95 (0.72)	2.66 (0.95)	2.02 (0.73)
Partner	2.07 (0.8)	2 (0.76)	2.05 (0.73)	2.61 (0.92)	1.71 (0.74)
Job	1.89 (0.65)	1.58 (0.62)	1.75 (0.57)	2.66 (0.87)	1.71 (0.67)

Means are reported with the associated standard deviation in parenthesis. Rum is an abbreviation for rumination.

Table 2

Mean and standard deviation for type of rumination across situations (females)					
Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	2.1 (0.65)	1.95 (0.64)	2.05 (0.56)	2.59 (0.76)	2.04 (0.75)
Competition	1.45 (0.51)	1.26 (0.42)	1.38 (0.44)	1.77 (0.76)	1.68 (0.75)
Dating	2.06 (0.77)	1.97 (0.74)	2.03 (0.7)	2.7 (0.92)	2.17 (0.72)
Partner	2.2 (0.8)	2.08 (0.76)	2.15 (0.73)	2.67 (0.88)	1.8 (0.74)
Job	1.9 (0.66)	1.65 (0.65)	1.8 (0.59)	2.72 (0.84)	1.77 (0.68)

Means are reported with the associated standard deviation in parenthesis. Rum is an abbreviation for rumination.

Table 3

Mean and standard deviation for type of rumination across situations (males)					
Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	1.84 (0.6)	1.79 (0.6)	1.82 (0.54)	2.63 (0.78)	1.83 (0.72)
Competition	1.53 (0.49)	1.31 (0.46)	1.45 (0.42)	2.01 (0.86)	1.66 (0.73)
Dating	1.84 (0.77)	1.79 (0.77)	1.82 (0.72)	2.63 (1.01)	1.77 (0.69)
Partner	1.85 (0.76)	2.85 (0.74)	1.85 (0.69)	2.51 (0.98)	1.55 (0.71)
Job	1.73 (0.6)	1.42 (0.53)	1.61 (0.52)	2.52 (0.9)	1.58 (0.61)

Means are reported with the associated standard deviation in parenthesis. Rum is an abbreviation for rumination.

Table 4

Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Number of females (males) that responded for type of rumination across situations					
Family	326 (191)	326 (191)	326 (191)	326 (191)	325 (185)
Competition	327 (191)	327 (191)	327 (191)	327 (190)	325 (189)
Dating	316 (169)	316 (169)	316 (169)	316 (169)	315 (167)
Partner	299 (161)	299 (161)	299 (161)	299 (161)	299 (158)
Job	269 (134)	296 (134)	296 (134)	268 (134)	267 (128)

Number of females is reported outside the parenthesis with number of males inside. Rum is an abbreviation for rumination.

Table 5 reveal that females report a significantly higher amount off state rumination, brooding and pondering after a negative event when compared with men. This is only true after situations that involve a negative event in the family context, the dating context, the partner context and the job context. When we look at the competition context there is no significant sex difference. For action rumination it is the competition situation that reveals a sex difference and here the sex difference has reversed so that males report the highest levels of rumination. The dating, partner and family context does not reveal a sex difference in action rumination but the job context does and in this context females report higher levels of action rumination after a negative event. When we look at Table 3 and Table 4 we can see that both sexes report less rumination in the competition situation and that females have a greater reduction in reported rumination after negative events in this context than men does. From Table 5 we can also see that when females ask a friend for advice after a negative event they agree more than males that they do so to get closer to that friend or because they want to communicate their problem, confirming hypothesis 8. This does not mean that females who tell about negative events that they have encountered because they want to get closer and communicate the problem are less motivated to get advice. We saw in the scale reliability section of this paper that those intentions are uncorrelated.

Table 5

Independent t-test (two tailed) for direction of sex difference and significance level for type of rumination across situations.

Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	***<F	**<F	***<F	ns <F	** <F
Competition	ns <M	ns <M	ns <M	**<M	ns <M
Dating	**<F	*<F	**<F	ns <F	*** <F
Partner	***<F	**<F	***<F	ns <F	** <F
Job	**<F	***<F	**<F	* <F	** <F

<F= females score higher. <M = males score higher. *** = significant at the .0005 level, ** = significant at the .01 level, * = significant at the .05 level, ns = not significant. Rum is an abbreviation for rumination.

Table 6

Effect sizes (Cohen's d) for sex difference for type of rumination across situations.

Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	0.4	0.44	0.45		0.33
Competition				0.35[1]	
Dating	0.27	0.27	0.28		0.64
Partner	0.42	0.33	0.4		0.32
Job	0.25	0.44[1]	0.4[1]	0.22	0.26

Only effect sizes for statistically significant gender differences are reported. All effect sizes represent a significant difference in the direction of higher score for females, except action rumination in the competition situation where males score higher. Rum is an abbreviation for rumination.

[1] = Equal variances were not assumed in the calculation of the effect size.

The independent t-test reported in Table 5 was not calculated with the Bonferroni corrections. Since an alpha of .05 is the consensus in social science the correction would be 0.05 divided by 30 which is 0.0017 (Dunn, 1959, 1961). All sex differences that are marked with three stars and most marked with two stars in table 5 would still be statistically significant. Another way of presenting the data is by the means of effect sizes which are reported in Table 6 (Kelley & Preacher, 2012). From this table we can see that most sex differences are between what Jacob Cohen defined as a small and a medium effect, with the difference in intention to bond in the dating context being between a medium and a large effect (Cohen, 1992).

Correlates of BDI scores

The correlation between score on the BDI scale, the main dependent variable in this study, and different types of rumination and intention to bond can be found in table 7. We can see that all types of rumination correlate with symptoms of depression. The type of rumination that has the strongest relationship with symptoms of depression is brooding. The social situation that has the strongest relationship with symptoms of depression is the family context.

Table 7

Pearson's r correlations with BDI scores across situations.

Situation	Brooding	Pondering	State rum	Action rum	Intention to bond
Family	.42**	.28**	.42**	.24**	.19**
Competition	.22**	.12**	.20**	.11*	.08 ns
Dating	.28**	.23**	.28**	.16**	.08 ns
Partner	.30**	.18**	.27**	.13**	.09 ns
Job	.20**	.20**	.22**	.19**	.10 ns

** = significant at the .01 level, * = significant at the .05 level, ns = not significant. Rum is an abbreviation for rumination.

Predictors of BDI scores

Several regression analyses were conducted to find out which factors could predict depression symptom scores. All analyses were done with the general scale for each rumination measure (see general scale reliability section of this paper). The first analysis was conducted to test which types of rumination could predict scores on the short version of the BDI. State rumination significantly predicts depression $\beta = .297$, $t(510) = 9.253$, $p < 0005$. State rumination also explained a significant proportion of the variance in depression scores $R^2 = .14$, $F(1,510) = 85.617$, $p < .0005$. Since pondering and brooding are subscales of state rumination a multiple regression was conducted for these two scales to check if both subscales contributed to the model. The model still explained scores on the BDI, $R^2 = .14$, $F(2,509) = 45.188$, $p < .0005$ but the beta coefficient for pondering was not a significant factor when combined with brooding $\beta = .042$, $t(509) = 0,784$, $p = .43$.

Action rumination is a novel scale created in this study. From table 7 we can see that scores on this scale correlated the BDI scale. The general action rumination scale also correlated significantly with the BDI scale, $r(510) = .225$, $p < .01$. To check whether this type of

rumination could explain unique variance in depression scores when combined with brooding, a multiple regression was performed. The model explained scores on the BDI, $R^2 = .14$, $F(2,509) = 44.855$, $p < .0005$ but the beta coefficient for action rumination was not a significant factor when combined with brooding $\beta = -.016$, $t(509) = -0,318$, $p = .75$. Brooding mediated depression scores better than action rumination but it is also correlated with action rumination.

Gender explained a significant, but small, proportion of the variance in depression scores $R^2 = .015$, $F(1,505) = 7,833$, $p < .01$. Positive Beliefs about Rumination Scale also explained a significant proportion of the variance in depression scores $R^2 = .09$, $F(1,509) = 49,750$, $p < .0005$. There was no significant sex difference in score on the Positive Beliefs about Rumination Scale.

