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Mental Habits: Metacognitive Reflection on Negative Self-Thinking

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Abstract

Eight studies investigated negative self-thinking as a mental habit. Mental content (negative self-thoughts) was distinguished from mental process (negative self-thinking habit). Negative self-thinking habit was assessed by a metacognitive instrument measuring whether negative self-thoughts occur often, unintended, and are initiated without awareness, difficult to control, and self-descriptive (Habit Index of Negative Thinking; HINT). Controlling for negative cognitive content, negative self-thinking habit: was distinct from rumination and mindfulness; predicted explicit as well as implicit low self-esteem (IAT, name letter effect); attenuated a positivity bias in the processing of self-relevant stimuli; and predicted anxiety and depressive symptoms nine months later. The results support the assumption that metacognitive reflection on negative self-thinking as mental habit may play an important role in self-evaluative processes.

Mental Habits: Metacognitive Reflection on Negative Self-Thinking

Self-evaluations are important elements of reflexive consciousness. At times such reflections are negative. Self-critical thoughts may be useful and make up part of what may be considered as a healthy mental life. Such thoughts enable us to learn from mistakes, or select courses of action that are likely to lead to positive outcomes. However, when negative self-thinking occurs frequently, this may have adverse consequences, such as contributing to low self-esteem or depression (e.g., Haaga, Dyck, & Ernst, 1991). Whereas negative self-thinking has received a good deal of attention in the literature on depression, much less consideration has been given to negative self-thinking in nonclinical contexts. The present studies aim at gaining better understanding of how habitual negative self-thinking relates to self-esteem (both explicit and implicit), and at people's abilities to reflect in a metacognitive sense on such thinking.

Habit

Frequent and satisfactory repetition of behaviors may result in habits, which build up into the routines with which we are so familiar in everyday life. Habits have been studied extensively in the behaviorist tradition (e.g., Hull, 1943). These scholars considered habit as behavior that is established through conditioning, and defined habit strength as the frequency of past behavior. Social psychologists adopted this conception, at least if one considers the fact that 'habit' and 'past behavioral frequency' are persistently used as synonyms. However, it can be argued that although a history of repetition is part of the habit concept, repetition alone is not enough to qualify a behavior as habit. Indeed, most conceptual definitions of habit contain other elements in addition to behavioral frequency, most notably the qualification of habit as behavior that has acquired a certain degree of automaticity (e.g., Aarts & Dijksterhuis, 2000; Betsch, Haberstroh, Molter, & Glöckner, 2004; James, 1890; Triandis, 1980; Verplanken, 2006; Verplanken & Aarts, 1999; Verplanken & Orbell, 2003; Wood,

Quinn, & Kashy, 2002; Wood, Tam, & Guerrero Witt, 2005). ‘Automaticity’ may be broken down into a number of features, i.e., lack of awareness, mental efficiency, lack of control, and lack of conscious intent (the ‘four horsemen of automaticity’; Bargh, 1994). The presence or absence of each of these features yields a variety of variants of automaticity. Applying this insight to habits, habit is behavior that has a history of repetition, is characterized by a lack of awareness and conscious intent, is mentally efficient, and is sometimes difficult to control. In addition, habits may become part of a person’s self-description (see also Verplanken & Holland, 2002). Verplanken and Orbell (2003) designed and validated a metacognitive instrument to measure habit along these lines, which they labelled the Self-Report Habit Index. This index is a generic instrument, which asks respondents whether a target behavior occurs frequently, requires conscious awareness, thought and effort, is difficult to control, and is self-descriptive.

We argue that the core characteristics of our conception of habit may not only be applicable to overt behavior, but also to mental processes. When these are subject to conscious reflection, we may thus define and investigate reflections on *mental habits*. One such mental habit is the focus of the present investigations, i.e., negative self-thinking.

Negative self-thinking as mental habit

Negative self-thinking has predominantly been investigated in clinical psychology, and particularly in the domains of depression and anxiety. In his seminal model of depression, Beck (e.g., 1967) incorporated negative thinking about oneself, the world and the future as core characteristics of depression. Negative self-thinking, together with dysfunctional attitudes, an internal and global attribution style, a ruminative response style, and a range of cognitive biases in information processing, are now considered as cognitive variables associated with depression (e.g., Haaga et al., 1991), or with cognitive vulnerability to depression (e.g., Ingram, Miranda, & Segal, 1998). Negative self-thinking has been found to

be related to other distress phenomena as well, e.g., eating disorders (e.g., Vitousek, 1996), physical symptoms of illness (Aydin, 1997), perfectionism (Flett, Hewitt, Blankstein, & Gray, 1998), suicide-related responses (Nock & Kazdin, 2002), seasonal affective disorder (e.g., Rohan, Sigmon, & Dorhofer, 2003), and generalized anxiety disorder (Wells, 2004). Perhaps surprisingly, negative self-thinking is rarely studied in nonclinical settings.

