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## **Worry and rumination : underlying processes and transdiagnostic characteristics**

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# *Chapter 1*

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**General introduction**



## General Introduction

With evolution of our species and the subsequent development of the human brain came our ability to think, to reflect and reason. It is an ability from which mankind has hugely profited and which has placed us at the top of the food chain, however, in its extreme forms it has proven to be counterproductive, hold us back and make us ill. Although from a psychiatric perspective cognitions were long viewed as a side product of psychopathology this all changed with the introduction of cognitive theory in the 1960's (Beck, 1967). Cognitions suddenly became the focal point in explaining psychological dysfunction. This paradigm shift put cognitive content and its associated processes at the forefront. Two cognitive processes that have received a lot of attention are worry and rumination. Worry is typically defined as a chain of thoughts and images, negatively affect-laden and relatively uncontrollable. It is considered to be an attempt to engage in mental problem-solving on issues of which the outcome is uncertain but contains the possibility of one or more negative outcomes (Borkovec, Robinson, Pruzinsky, & DePree, 1983, p. 10). Worry is the cardinal feature of generalized anxiety disorder (GAD) and has mainly been studied in this context. One of the main differences with rumination is that worry is considered to be future oriented and rumination past oriented. Rumination can be defined as an attempt to analyse the causes and consequences of negative events, problems and moods (Watkins & Baracaia, 2001) and is typically linked to depression. In contrast to depression, GAD was long a relatively understudied disorder (Dugas, 2000; Dugas, Anderson, Deschenes, & Donegan, 2010) and consequently, not much attention was initially paid to the process of worry. In the last couple of decades worry has been placed in a different perspective and together with rumination it is now at the centre of an ongoing debate on whether these processes are possibly the driving force across many psychological disorders, emotional disorders in particular. Besides the question surrounding the transdiagnostic nature of worry and rumination it is also debated whether worry and rumination are in fact conceptualizations of the same underlying cognitive process (e.g. Ehring & Watkins, 2008). At first glance there seem to be many similarities between the two concepts and they are often referred to by the overarching term repetitive negative thinking (RNT) which has been defined as "repetitive thinking about one or more negative topics that is experienced as difficult to control" (Ehring & Watkins, 2008, p.193). Whether there is more to this than meets the eye is currently debated. The main aim of this thesis is to clarify some of the pending issues surrounding the transdiagnostic nature of worry and rumination as well as whether they share the same underlying processes and functions.

## Worry and rumination compared

If worry and rumination are indeed conceptualizations of the same underlying transdiagnostic process then they are expected to meet two sets of criteria: those for a transdiagnostic process and those for establishing a shared underlying process.

A truly **transdiagnostic process** should meet several criteria: 1) to be present *across* multiple disorders but not due to comorbidity with one specific disorder; 2) exhibit similar process characteristics *across* these disorders; and 3) contribute to the onset, maintenance and/or recurrence of psychopathology across disorders.

Even if worry and rumination are indeed established to be transdiagnostic processes this does not necessarily mean that they share *the same* underlying process. In case of a **shared underlying process** between worry and rumination, it is to be expected that they 1) are present in the *same* disorders, 2) have the *same* causal status regarding these (emotional) disorders, 3) share the *same* process characteristics and 4) are highly interrelated.

Over the past few decades important steps have been made in unravelling these issues and many have at least in part been successfully addressed. A few of the main developments as well as the pending issues are briefly discussed here.

### **Worry and rumination as transdiagnostic processes**

Worry levels have been found to be higher among patients diagnosed with GAD compared to all other anxiety disorders (Brown, Antony, & Barlow, 1992) and levels of rumination have been reported to be higher among patients suffering from depression than those suffering from anxiety disorders (for an overview of the literature see Olatunji, Naragon-Gainey, & Wolitzky-Taylor, 2013). These findings seem to advocate a disorder specific approach. However, the well documented differences in temporal orientation between worry and rumination (worry-future; rumination-past) are probably at least in part responsible for the observed differences in levels of worry and rumination between anxiety and depressive disorders. Moreover, when comparing worry and rumination levels found in clinical populations to those in healthy controls, heightened levels are found across nearly all axis-I disorders (see Ehling & Watkins, 2008 for an overview). This observation has led to the proposition that worry and rumination are transdiagnostic processes (Harvey et al., 2004). Still, it has to be noted that a vast majority of the studies on worry and rumination have been conducted in MDD and GAD leaving other axis-I disorders relatively understudied. Also, most studies focussed on individual disorders while disregarding comorbidity which is well known to be the rule rather than the exception and which may pose an important confound. That being said, if worry and rumination are indeed transdiagnostic processes then it is to be expected that they are also in part responsible for the occurrence of comorbidity.