A hierarchical regression analysis was used to assess the ability of gender and Positive Beliefs about Rumination Scale to predict BDI scores, after controlling for brooding. Gender was included in step 1, explaining 1.5 % of the variance in BDI scores. After entry of the Positive Beliefs about Rumination Scale in step 2 the model explained 10.4 % of the variance in BDI score, $F(2, 504) = 29.369$, $p < .0005$. This gave an R square change of .09 with F change $(1,504) = 50.142$ $p < .0005$. In step 3 brooding was introduced and the model could now account for 18.5 % of the variance in BDI scores. $F(3, 503) = 37.972$, $p < .0005$. This gave an R square change of .08, F change $(1,503) = 49.522$, $p < .0005$. In the final model gender was no longer a significant predictor of scores on the BDI. The beta value of Positive Beliefs about Rumination Scale was also reduced in model 3 but this was still a significant predictor of BDI scores ($\beta = .19$, $t(503) = 4.405$, $p < .0005$). Brooding had the highest beta value ($\beta = .31$, $t(503) = 7.037$, $p < .0005$). The effect of gender on BDI scores was fully mediated by brooding and the effect of Positive Beliefs about Rumination Scale on BDI scores was partially mediated by brooding, giving support to hypothesis 12 and 13.

Predictors of Brooding

A hierarchal multiple regression was used to assess the ability of sex and Positive Beliefs about Rumination Scale to predict levels of rumination, after controlling for the influence of intention to bond. Sex were entered at step 1, explaining 2.7 % of the variance in brooding with a beta of .17. After entry of Positive Beliefs about Rumination Scale at step 2 the total variance explained by the model as a whole was 15.3 %, $F(2, 495) = 44.787$, $p < .0005$. The R square change was .12, F change $(1, 495) = 72.715$, $p < .0005$. At step 3 the intention to

bond variable was introduced. Total variance in brooding explained by the model was raised to 25.9%, F (3, 494) = 57.628, p < .0005, the R square change was .106. In the final model Positive Beliefs about Rumination Scale and intention to bond had the highest beta values (Positive Beliefs about Rumination Scale, β = .33, t(494) = 8.587, p < .0005 and, intention to bond, β = .30, t(494) = 8.408, p < .0005). The effect of biological sex was partially mediated by intention to bond.

Path analysis

The regression analysis revealed a relationship between biological sex and psychological symptoms of depression that was mediated by brooding, confirming hypothesis 3. The effect of gender on brooding was partially mediated by intentions to co-ruminate. On top of that positive beliefs about rumination had an effect on BDI scores and this effect was partially mediated by brooding. In order to examine all these connections at the same time in one model structural equation modelling was used (Arbuckle, 2013). The model was tested four times under different "social situation" conditions to see whether social context had an effect on the connections between variables. The first model tested was the "all social contexts model", which assumes that the relationship between all variables is the same in each situation. The second model was tested with the family, dating and partner contexts combined, which assumes that the relationship between variables is the same in these three contexts. The results of this analyses is shown in figure 2. The third model was tested with the competition context alone and the fourth model was tested with the job context alone. Model 3 and 4 does not make any assumptions about whether the relationship between variables is the same across social context or not. The result of those analyses are shown in figure 3 and figure 4 respectively.