If we wish to consider negative self-thinking as a mental habit, what exactly does that mean? To answer this question, it is useful to make a distinction between mental *contents* and mental *processes* of negative self-thinking. Negative self-thinking has content in the form of negative self-cognitions. For instance, a person may endorse negative adjectives as self-descriptive (Greenberg & Beck, 1989), have specific negative thoughts about oneself (Hollon & Kendall, 1980), make internal and global attributions in response to negative life events (Abramson, Metalsky, & Alloy, 1989), or hold dysfunctional attitudes (Weissman & Beck, 1978). Process aspects of negative self-thinking refer to the *way* a person thinks. For example, depressed persons often ruminate about the very symptoms of their depressive state (e.g., Nolen-Hoeksema, 1991). Avoidance or thought suppression may sometimes be used to cope with distress (Wang, Brennen, & Holte, 2005; Wenzlaff & Bates, 1998). Following the distinction between mental content and process, we argue that the degree to which negative self-thinking is habitual can be considered as a process aspect, which can be distinguished from the content of negative self-thoughts. Thus, negative self-thinking can be considered habitual to the degree to which such thinking occurs frequently, is initiated without awareness, and is mentally efficient, difficult to control, unintended, and self-descriptive. A primary goal of the present studies was to test the assumption that the habitual aspect of negative self-thinking contributes to feelings of low self-worth over and above the negative cognitive content of such thinking amongst nonclinical samples.

Metacognitive reflection on negative self-thinking

An assumption underlying our approach is that negative self-thinking may be subject to metacognitive reflection. Metacognitive reflection refers to the appraisal, monitoring, or control of one's cognitions or mental functioning (e.g., Flavell, 1979; Jost, Kruglanski, & Nelson, 1998; Metcalfe & Shimamura, 1994; Nelson, 1992; Petty, Briñol, Tormala, & Wegener, in press; Wells, 1995). By investigating whether the habitual aspect of negative self-thinking, measured in the form of metacognitive beliefs, contributes to feelings of self-worth over and above cognitive content, we thus also test the important assumption that metacognitive beliefs play a role in self-related cognitive and emotional functioning.

Metacognitions have been studied in a variety of domains, most notably memory (e.g., Nelson, 1992), but also attitude strength (e.g., Petty & Krosnick, 1995), persuasion (e.g., Briñol & Petty, 2004), consumer behavior (e.g., Alba & Hutchinson, 2000), the self (e.g., Pelham, 1991), social cognition (e.g., Yzerbyt, Lories, & Dardenne, 1998), depression (e.g., Nolen-Hoeksema, 1991), and anxiety (e.g., Wells, 1995). Confining metacognitive reflection to negative self-thinking, various types of metacognitions may be distinguished (see Petty et al., in press). For instance, one may reflect on the target of thoughts ("Do I have these doubts about myself?"), the origin of thoughts ("Why do I always think I'm ugly?"), the amount of thoughts ("I have many negative thoughts about myself"), the valence of thoughts ("When I think about myself, my thoughts are often negative"), or consequences of thoughts ("My thoughts cause bad things to happen").

We propose that the way negative self-thoughts occur, and in particular the degree to which such thoughts come habitually, may thus also be subject to metacognitive reflection. Whereas simply asking individuals to report on their "habit" of negative self-thinking cannot be expected to produce valid responses, this may be different when the habit concept is broken down into the features that, in our view, constitute the construct. Thus, it is much easier to report on the experience of frequency ("Negative thinking about myself is something

I do frequently”), lack of awareness of initiating negative self-thinking (“I start doing before I realize I’m doing it.”), lack of conscious intent (“I do it unintentionally”), mental efficiency (“I do it automatically”), the difficulty to control (“I would find it hard not to do”), and self-descriptiveness (“It is typically me”). In order to measure the strength of a negative self-thinking habit, we thus adapted the Self-Report Habit Index (Verplanken & Orbell, 2003), and labelled this measure the Habit Index of Negative Thinking (HINT; see Appendix) for the present purposes. Given that valid metacognitive reflections can be obtained on target, origin, amount, valence, and consequences of thoughts, it seems not unreasonable to assume that responses on the HINT have validity in reflecting the constituting elements of a mental habit of negative self-thinking, i.e., the experience of repetition, lack of awareness and conscious intent, mental efficiency, the difficulty to control, and self-descriptiveness.