### **Similarities at process level**

The assumption that worry and rumination share the same process is largely based on studies showing substantial correlations between the two constructs (e.g. Segerstrom et al., 2000,  $r=.32$  to  $r=.46$ ; Muris et al., 2004,  $r=.55$ ; Watkins, 2004,  $r=.51$ ; Hong, 2007,  $r=.42$ ). The mere fact that these processes seem to co-occur is however not sufficient to conclude that they are the same. If they truly are reflections of one shared underlying process then it is to be expected that they also show the same process characteristics and operate via the

same mechanisms. A few aspects have received specific attention in this regard among which the format in which worry and rumination present themselves and the processing style they represent. To date evidence suggests that both worry and rumination contain more verbal thoughts than imagery (e.g. Borkovec & Inz, 1990; Fresco et al., 2002) and that they are characterized by a more abstract style of processing (i.e. cross-situational, indistinct and unclear) as opposed to a concrete processing style which is situationally specific, unequivocal and clear (Stöber & Borkovec, 2002; Watkins & Moulds, 2005). These are promising avenues which are being explored, and will be discussed in more detail in the next section of this introduction.

### **Causal status**

Worry and rumination are generally referred to as trait variables, stable over time, and are proposed to constitute vulnerability factors for emotional disorders. Longitudinal prospective studies concerning rumination have shown that rumination predicts the occurrence of both anxiety and depressive symptoms over time, including new onset of depressive disorders (Nolen-Hoeksema, 2000). Likewise, worry has been found to be a vulnerability factor predicting increments of anxiety and depressive symptoms over time (Hong, 2007). The role of worry and rumination is further confirmed by an extensive review of the literature on repetitive (negative) thinking (RNT) revealing that RNT is a vulnerability factor for both anxiety and depressive disorders (Watkins, 2008). In sum, evidence on the causal status of worry and rumination is accumulating. So far both cognitive constructs seem to be involved in very similar ways which is a prerequisite for identical processes.

### **Unresolved issues**

As already mentioned, the worry-rumination debate would benefit from studies examining the transdiagnostic nature of these cognitive processes across axis-I disorders (not solely in GAD and MDD), and also by taking comorbidity into account. At the moment this is often not the case, limiting the interpretation of the findings. Moreover, there are only few studies that examine whether worry and rumination contribute to the occurrence of comorbidity which would be expected from a transdiagnostic process. In line with this they would be expected to mediate the prospective relationship between anxiety and depressive disorders and vice versa. McLaughlin and Nolen-Hoeksema (2011) found some support for these predictions however they focussed on symptoms, not disorders, and only examined rumination.

Regarding the causal status of both cognitive constructs existing studies have certain limitations. Often there is no correction for severity of (sub)clinical symptoms or the presence of previous episodes (see overview Watkins, 2008). Also, it is unknown to what extent rumination and worry have incremental predictive validity over and above more general predictors. Hierarchical vulnerability models (Mineka, Watson, & Clark, 1998; Brown & Naragon-Gainey, 2013) distinguish different dimensions of which the higher order ones are very general and involved in all disorders whereas lower-order dimensions are more disorder specific. In existing studies it is seldom clear whether the

lower-order processes of worry and rumination add anything to well established higher order components such as personality traits (e.g., neuroticism or extraversion).

Besides the (methodological) limitations of existing studies there are also several other aspects which are in need of further exploration/clarification. First of all the assumption that worry and rumination are stable across substantial periods of time has to be addressed. Test-retest periods are usually short whereas true trait components are expected to be stable across long periods of time. Secondly, it has to be examined whether fluctuations in worry and rumination scores co-occur as would be expected if they share the same underlying process. Finally, the direction of effects between worry-rumination and emotional disorders are in need of attention. So far most studies have focused on cross-sectional or uni-directional relationships of worry and rumination with each other and with particular emotional disorders, and did not examine reciprocal effects nor the temporal character of the effects. Considering that experimental studies have repeatedly shown that experimentally induced worry or rumination directly and negatively affects anxious and depressed mood states (e.g. McLaughlin, Mennin, & Farach, 2007; McLaughlin, Borkovec, & Sibrava, 2007; Behar, Zuellig, & Borkovec, 2005) as well as the opposite effect of mood inductions leading to the activation of cognitive processes (Gemar, Segal, Sagrati, & Kennedy, 2001; Miranda, Gross, Persons, & Hahn, 1998; Miranda & Persons, 1988) it would be interesting to investigate whether such relationships are also present when studied using a longitudinal design and if so which direction of effects prevails. Furthermore elucidation on the presence of a mutually reinforcing downward spiral between repetitive negative thinking and emotional disorders would provide important insights into the mechanisms involved in psychopathology and shed light on the role of worry and rumination herein. If worry and rumination indeed constitute one shared process then it is to be expected that the results will show identical patterns for both types of repetitive negative thinking.