The standardized coefficient for the first model are given for each path in figure 1. The model fit the data very well: goodness-of-fit χ^2(3, N = 524) = 2.067, p = .559, Tucker-Lewis index (TLI) = 1.018, comparative fit index (CFI) = 1, root-mean-square error of approximation (RMSEA) = .000. Because of missing data modification indices was not calculated.
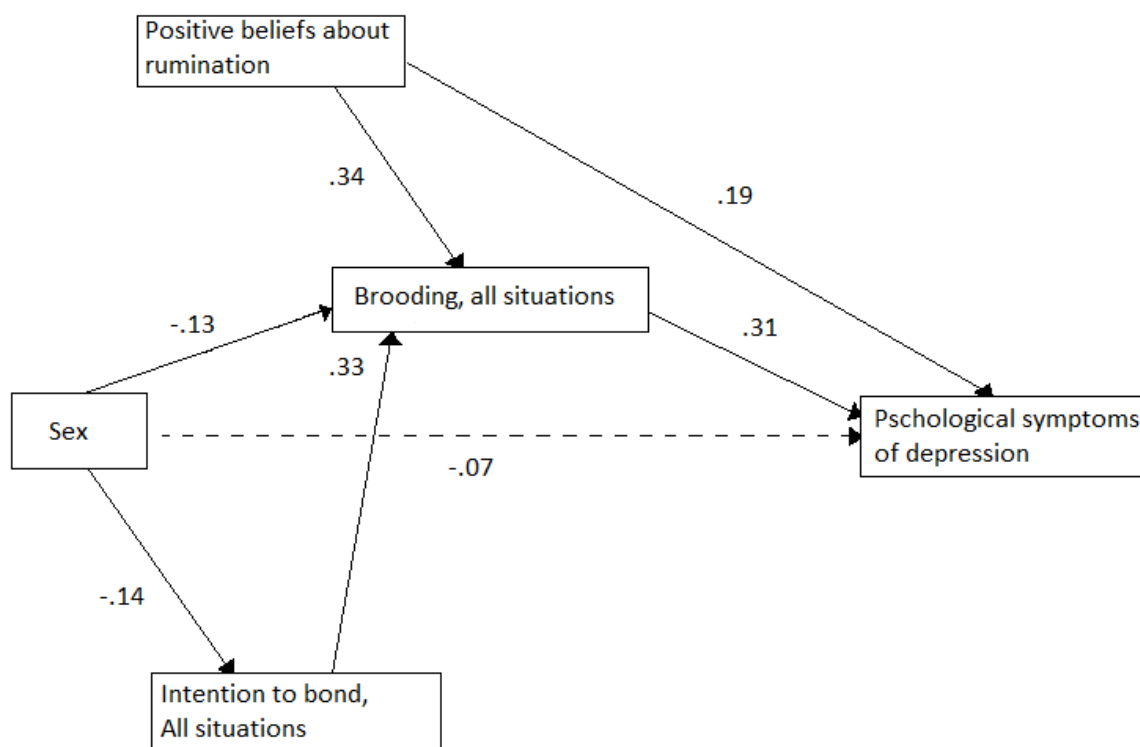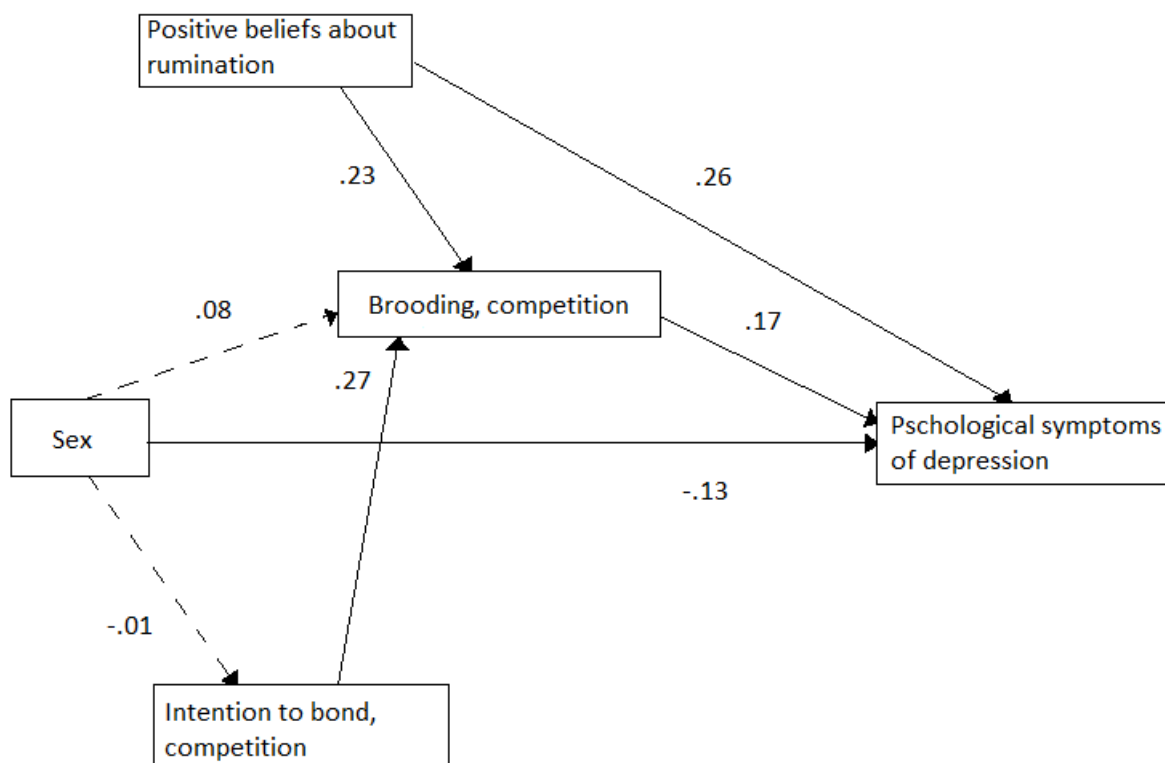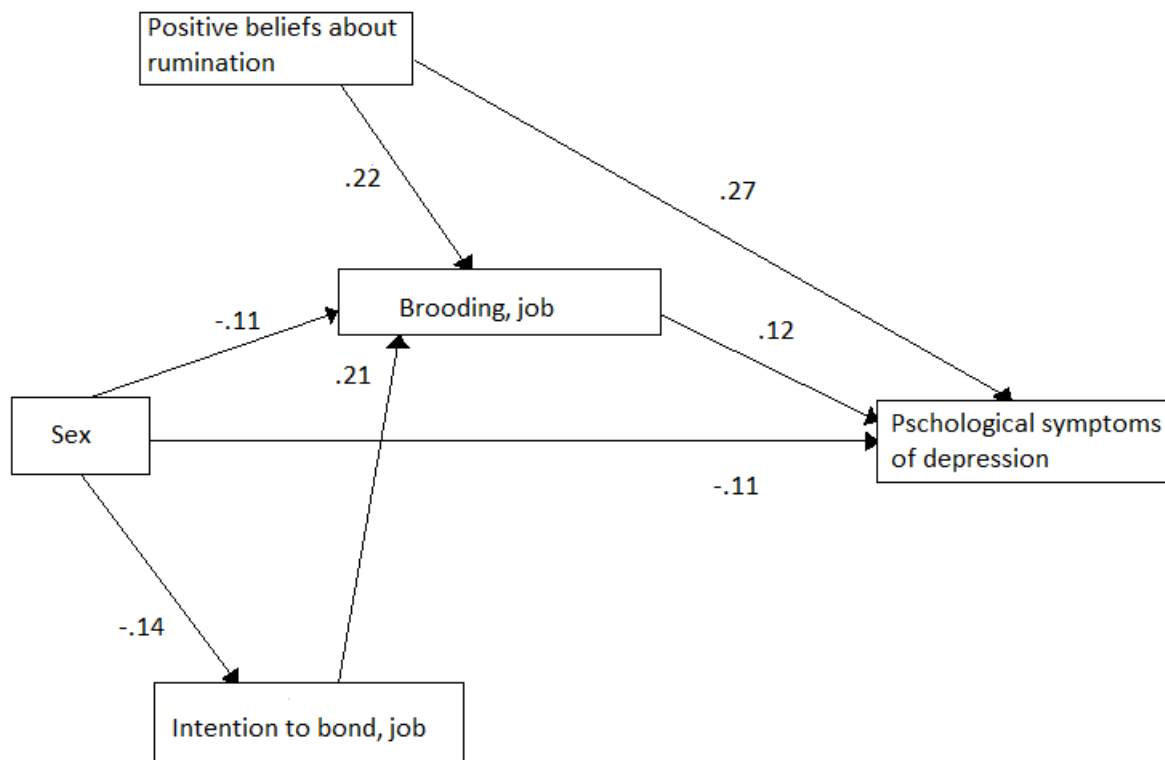
*Figure 1.*Brooding, intention to bond and positive beliefs about rumination across all situations and sex's relationship to each other, and to psychological symptoms of depression. All paths shown are significant at p < .01, except for the broken line. Negative correlations on the arrows from the gender box means that female score higher on the dependent variable.
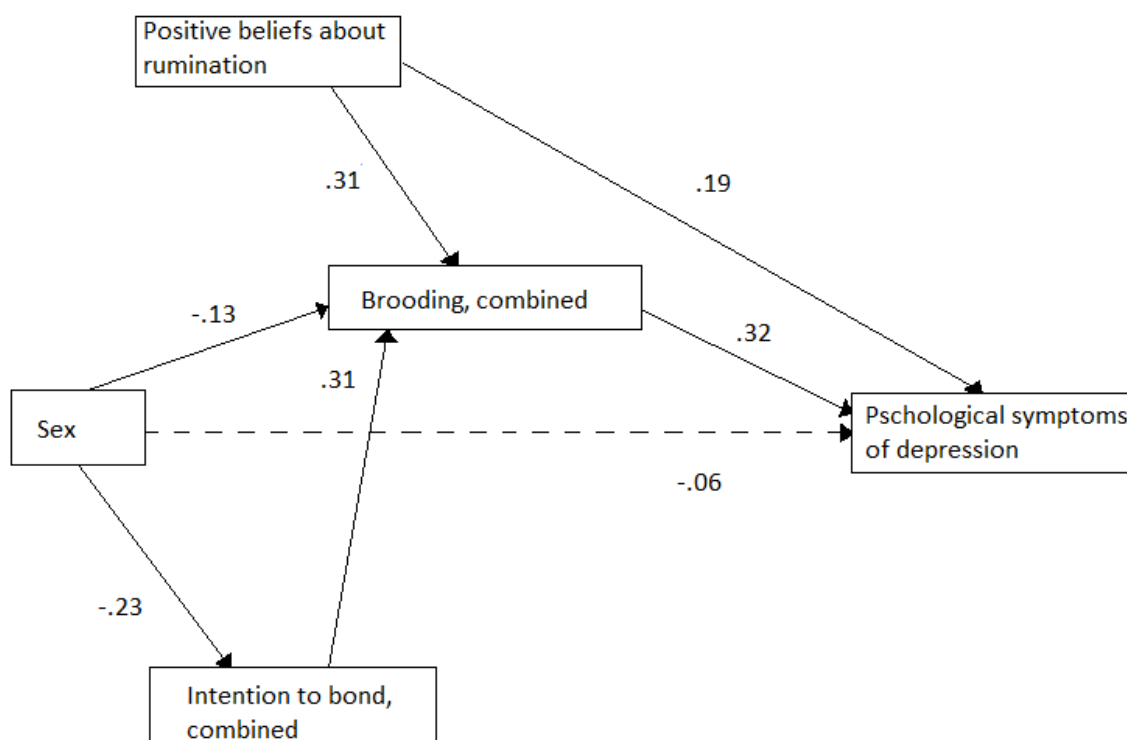
Figure 2. Brooding, intention to bond and positive beliefs about rumination (family, dating and partner contexts combined) and sex's relationship to each other, and to psychological symptoms of depression. All paths shown are significant at p < .01, except for that drawn with a broken line. Negative correlations on the arrows from the sex box means that female score higher on the dependent variable.

When we combine the family, partner and date situation in the second model it does not fit the data as well as when we tested it across all situations: goodness-of-fit χ^2(3, N = 524) = 8.082, p = .044, Tucker-Lewis index (TLI) = .909, comparative fit index (CFI) = .982, root-mean-square error of approximation (RMSEA) = .057. Because of missing data modification indices was not calculated. The standardized coefficient are given for each path in figure 2.

Figure 3. Brooding, intention to bond and positive beliefs about rumination in the competition context and sex's relationship to each other, and to psychological symptoms of depression. All paths shown are significant at p < .01, except for those drawn with broken lines. Negative correlations on the arrows from the sex box means that female score higher on the dependent variable.

When we look at the competition context the model fit the data very well: goodness-of-fit χ^2(3, N = 524) = 0.517, p = .915, Tucker-Lewis index (TLI) = 1.095 comparative fit index (CFI) = 1, root-mean-square error of approximation (RMSEA) = .000. Because of missing data modification indices was not calculated. The standardized coefficient are given for each path in figure 3.

Figure 4. Brooding, intention to bond and positive beliefs about rumination in the job context and sex's relationship to each other, and to psychological symptoms of depression. All paths shown are significant at p <. 05. Negative correlations on the arrows from the sex box means that female score higher on the dependent variable.

When we look at the job situation the model fit the data very well: goodness-of-fit χ^2(3, N = 524) = 1.758, p = .624, Tucker-Lewis index (TLI) = 1.060 comparative fit index (CFI) = 1, root-mean-square error of approximation (RMSEA) = .000. Because of missing data modification indices was not calculated. The standardized coefficients are given for each path in figure 4.

The standardized coefficients in each model shows that the connection between variables changes with the social context. The social context influenced the relationship between variables so that brooding no longer was a significant mediator of the effect of sex on depression in the competition and job contexts.

Discussion

The most common response after a negative event was to think repetitively in the form of action rumination. The difference between this type of repetitive thinking and other forms of repetitive thinking was large, as indicated by effect sizes (Cohen, 1992). This finding challenges the prediction made by Analytical Rumination theory that brooding and pondering represent psychological mechanisms that are utilized by all people when they experience social problems (Andrews & Thomson, 2009). There was a significant effect of social context on the amount of repetitive thinking that respondents reported, with less rumination in the competitive context. The amount of repetitive thinking was also dependent on the sex of the respondent but this effect was mediated by the social context. This gives support to the general assumption that psychological mechanisms are domain specific and that social context differentially cued ancestral fitness-relevant information. Regarding sex differences, this study replicates earlier findings that females score higher on depressive symptoms than males (E.g., Hyde et al., 2008; Nolen-Hoeksema, 1987). Females were most prone to reacting with repetitive thinking after a negative event and this mediated the sex difference in symptoms of depression. These findings confirmed the predictions from Response Styles theory (Nolen-Hoeksema, 1987; Nolen-Hoeksema et al., 2008), but the finding that social context mattered gave an important caveat, namely that it is only after some negative events that brooding mediates the sex difference in depressive symptoms. Specifically the competitive context differentiated itself from other contexts when regarding sex differences in repetitive thinking. That males scored higher than females on measures of repetitive thinking after a loss in sports or games gives support to the Male Options Rumination hypothesis which claims that contexts signalling strong cues about dominance would be salient to males. The type of repetitive thinking that explained the most variance in symptoms of depression was brooding and the sex difference in brooding was partially mediated by females' greater affinity for bonding when they share their problems with a friend. To find factors that can explain some of the sex difference in brooding is important since little is known about why females brood more than men. In this regard it is interesting to note that positive meta beliefs about rumination did not explain sex differences in brooding which was a failure to replicate earlier findings from clinical samples (Watkins & Moulds, 2005).

Structure of repetitive thought

People agreed more with the items that made up the action rumination scale than the other types of repetitive thinking. This difference holds true across social contexts, even though the amount of rumination declines in the competition context, confirming Hypothesis 4 that action rumination is more common than state rumination. It is possible that people scored higher on action-rumination because the items in the action rumination scale are more social desirable than the items in the state rumination scale, and that the difference is due to a biased memory for "responding in the constructive manner". However, the fact that the respondents could differentiate between action rumination and state rumination supports the notion that it measures a different aspect of repetitive thinking. Across situations the correlation between action and state rumination was lower than the correlation between brooding and pondering which have been found to represent different factors of the ruminative response scale (Treynor et al., 2003). Earlier attempts at creating structural models of repetitive thoughts have revealed a valence dimension and an abstractness dimension in repetitive thinking (Treynor et al., 2003; Watkins, 2008). A third possible dimension could be the type of purpose of the repetitive thought. Segerstrom et al. (2003) found a searching versus solving purpose in measures of repetitive thought. Our operationalization of Mikulincer (1996) action rumination would be on the "solving" end on the continuum since the items focus on how to behave differently to get another result (i.e. solving purpose), rather than trying to find a meaning with the present negative result (i.e. searching purpose). The finding that our operationalization of action rumination differentiates from the operationalization of pondering and brooding suggests that it could be a valuable tool for researchers interested in the nuances of repetitive thinking.

Analytical rumination theory and action rumination

Analytical Rumination theory claims that repetitive thinking is part of an evolved strategy depressed people use to solve complex social problems (Andrews & Thomson, 2009). If the purpose of repetitive thinking is to solve social problems one would expect the types of repetitive thinking that have a solving purpose to be most common. The fact that the participants in this study used action rumination more than other forms of repetitive thinking could mean that action-oriented repetitive thought is used more often after negative events in non-clinical samples. Although the data in this study confirms hypothesis 4 that action rumination is more common than state rumination it does not definitely exclude the possibility that depressive rumination (brooding and pondering) is an evolved adaption as proclaimed by

the Analytical Rumination Hypothesis. It does show that it is not the most common response to negative events, which is unexpected if depressive rumination is a species-typical adaptation activated in particular contexts (Tooby & Cosmides, 1995). In a clinical sample it is likely that brooding would be more common, which would suggest that brooding is a causal maintaining factor amongst people who become depressed. In other words, clinically depressed people do not brood because they are depressed; they maintain and prolong their depressive symptoms because they brood (Wells, 2011). Action rumination might be a better candidate for an evolved problem-solving strategy that are activated in particular contexts for most humans (Tooby & Cosmides, 1995). Although brooding has been found to be more abstract and to have a more negative valence than pondering, both constructs lack a focus on how to behave differently to get another result in the future (Treynor et al., 2003; Watkins, 2008). That brooding predicts depression better than pondering (see below) suggest that the abstractness and valence matters. These dimensions should not make us neglect the importance of the searching versus solving dimension. The data from this study suggest that this dimension differentiates best what type of repetitive thinking is most common after a negative event. If depressives do use the brooding more than action rumination they could end up with many problems and few solutions, the opposite of what Analytical Rumination theory claims repetitive thinking does for depressives. If depression is an adaptation to solve complex social problems one would expect the types of repetitive thinking that helps to solve those problems to increase in depressed people. These data show that the type of repetitive thinking that is most used after negative social events (i.e. action rumination) is unrelated to depression when controlled for a less common type of repetitive thinking (i.e. brooding). If it turns out that using action rumination in fact helps in problem-solving social problems this lack of relation to depression would seriously question the claim that depression evolved to solve social problems.

Female Co-rumination for Bonding

Although the intention to co-ruminate scale did not work as intended some findings are still relevant for the Female Co-rumination for Bonding hypothesis. First, females were more interested than men in sharing their problems with a friend because they wanted to bond, confirming hypothesis 8. Second, intention to bond did not directly mediate scores on depression like hypothesis 10 predicted. It did however predict brooding which in turn mediated depression in some, but not all social contexts. Third, intention to bond partially mediated the sex difference in brooding. This is an exciting finding because little is known

about why females brood more than males. Females´ greater experience of social hardships has been proposed as reasons for females enhanced brooding (Nolen-Hoeksema, 2003).

According to our data higher intention to bond when sharing problems could be one of the reasons females' brood more than males. This would be in line with the Female Co-Rumination for Bonding hypothesis which claims that females have evolved psychological mechanisms to increase female bonding, which leaves some women at risk for maintaining depressive symptoms due to co-rumination (Kleppestø et al., In prep). Depression could be mediated by the use of brooding in situations where the person is alone, (i.e. co-rumination is not possible). This would make females heightened depression levels a by-product of their greater affinity for bonding trough co-rumination. One reason why females are more depressed than men could be that they have evolved psychological mechanisms that motivate them to bond with peers' trough co-rumination. When they use those psychological mechanisms in situations where co-rumination is not possible they increase the risk that they engage in brooding which again increases the risk for depression.

Male Options Rumination Hypothesis and repetitive thinking in the competition context

Women score higher on measures of repetitive thinking after a negative event in most social contexts. As predicted by the Male Options Rumination hypothesis this pattern reverses in the competition context. In this context men score higher than women on all measures of repetitive thinking but it only reaches significance for action rumination. A floor effect could explain why a potential sex difference in rumination would disappear in the social context that had the lowest scores in rumination, but it could not explain a reversal of the direction of the effect (Groth-Marnat, 2009). As a group males report more rumination when they are asked to remember how they reacted to a loss in sports or games. This finding confirms hypothesis 6 that the direction of the sex difference in repetitive thinking is dependent on social context, giving support to the notion that action rumination might result from an evolved psychological mechanism that is sensitive to contexts relevant for ancestral fitness (Tooby & Cosmides, 1995).

Why does the change in direction of the sex difference happen in the competition situation and not in other social contexts, like hypothesis 7 proclaims? We think participants answering questions about rumination after thinking about a negative event in this context had a higher chance of activating psychological mechanisms relevant for intra sexual competition.