Finally, although evidence of similarities between worry and rumination at process level has accumulated over the last few years there are still issues which need to be addressed. In this thesis the focus will be on worry and its avoidance function. In the next section this will be discussed more in depth.

## **Worry & Avoidance**

Both worry and rumination have been proposed to serve as a type of avoidance. In a recent review Nolen-Hoeksema et al. (2008) described that worry and rumination both appear to have an avoidance component, however motivated by different goals/aims. They proposed that the unconscious motive when engaging in rumination is to avoid aversive situations and the responsibility to take action whereas the unconscious motive involved in worry is to avoid core negative affect and painful images. In this thesis the focus is solely on the processes via which *worry* serves its avoidance purpose and the negative effects it may have.



**Behavioural avoidance**

Avoidance is considered the hallmark of anxiety disorders (Barlow, 2004), a view that has consequently led to the development of therapies targeting this specific aspect. Exposure based therapies in particular are aimed at breaking the reinforcing avoidance mechanism and have since their introduction been applied across anxiety disorders. Most of these disorders are typified by clear overt behavioural avoidance which then becomes the focal point of therapy. GAD however, is characterized by a wide range of mainly internally generated feared outcomes (Borkovec, Hazzlett-Stevens, & Diaz, 1999) between which individuals suffering from GAD appear to switch frequently (Butler, 1994; Borkovec & Roemer, 1994). The absence of clear behavioural markers complicates traditional exposure based therapies which have thus far only been moderately successful in treating GAD (e.g. Gould et al., 2004). This does not necessarily mean that behavioural avoidance does not occur, it may just not be in a circumscribed domain. Roemer and Orsillo posit that attention should also be given to behavioural inaction. Worrying takes up a lot of energy and is time-consuming with GAD patients reporting to spend as much as 50% to 90% of their time engaging in worrying and feeling anxious (Sanderson & Barlow, 1990). All this mental activity does generally however not result in the accomplishment of desired goals. On the contrary; procrastination and quest for absolute certainty slows down decision making (Metzger, Miller, Cohen, Sofka, & Borkovec, 1990) and is believed to undermine successful problem solving. Thus, although worriers are mentally active their behavioural activity range seems restricted (Roemer & Orsillo, 2002).

**Cognitive avoidance**

The continued search for the avoidance component in GAD combined with the limited success of traditional exposure therapy and the inclusion of worry as the cardinal feature of GAD in the DSM-III-R (APA, 1987) has swung the focus from behavioural avoidance to that of cognitive avoidance. This new perspective is best captured in the Avoidance Theory of worry (Borkovec, Ray, & Stöber, 1998) which postulates that worry is a form of cognitive avoidance that operates via the reduction of aversive imagery with the purpose to avoid somatic anxiety reactions. Studies indeed show that worry is a predominantly verbal thought (rather than imagery-based) activity, and that the percentage of imagery is greatly reduced when engaging in worry instead of a relaxation condition (Borkovec & Inz, 1990; East & Watts, 1994; Freeston, Dugas, & Ladouceur, 1996). Moreover, individuals with GAD report less imagery than non-psychiatric controls both during worry and relaxation (Borkovec & Inz, 1990). In turn, it has been found that verbal thought activity yields significantly less cardiovascular fear responses than imagery (Vrana, Cuthbert, & Lang, 1986) leading to the hypothesis that verbal worry might be an attempt to avoid the physiological sensations that accompany aversive imagery. This process of avoidance however interferes with successful emotional processing of threat related material for which activation is deemed necessary (Foa & Kozak, 1986). The evasion of emotional experiences is in line with self-reported reasons for worrying by GAD patients (Borkovec & Roemer, 1995) and may reinforce engagement in the worry process; however, it has

long term negative consequences as it inhibits closure on worry topics consequently maintaining anxiety/worry.

A caveat in the avoidance theory is that it does not address the question of *how* worrying leads to reduced imagery. A possible explanation comes from the Reduced Concreteness theory of worry (Stöber, 1998; Stöber & Borkovec, 2002). This theory posits that the mediator between worrying and reduced imagery is reduced concrete thinking (increased abstract thinking), which is presumed to be characteristic of worry. *Concrete thinking* is defined as “distinct, situationally specific, unequivocal, clear, singular” whereas *abstract thinking* is described as “indistinct, cross-situational, equivocal, unclear, aggregated” (Stöber & Borkovec, 2002, p. 92). Paivio and Marschark (1991) found that the concreteness of words and sentences is related to the quality of imagery and that abstract thinking not only evokes less imagery but also less vivid imagery. Hence, the Reduced Concreteness theory hypothesizes that it is the relatively abstract style of thinking during worry which is responsible for reduced aversive visual imagery, which in turn contributes to the maintenance of worry. It does so not only by hindering emotional processing but also by thwarting the problem solving function of worry as abstract thinking is less likely to produce a specific conclusion and effective problem solutions.