Contexts that signal these problems should activate the male psychology in a lager degree than it would activate the female psychology. The idea is that males over evolutionary time would have had more to gain by solving adaptive problems associated with intra-sexual competition, hierarchy and status (Buss & Schmitt, 1993; Cummins, 2005; Schmitt, 2015). The potential reproductive success of males and females are quite different. The amount of offspring a female can have in her lifetime is greatly diminished by the fact that the minimum investment for a human female is nine months of pregnancy and possible several years of lactation. The ceiling for how many offspring a male can get into the next generation is much higher because it is not limited by these necessities. The rate limiting step for how many grandchildren a male can have is not how long each pregnancy lasts, but how many women a man can get pregnant. Males thus have an evolutionary niche in evolving strategies to securing access to as many fertile females as possible. This means that the reproductive success of males are more variable that that of females (Trivers, 1972). This is where status differences matters. In general males with higher status tend to have access to more females than males with low status (Betzig, 1993; Cummins, 2005). Sports and games are social situations that have exactly the attributes one would expect to trigger psychological mechanisms relevant for a dominance struggle. It is easy to evaluate who is the winner and who is the loser. There is prestige associated with being the winner and the winner is often celebrated or at least announced.

The Male Options Rumination hypothesis claims that when males experience losses in social contexts that signal competitive struggles they activate rumination to a greater extent than females. This activation is a result of trying to problem solve behaviourally unsolvable problems (Kleppestø et al., In prep). That it was only action rumination that reached a significant sex difference in the male direction is telling since this type of rumination is on the solving side of the continuum from searching to solving described above. After a loss in a competitive context it is often easier to evaluate what went wrong and what should have been done differently to achieve a better result. In addition to being the most common type of repetitive thinking, action rumination has a context sensitivity that is dependent on biological sex. This type of context specificity is another trait associated with evolved adaptions (Tooby & Cosmides, 1995). Furthermore, this also might make men *more vulnerable* to depression in contexts where competitive behaviour is unlikely to lead to success, such as countries with higher mate-competition (e.g. polygyny) and higher rates of violent competition between males (Kleppestø et al., In prep; Kruger & Nesse, 2006).

That action rumination is proportionally more activated among males than females after a loss in a competitive situation does not rule out that other unconscious defeat-strategies being proposed by Rank Theory also are present among those who lose in competitive struggles. Rank Theory does however predict specificity in the types of events that would trigger the psychological mechanisms related to yielding behaviour. According to rank theory there should be more unconscious defeat-strategies and yielding behaviour after a loss in a dominance struggle than after other events. The finding that all types of repetitive thinking are less common after a loss in the competitive context contradicts this prediction (Sloman & Gilbert, 2000; Sloman & Price, 1987).

Relations between repetitive thinking and depression

Hierarchical regression analysis revealed that brooding was the type of repetitive thinking that best predicted symptoms of depression. This is a confirmation of hypothesis 3 and it is consistent with previous findings about the connection between repetitive thinking and depression (Nolen-Hoeksema et al., 2008; Papageorgiou & Wells, 2004; Treynor et al., 2003). All measures of repetitive thinking correlated positively with depression scores but regression analysis revealed that this relationship was mediated by the correlation they shared with brooding. It is particularly interesting that the relationship between depression and action rumination was found to disappear when controlled for brooding. People who respond to a negative event with action rumination have an increased chance of responding to the negative event with brooding, and the degree to which they do respond with brooding predicts depression. One way to interpret this is that action rumination is a species typical trait and that having the capacity for action rumination also makes humans vulnerable to using other less typical ways of repetitive thinking, like brooding. Depression could be the by-product of these other less used ways of repetitive thinking (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993; Treynor et al., 2003; Wells, 2011).

This study did replicate the associations between sex, brooding and depression that studies inspired by Response Styles theory previously have found. Females score higher on symptoms of depression and this is mediated by females´ higher scores on brooding, confirming hypothesis 1,2 and 3 (Nolen-Hoeksema, 1987, 1991; Nolen-Hoeksema & Morrow, 1991, 1993; Nolen-Hoeksema et al., 1993; Nolen-Hoeksema et al., 2008). These types of findings have led to explanations about why females are such "high ruminators" or "brooders" (Nolen-Hoeksema, 2003). The findings from this study give an important caveat to this general picture. This study does not find any differences between the sexes in brooding

after a negative event in the competition context. The trend is that men brood more than women in this context but the difference is not significant. For action rumination they do react significantly more than females after a loss in a competitive situation confirming hypothesis 6, that the sex difference in repetitive thinking is dependent on context, and 7, that males think more repetitively after a loss in a competitive situation. When the social context is taken into consideration the question changes from why females are such "high ruminators" to "when do females ruminate more than males". Since females' do not brood more than males the repetitive thinking after a loss in sports or games can't explain the sex difference in depression.

Positive beliefs about rumination did predict depression scores and the effect on depressive symptoms was mediated partially by brooding. This is a confirmation of hypotheses 12 and 13 and gives support to the meta-cognitive treatment model (Wells, 2011). If the meta-assumptions about rumination predict depression both directly and indirectly via brooding it makes sense that it is possible to reduce the symptoms of depression by challenging the belief that it is a good idea to brood. There was no sex difference in positive beliefs about rumination, disconfirming hypothesis 11. This is a failure to replicate the finding of Watkins and Moulds (2005) who found that positive beliefs about rumination mediated the effect of gender on depression in a clinical sample. It is however possible that this sex difference is specific to clinical populations.

The difference between action rumination and brooding gives a useful perspective on the apparent incompatibility of the Analytical Rumination Hypothesis and Metacognitive Therapy treatments results. It is possible that metacognitive therapy primarily works by reducing brooding, even if it means that it also reduces other forms of repetitive thinking like action rumination. If action rumination have beneficial consequences this would be an unwanted effect (Watkins, 2008). Metacognitive therapy is a part of the process-approach to cognitive-behaviour therapy, which means that clinicians do not focus on the content of thoughts, but rather the rigid and preservative manner in which depressives think (Hayes, 2004; Wells, 2011). It is not known whether action rumination actually solves problems or whether metacognitive or other treatments can differentiate this type of repetitive thinking or not (see future research). If action rumination is beneficial and brooding has maladaptive consequences treatment models could benefit from distinguishing between these types of thinking.

Future research

Action rumination is a new construct developed in this study and the operationalization of this construct needs to be developed further. Whether this type of repetitive thinking could be a better candidate for an evolved psychological mechanism than other forms of repetitive thinking is an intriguing question that needs further empirical and theoretical work. One pressing concern is to investigate if and how action rumination could help people to solve social problems. Both evolutionary theories and control theories assumes that repetitive thinking could be beneficial for the individual (Andrews & Thomson, 2009; Martin & Tesser, 1996b; Watkins, 2008). Since action rumination is a new construct these assumptions need to be tested specifically for this type of repetitive thinking. Researchers could look for thoughts that have a positive valence, are relatively concrete and have a solving rather than a searching purpose. As mentioned above the construct of action rumination could be a useful tool to investigate different therapeutic approaches to the treatment of depression. An intriguing question is whether it would affect success rates if clinicians focused on only challenging the types of repetitive thinking that is on the searching side of the continuum from searching to solving purpose, like brooding. This type of disentangling research could get us closer to answer the question "why does therapy work?" (Ryum & Halvorsen, 2014). The possibility of tackling only the maladaptive component without taking away the possible constructive aspects of repetitive thinking could be the long term benefit of such a research program.

The operationalization of the intentions to co-ruminate construct that was developed in this study did not go as planned. Further development of the intentions to co-ruminate construct is necessary before this could be used with success in figuring out the complex relations between sex, repetitive thinking and depression. The intention to get closer to the friend and the intention to communicate the problem when telling about a negative event did correlate positively (.36). This is within the level that Briggs and Cheek (1986) recommend for internal reliability and as such it can prove a useful backbone for further development of an intention to co-ruminate scale. These items probe two highly related but different reasons for asking for advice. In the light of the Female Co-rumination for Bonding hypothesis it makes sense to call the factor that these items share "intention to bond". Further research is needed to extend and improve the operationalization of the intention to bond construct.

One of the most important findings in this study was that social context influences the relationship between repetitive thinking and variables such as sex and depressive symptoms.

Further research on how social context influences how people react to negative events is needed.

Limitations

Scales created in this study

Briggs and Cheek (1986) recommended that the optimal range for inter item correlations to be between .2 and .4. For most measures the mean inter-item correlations and associated range fluctuated somewhat between situations on each measure. For the *action rumination* scale the inter-item correlations are somewhat higher than recommended. Lower scores than recommended can be interpreted to mean that the items measure things that are not related to each other which can be a big problem for the reliability of a scale. Higher scores than recommended can be interpreted to mean that the items asks about the same thing in a different way and that one or more of the items are redundant, however it can also mean that the items measure highly related but yet different things which would be the point of making a scale in the first place. The action rumination scale is a new scale made in this study and given its high inter-item correlation it is quite possible that it needs to be developed further.

One of the items in the intention to co-ruminate scale was; "*I got good advice from my friend about how I should solve the problem*". How pleased one is with the advice is not an intention to co-ruminate. Rather than an intention it could be interpreted as a reaction to the advice. A note about why this item was included in the scale is therefore necessary. Given the initial assumption that the intention to get closer to a friend and the intention to communicate the problem was negatively correlated with the intention to get advice it seems likely that a person who had an intention to bond when telling about a negative event would be disappointed with getting an advice on how to solve the problem. With that assumption disconfirmed by the data in this study this item seems like a candidate for exclusion in a future version of the intention to ruminate scale.

Another problem is related to the wording of the last two items. Both the intention to get closer item and the intention to communicate the problem item was framed so that it was in opposition to the intention to get advice. The wording should be changed so that the items do not indicate an either/or relationship. It is a notable fact that students answering these questions did not "give in" to the assumption implicit in the wording of the items. As a group

they tell about a negative event both "to get advice" and "not to get advice, but to get closer to the person".

A positive correlation between intention to get closer and intention to communicate problem was in line with our expectations. That there was no negative correlation between those two variables and intention to get advice or how pleased one was with the advice did not support the either/or assumption that the intention to co-ruminate scale was founded on. It seems that it is not an either/or situation when asking people about their intentions for telling a friend about a negative event. People can at the same time tell about a problem because they want advice on how to solve it and because they want to communicate the problem and get closer to the person they tell it to. Although females are more interested in sharing their problems with a friend to bond it does not follow that females are less interested in advice about the problems they share because wanting to bond and wanting to get advice is uncorrelated. In fact, when compared with males, females are *more* not less interested in advice. This is a disconfirmation of hypothesis 9 that females are less interested in advice when they share problems with a friend

Generalizability

Because the participants in this study mainly were students in the late teens and early twenties, the generalizability of the findings in this study to other demographics is limited. This study has a correlational design which does not allow interpretation about causality. The various associations in the data should be considered in relation to the literature and prevailing theories on repetitive thinking and depression. One caveat is important in this regard. Because the main aim of the study was to investigate repetitive thinking in connection with social context, the instructions to the Ruminative Response Scale have been altered. This makes it more difficult to compare the findings in this study with the findings that have been found in the unaltered version of the same scale. Although the comparability of this study with the literature on repetitive thinking suffers from the design that is used it is possible to compare the findings from this study with the expected predictions of the relevant theories in the field. Also, the cross sectional design of this study makes it difficult to draw conclusions about how the relation between the independent variables and depression develops over time.

Conclusion

This paper replicates earlier findings that repetitive thinking in the form of brooding is an important predictor of depression and that females ruminate more than males (e.g. Hyde et al., 2008; Nolen-Hoeksema, 1987). Females' use of brooding did mediate the sex difference in depression. Little is known about why females brood more than males (Nolen-Hoeksema, 2003). The study shows that Intention to bond when sharing a problem with a friend partially mediates the sex difference in brooding. This finding supports the Female Co-rumination for Bonding hypothesis that claims that females are susceptible to brooding because of their greater affinity for co-rumination. Social context did however affect both the amount of repetitive thinking people have after a negative event and the direction of the sex difference in repetitive thinking. This context sensitivity suggests domain specificity in which types of situations that trigger repetitive thinking.

A framework of three dimensions was suggested for the analysis and future research of repetitive thinking. These dimensions were negative versus positive valence, abstractness versus concreteness and searching versus solving purpose. Repetitive thinking is more associated with depression when it has a more negative valence, is more abstract and has a searching instead of a solving purpose (i.e. brooding). Action rumination was operationalized for the first time as a questionnaire measure in this study (Mikulincer, 1996). It represents the polar opposite of brooding when evaluated in terms of the three dimensions and it turned out to be the most common way of responding to a negative social event. This finding challenges Analytic Rumination theory (Andrews & Thomson, 2009) that suggest that depressive rumination in the form of brooding and pondering is part of a species typical adaptation to solve social problems.

Researchers interested in repetitive thinking and depressive symptoms should consider the effect of the social context when they ask people about their inner thoughts. This perspective brings valuable information about the relationship between rumination, sex and depression that is neglected in the current approach to these phenomena. Also, it is important to distinguish between the types of repetitive thinking that is probed because these have different relations to depression, sex and social context. Action rumination could prove to be a better measure of a species typical adaptation than constructs like brooding and pondering. Future theories about the evolutionary function or non-function of depression could benefit from an

increased understanding about how non-depressed people use repetitive thinking in response to negative events.

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Appendix A - Translation of items from the ruminative response scale

Original text in the ruminative response scale is written inn black, Norwegian translation in red and reverse translation in blue. Only one item need to be altered after the first round of translation and reverse translation. Item 13, "think about a recent situation, wishing it had gone better" where first translated into Norwegian so that the reverse translation became "Though about a previous situation and wished that it had gone better". Since "recent" and "previous" does not constitute the same meaning it was changed so that the translation and reverse translation became "Tenkte på en nylig situasjon og ønsket at det hadde gått bedre" and "Though about a recent situation and wished that it had gone better" respectively.

11 go away by yourself and think about why you feel this way

Gikk for deg selv og tenkte på hvorfor du følte som du gjorde

Seeked solitude and thought about why you felt as you did

12 write down what you are thinking about and analyze it

Skrev ned hva du tenkte på og analyserte det

Wrote down what you were thinking and analyzed it

21 go someplace alone to think about your feelings

Gikk for deg selv og tenkte på følelsene dine

Seeked solitude and thought about my feelings

5 think "What am I doing to deserve this?"

Tenkte "Hva har jeg gjort for å fortjene dette?"

Thought «what have I done to deserve this?»

10 think "Why do I always react this way?"

Tenkte "Hvorfor reagerer jeg alltid på denne måten?"

Though «Why do I always react in this manner/way/like this?"

13 think about a recent situation, wishing it had gone better

Tenkte på en tidligere situasjon og ønsket at det hadde gått bedre

Though about a previous situation and wished that it had gone better

15 think "Why do I have problems other people don't have?"

Tenkte "hvorfor har jeg problemer som andre folk ikke har?"

Thought «Why do I have problems other people do not have?"

16 think "Why can't I handle things better?"

Tenkte "Hvorfor kan jeg ikke takle ting bedre?"

Thought «Why can I not cope better with things?"

Appendix B – The questionnaire

The next four pages contain the questionnaire that was used and developed in this graduate thesis. Part A contains questions about the age and sex of the respondent. Part B contains items from the Ruminative Response Scale, Action rumination scale and Co-rumination Scale. Part C contains items from Becks Depression Inventory. Part D contains items from the Positive Beliefs About Rumination Scale.

Appendix B – The questionnaire

REPETERENDE TANKER ETTER NEGATIVE HENDELSER

Folk tenker og gjør mange forskjellige ting når de havner i situasjoner som ikke gikk slik de skulle ønsket seg. Nedenfor kommer noen forslag til måter å reagere på i ulike situasjoner. Formålet med denne undersøkelsen er å se om det er en sammenheng mellom hvilke måter folk reagerer på i situasjoner som ikke gikk slik de skulle ønsket seg og følelsesmessige reaksjoner.

Det er frivillig å delta i undersøkelsen, og alle som svarer er anonyme. Det skal ikke skrives navn eller annen personidentifiserende informasjon på skjemaet. Du samtykker i å delta ved å svare på spørsmålene og levere inn skjemaet.

Takk for at du er villig til å delta!