### Unresolved issues

So far evidence supports the notion of reduced concreteness in the *problem analysis phase* in worriers (Stöber, 1996; Stöber, Tepperwien, & Staak, 2000; Stöber & Borkovec, 2002), but this has not yet been established in the next phase within the problem solving process: i.e., the *solution generation phase*. Critically, although the reduced concreteness theory predicts that reduced concreteness of thinking during worry will impair problem-solving, this prediction has not yet been directly tested. Although the theory originated in worry, to date, the only direct evidence that concreteness of thinking influences problem solving is in patients with depression (Watkins & Baracaia, 2002; Watkins & Moulds, 2005). Thus a logical next step is to examine this issue in its original context i.e. worry. If worry and rumination are indeed conceptualizations of the same underlying process as is often proposed, then it is to be expected that they establish their (negative) effects through the same mechanisms.

Besides cognitive avoidance, behavioural avoidance or better the behavioural inaction that typifies worriers is thought to slow down decision making (Metzger et al., 1990). The aspiration of obtaining complete certainty and the tendency to prepare for all possible scenarios often results in worriers postponing or abandoning decision making altogether. This situation in which they do not move forward nor backwards is likely to undermine learning due to lack of ‘learning by experience’. However, there is some evidence that contradicts this idea. Mueller et al. (2010) found that people suffering from GAD show better decision making than healthy controls as evident through their steeper learning curve on a forced decision making task. This proposed positive effect of worrying could pose a reinforcement mechanism underlying pathological worrying. However, the question remains whether worriers still show this superiority when not forced to make a decision and given the option to display their behavioural inaction and avoid making a decision.

## Aims and outline

The aim of the present thesis was twofold; (a) to compare worry and rumination in their relationship with each other and with emotional disorders; (b) to examine worry at a more functional/process level. In order to address these issues we used epidemiological data from the Netherlands Study of Depression and Anxiety (NESDA). NESDA is an ongoing longitudinal study including 2981 participants who are followed for many years. The study has several important strengths among which a large sample size, longitudinal design and the inclusion of multiple waves. The NESDA study allowed us to investigate the first main aim of this thesis (i.e., comparing worry and rumination in their relationship with each other and with emotional disorders). The NESDA study however is not designed to investigate worry and rumination at process level. To accommodate for this, additional experimental studies were conducted to examine the second main aim of this thesis (i.e., studying process and functional characteristics of worry).

The first part of the thesis focusses on the comparisons between worry and rumination using epidemiological data from the NESDA.

**Chapter 2** includes a study with a cross-sectional design examining the predictive utility of both worry and rumination. Specifically, it is investigated whether worry and rumination have incremental validity in predicting the presence of a history or current occurrence of emotional disorders over and above more general personality traits while taking comorbidity into account.

**Chapter 3** includes a study with a three-wave longitudinal design and focusses on the stability of worry, rumination and psychopathology over time as well as the reciprocal relationships among these three aspects. This is done by establishing the trait and state components of worry, rumination and psychopathology and examining the correlations between these different trait and state components across time. Specifically, the presence of a mutually reinforcing downward spiral between repetitive negative thinking and emotional disorders is examined.

**Chapter 4** presents a study using a cross-sectional and longitudinal (three wave) design, examining whether worry and rumination account for the comorbidity among emotional disorders. Specifically it is investigated whether both worry and rumination account for the cross-sectional overlap of emotional disorders at baseline and whether they mediate the prospective cross-disorder (fear → distress and distress → fear) relations among emotional disorders.

The second part of the thesis contains experimental studies which focus on worry at process level and highlight the role of avoidance in maintaining pathological worry.

**Chapter 5** includes two experimental studies that investigate whether reduced concreteness is a pivotal component in explaining the cognitive avoidance function of worry and indeed leads to poorer problem solving as is often suggested.

**Chapter 6** presents an experimental study focussing on the presence of behavioural avoidance in decision making and how this affects the maintenance of worry. The study investigates whether the positive effect that worry has previously shown to have on decision making is also present when worriers are given the opportunity to avoid making decisions.

Finally, **chapter 7** contains a summary and integration of the main findings, clinical implications, limitations and suggestions for future directions in the field.

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