Simen Mjøen Larsen, psykologstudent

Leif Edward Ottesen Kennair, professor, veileder

◉ NTNU
Kunnskap for en bedre verden
Psykologisk institutt

LES DETTE FØR DU STARTER!	Skjemaet skal leses maskinelt. Følg derfor disse reglene:
	• *Bruk svart/blå kulepenn. Skriv tydelig, og ikke utenfor feltene.* **Kryss av slik:** ☒.
	• *Feilplasserte kryss kan strykes ved å fylle hele feltet med farge.*
	• *Sett bare ett kryss på hvert spørsmål om ikke annet er oppgitt.*

A. BAKGRUNNSINFORMASJON

1. Kjønn: Kvinne... ☐₁ Mann..... ☐₂   2. Alder (antall år): ☐

B. SITUASJONER MED NEGATIVT UTFALL

Tenk på de siste gangene du var i en sosial situasjon i familien der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
1. Tenkte «Hva har jeg gjort for å fortjene dette?»	☐	☐	☐	☐
2. Tenkte «Hvorfor reagerer jeg alltid på denne måten?»	☐	☐	☐	☐
3. Gikk for deg selv og tenkte på hvorfor du følte som du gjorde	☐	☐	☐	☐
4. Skrev ned hva du tenkte på og analyserte det	☐	☐	☐	☐
5. Tenkte på en nylig situasjon og ønsket at det hadde gått bedre	☐	☐	☐	☐
6. Tenkte «Hvorfor har jeg problemer som andre folk ikke har?»	☐	☐	☐	☐
7. Tenkte «Hvorfor kan jeg ikke takle ting bedre?»	☐	☐	☐	☐
8. Gikk for deg selv og tenkte på følelsene dine	☐	☐	☐	☐
9. Tenkte på hva jeg kunne ha sagt annerledes for å få et bedre resultat	☐	☐	☐	☐
10. Tenkte på hva jeg skal si neste gang jeg havner i en lignende situasjon	☐	☐	☐	☐
11. Gikk igjennom hendelsen mentalt for å finne noe jeg kunne forbedre ved min egen atferd	☐	☐	☐	☐
12. Jeg tenkte mange ganger på hva jeg skal gjøre for å løse problemet hvis det skjer igjen	☐	☐	☐	☐

Tenk på de siste gangene du fortalte en venn om en sosial situasjon i familien der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
13. Jeg fortalte om problemet fordi jeg ønsket å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
14. Jeg fikk gode råd fra min venn om hvordan jeg skulle løse problemet	☐	☐	☐	☐
15. Jeg var mer opptatt av å formidle problemet enn å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
16. Jeg fortalte ikke om problemet fordi jeg ønsket råd, men fordi jeg ønsket å komme nærmere vennen min	☐	☐	☐	☐

Tenk på de siste gangene du tapte i en konkurranse som handlet om idrett, sport eller spill. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
17. Tenkte «Hva har jeg gjort for å fortjene dette?»	☐	☐	☐	☐
18. Tenkte «Hvorfor reagerer jeg alltid på denne måten?»	☐	☐	☐	☐
19. Gikk for deg selv og tenkte på hvorfor du følte som du gjorde	☐	☐	☐	☐
20. Skrev ned hva du tenkte på og analyserte det	☐	☐	☐	☐
21. Tenkte på en nylig situasjon og ønsket at det hadde gått bedre	☐	☐	☐	☐

Før du fortsetter: Kontroller at du ikke har glemt noe på denne sida.

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
22. Tenkte «Hvorfor har jeg problemer som andre folk ikke har?»	☐	☐	☐	☐
23. Tenkte «Hvorfor kan jeg ikke takle ting bedre?»	☐	☐	☐	☐
24. Gikk for deg selv og tenkte på følelsene dine	☐	☐	☐	☐
25. Tenkte på hva jeg kunne ha sagt annerledes for å få et bedre resultat	☐	☐	☐	☐
26. Tenkte på hva jeg skal si neste gang jeg havner i en lignende situasjon	☐	☐	☐	☐
27. Gikk igjennom hendelsen mentalt for å finne noe jeg kunne forbedre ved min egen atferd	☐	☐	☐	☐
28. Jeg tenkte mange ganger på hva jeg skal gjøre for å løse problemet hvis det skjer igjen	☐	☐	☐	☐

Tenk på de siste gangene du fortalte en venn at du tapte i en konkurranse som handlet om idrett, sport eller spill. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
29. Jeg fortalte om problemet fordi jeg ønsket å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
30. Jeg fikk gode råd fra min venn om hvordan jeg skulle løse problemet	☐	☐	☐	☐
31. Jeg var mer opptatt av å formidle problemet enn å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
32. Jeg fortalte ikke om problemet fordi jeg ønsket råd, men fordi jeg ønsket å komme nærmere vennen min	☐	☐	☐	☐

Tenk på de siste gangene du forsøkte å sjekke opp en person, eller var på date, men du ble avvist. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
33. Tenkte «Hva har jeg gjort for å fortjene dette?»	☐	☐	☐	☐
34. Tenkte «Hvorfor reagerer jeg alltid på denne måten?»	☐	☐	☐	☐
35. Gikk for deg selv og tenkte på hvorfor du følte som du gjorde	☐	☐	☐	☐
36. Skrev ned hva du tenkte på og analyserte det	☐	☐	☐	☐
37. Tenkte på en nylig situasjon og ønsket at det hadde gått bedre	☐	☐	☐	☐
38. Tenkte «Hvorfor har jeg problemer som andre folk ikke har?»	☐	☐	☐	☐
39. Tenkte «Hvorfor kan jeg ikke takle ting bedre?»	☐	☐	☐	☐
40. Gikk for deg selv og tenkte på følelsene dine	☐	☐	☐	☐
41. Tenkte på hva jeg kunne ha sagt annerledes for å få et bedre resultat	☐	☐	☐	☐
42. Tenkte på hva jeg skal si neste gang jeg havner i en lignende situasjon	☐	☐	☐	☐
43. Gikk igjennom hendelsen mentalt for å finne noe jeg kunne forbedre ved min egen atferd	☐	☐	☐	☐
44. Jeg tenkte mange ganger på hva jeg skal gjøre for å løse problemet hvis det skjer igjen	☐	☐	☐	☐

Tenk på de siste gangene du fortalte en venn at du prøvde å sjekke opp en person, eller var på date, men ble avvist. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
45. Jeg fortalte om problemet fordi jeg ønsket å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
46. Jeg fikk gode råd fra min venn om hvordan jeg skulle løse problemet	☐	☐	☐	☐
47. Jeg var mer opptatt av å formidle problemet enn å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
48. Jeg fortalte ikke om problemet fordi jeg ønsket råd, men fordi jeg ønsket å komme nærmere vennen min	☐	☐	☐	☐

Tenk på de siste situasjonene du har hatt med partneren din der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
49. Tenkte «Hva har jeg gjort for å fortjene dette?»	☐	☐	☐	☐
50. Tenkte «Hvorfor reagerer jeg alltid på denne måten?»	☐	☐	☐	☐
51. Gikk for deg selv og tenkte på hvorfor du følte som du gjorde	☐	☐	☐	☐
52. Skrev ned hva du tenkte på og analyserte det	☐	☐	☐	☐
53. Tenkte på en nylig situasjon og ønsket at det hadde gått bedre	☐	☐	☐	☐
54. Tenkte «Hvorfor har jeg problemer som andre folk ikke har?»	☐	☐	☐	☐
55. Tenkte «Hvorfor kan jeg ikke takle ting bedre?»	☐	☐	☐	☐
56. Gikk for deg selv og tenkte på følelsene dine	☐	☐	☐	☐
57. Tenkte på hva jeg kunne ha sagt annerledes for å få et bedre resultat	☐	☐	☐	☐

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
58. Tenkte på hva jeg skal si neste gang jeg havner i en lignende situasjon	☐	☐	☐	☐
59. Gikk igjennom hendelsen mentalt for å finne noe jeg kunne forbedre ved min egen atferd	☐	☐	☐	☐
60. Jeg tenkte mange ganger på hva jeg skal gjøre for å løse problemet hvis det skjer igjen	☐	☐	☐	☐

Tenk på de siste gangene du fortalte en venn om en situasjon med partneren din der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
61. Jeg fortalte om problemet fordi jeg ønsket å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
62. Jeg fikk gode råd fra min venn om hvordan jeg skulle løse problemet	☐	☐	☐	☐
63. Jeg var mer opptatt av å formidle problemet enn å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
64. Jeg fortalte ikke om problemet fordi jeg ønsket råd, men fordi jeg ønsket å komme nærmere vennen min	☐	☐	☐	☐

Hvis du har jobberfaring, vennligst besvar også de følgende spørsmålene. Hvis du ikke har jobberfaring, hopp til del C («Beck's Inventory - D»). Tenk på de siste gangene du var i en sosial situasjon på jobben der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?
Ett kryss på hver linje.

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
65. Tenkte «Hva har jeg gjort for å fortjene dette?»	☐	☐	☐	☐
66. Tenkte «Hvorfor reagerer jeg alltid på denne måten?»	☐	☐	☐	☐
67. Gikk for deg selv og tenkte på hvorfor du følte som du gjorde	☐	☐	☐	☐
68. Skrev ned hva du tenkte på og analyserte det	☐	☐	☐	☐
69. Tenkte på en nylig situasjon og ønsket at det hadde gått bedre	☐	☐	☐	☐
70. Tenkte «Hvorfor har jeg problemer som andre folk ikke har?»	☐	☐	☐	☐
71. Tenkte «Hvorfor kan jeg ikke takle ting bedre?»	☐	☐	☐	☐
72. Gikk for deg selv og tenkte på følelsene dine	☐	☐	☐	☐
73. Tenkte på hva jeg kunne ha sagt annerledes for å få et bedre resultat	☐	☐	☐	☐
74. Tenkte på hva jeg skal si neste gang jeg havner i en lignende situasjon	☐	☐	☐	☐
75. Gikk igjennom hendelsen mentalt for å finne noe jeg kunne forbedre ved min egen atferd	☐	☐	☐	☐
76. Jeg tenkte mange ganger på hva jeg skal gjøre for å løse problemet hvis det skjer igjen	☐	☐	☐	☐

Tenk på de siste gangene du fortalte en venn om en sosial situasjon på jobben der resultatet ikke ble slik du ville. Hvor enig er du i at du gjorde følgende?

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
77. Jeg fortalte om problemet fordi jeg ønsket å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
78. Jeg fikk gode råd fra min venn om hvordan jeg skulle løse problemet	☐	☐	☐	☐
79. Jeg var mer opptatt av å formidle problemet enn å få råd om hvordan jeg skulle løse det	☐	☐	☐	☐
80. Jeg fortalte ikke om problemet fordi jeg ønsket råd, men fordi jeg ønsket å komme nærmere denne personen	☐	☐	☐	☐

C. BECK'S INVENTORY - D

I denne delen av spørreskjemaet vil du finne setninger inndelt i grupper. Vennligst les alle setningene i hver gruppe nøye. Deretter velger du den setningen i hver gruppe som best beskriver hvordan du har følt deg *den siste uka, i dag inkludert*. Kryss så av for setningen du har valgt. Dersom flere setninger innenfor samme gruppe synes å passe like godt, krysser du av for hver av dem.

Husk å lese alle setningene innenfor en gruppe før du velger. Vennligst svar for alle gruppene.

1. ₀ Jeg føler meg ikke trist ☐
   ₁ Jeg er lei meg eller føler meg trist ☐
   ₂ Jeg er lei meg eller trist hele tiden og klarer ikke å komme ut av denne tilstand ☐
   ₃ Jeg er så trist eller ulykkelig at jeg ikke holder det ut ☐

2. ₀ Jeg er ikke særlig pessimistisk eller motløs overfor fremtiden ☐
   ₁ Jeg føler meg motløs overfor fremtiden ☐
   ₂ Jeg føler at jeg ikke har noe å se fram til ☐
   ₃ Jeg føler at fremtiden er håpløs og at forholdene ikke kan bedre seg ☐

Før du fortsetter: Kontroller at du ikke har glemt noe på denne sida.

3. 0 Jeg føler meg ikke som et mislykket menneske .... ☐
    1 Jeg føler at jeg har mislykkes mer enn andre mennesker .... ☐
    2 Når jeg ser tilbake på livet mitt, ser jeg ikke annet enn mislykkethet .... ☐
    3 Jeg føler at jeg har mislykkes fullstendig som menneske .... ☐

4. 0 Jeg får like mye tilfredsstillelse ut av ting som før.. ☐
    1 Jeg nyter ikke ting på samme måte som før .... ☐
    2 Jeg får ikke ordentlig tilfredsstillelse av noe lenger... ☐
    3 Jeg er misfornøyd eller kjeder meg med alt .... ☐

5. 0 Jeg føler meg ikke særlig skyldbetynget .... ☐
    1 Jeg føler meg skyldbetynget en god del av tiden... ☐
    2 Jeg føler meg temmelig skyldbetynget meste-parten av tiden .... ☐
    3 Jeg føler meg skyldbetynget hele tiden .... ☐

6. 0 Jeg har ikke følelsen av å bli straffet .... ☐
    1 Jeg føler at jeg kan bli straffet .... ☐
    2 Jeg forventer å bli straffet .... ☐
    3 Jeg føler at jeg blir straffet .... ☐

7. 0 Jeg føler meg ikke skuffet over meg selv .... ☐
    1 Jeg er skuffet over meg selv .... ☐
    2 Jeg avskyr meg selv .... ☐
    3 Jeg hater meg selv .... ☐

8. 0 Jeg føler ikke at jeg er noe dårligere enn andre .... ☐
    1 Jeg kritiserer meg selv for mine svakheter eller feilgrep .... ☐
    2 Jeg bebreider meg selv hele tiden for mine feil eller mangler .... ☐
    3 Jeg gir meg selv skylden for alt galt som skjer ...... ☐

9. 0 Jeg er ikke mer irritert nå enn ellers .... ☐
    1 Jeg blir lettere ergerlig eller irritert enn før .... ☐
    2 Jeg føler meg irritert hele tiden nå .... ☐
    3 Jeg blir ikke irritert i det hele tatt over ting som pleide å irritere meg .... ☐

10. 0 Jeg har ikke mistet interessen for andre mennesker. ☐
    1 Jeg er mindre interessert i andre mennesker enn jeg pleide å være .... ☐
    2 Jeg har mistet det meste av min interesse for andre mennesker .... ☐
    3 Jeg har mistet all interesse for andre mennesker.. ☐

11. 0 Jeg tar avgjørelser omtrent like lett som jeg alltid har gjort .... ☐
    1 Jeg forsøker å utsette det å ta avgjørelser mer enn tidligere .... ☐
    2 Jeg har større vanskeligheter meg å ta avgjørelser enn før .... ☐
    3 Jeg klarer ikke å ta avgjørelser i det hele tatt lenger . ☐

12. 0 Jeg føler ikke at jeg ser dårligere ut enn jeg pleide å gjøre .... ☐
    1 Jeg er bekymret for at jeg ser gammel eller lite tiltrekkende ut .... ☐
    2 Jeg føler at det er varige forandringer i mitt utse-ende som får meg til å se lite tiltrekkende ut .... ☐
    3 Jeg tror jeg ser stygg ut .... ☐

13. 0 Jeg er ikke mer bekymret for helsen min enn vanlig . ☐
    1 Jeg er bekymret over fysiske plager som verking og smerter, eller urolig mage, eller forstoppelse ... ☐
    2 Jeg er meget bekymret over mine fysiske plager og det er vanskelig å tenke på stort annet .... ☐
    3 Jeg er så bekymret over mine fysiske plager at jeg ikke klarer å tenke på noe annet .... ☐

D. ANTAGELSER OM GRUBLING

De fleste opplever depressive tanker av og til. Når depressiv tenkning vedvarer og er repetitiv, kalles det grubling. Dette spørreskjemaet handler om antagelser folk har om grubling. Her er en liste med noen slike antagelser. Vennligst les hver antagelse nøye, og kryss av for hvor mye du vanligvis er enig med hver enkelt. Vennligst besvar alle utsagnene.

	Ikke enig 1	Litt enig 2	Ganske enig 3	Helt enig 4
1. Jeg trenger å gruble på de fæle tingene som har skjedd i fortiden for å forstå dem	☐	☐	☐	☐
2. Grubling på mine problemer hjelper meg til å fokusere på de viktigste tingene	☐	☐	☐	☐
3. Grubling på fortiden hjelper meg å forhindre fremtidige mistak og feil	☐	☐	☐	☐
4. Grubling på fortiden hjelper meg å finne ut av hvordan ting kunne ha blitt gjort bedre	☐	☐	☐	☐

Takk for at du ville svare på spørsmålene!