Related process-oriented constructs

The construct of habitual negative self-thinking is related to, but distinct from, some other process-oriented constructs, which may also be subject to metacognitive reflection. Most notable is mental rumination. This construct has been studied in the context of depression and anxiety, and refers to persistent thinking about symptoms of depression (e.g., Nolen-Hoeksema, 1991), or worry (Cartwright-Hatton & Wells, 1997). Rumination has also been investigated as a component of self-consciousness in nonclinical samples (e.g., Trapnell & Campbell, 1999). The difference between rumination and habitual negative self-thinking lies predominantly in the content of the thinking. Habitual negative self-thinking differs from Nolen-Hoeksema’s (1991) and Cartwright-Hatton and Wells’s (1997) rumination constructs in that the latter two exclusively focus on symptoms of depression and worry, respectively. The object of Trapnell and Campbell’s (1999) rumination construct is events, states, or memories. These may often, but not necessarily, be negative, whereas habitual negative self-thinking focuses exclusively on negatively valenced self-thoughts.

A second construct that bears some similarity to habitual negative self-thinking is (the absence of) mindfulness. Mindfulness refers to the state of being attentive to and aware of what is taking place in the present. Mindfulness varies across situations, but has also been studied as an individual difference variable (Brown & Ryan, 2003). Mindfulness has been found to be positively associated with various indicators of well-being and self-esteem, and negatively with neuroticism, rumination, anxiety and depression (Brown & Ryan, 2003). Although a state of mindfulness works against the operation of automatic and habitual functioning, the absence of mindfulness does not necessarily imply negative self-thinking. In that sense, habitual negative self-thinking is distinct by being a more specific as well as a negatively valenced process. Although rumination and the absence of mindfulness can both be conceptually distinguished from habitual negative self-thinking, we will also test the discriminant validity of the habitual negative self-thinking construct empirically.

Aim and overview of the studies

Negative self-thinking can be expected to be associated with feelings of low self-worth, and, in extreme cases, anxiety and depression. Negative self-thoughts can thus be considered as the cognitive content that underlies such negative affects. The experience of habitual negative self-thinking may have an additional impact on a person's self-views, which makes such metacognitions potentially important for feelings of self-worth, and may in extreme cases be involved in the causation and maintenance of psychological disturbances (e.g., Nolen-Hoeksema, 1991; Teasdale et al., 2002; Wells, 2000). The main hypothesis that will be tested in the present studies is that the habitual quality of negative self-thinking, measured in the form of a comprehensive set of metacognitive beliefs, accounts for variance in self-worth measures over and above measures of negative cognitive content. The present studies may contribute in a number of ways. First, we will investigate self-worth in the form of explicit self-esteem, implicit self-esteem, as well as symptoms of anxiety and depression.

In particular, the role of negative thinking in implicit self-esteem has not yet received much research attention (e.g., Koole & DeHart, in press; Koole & Pelham, 2003). The studies also aim to contribute to the literature on metacognitions on self-views. Whereas what we think about ourselves forms the core of our self-evaluations, metacognitions about such views, such as for example the confidence one has in self-beliefs or self-evaluations, have been found to be highly influential (e.g., Pelham & Swann, 1994; Sedikides, 1993). The additional value of metacognitions on habitual qualities of negative self-thinking over and above cognitive content in explaining self-evaluations has not yet been studied. Finally, whereas negative thinking has always been an important construct in the domain of anxiety and depression, relatively little has been done on negative thinking in nonclinical settings.

Eight studies will be presented. In each study, habitual negative self-thinking was measured by the Habit Index of Negative Thinking (HINT; see Appendix). In Study 1, we tested whether the HINT was related to the type of thoughts to which it is assumed to refer, i.e., negative self-thoughts, rather than negative thoughts in general. In Study 2, habitual negative self-thinking as a process-oriented measure was pitted against a measure of negative cognitive content, i.e., the Automatic Thoughts Questionnaire, in the prediction of explicit self-esteem. Study 3 conceptually replicated Study 2 with self-elicited negative thoughts. Study 4 tested the discriminant validity of habitual negative self-thinking with respect to mental rumination and mindfulness. Study 5 investigated the relationships between habitual negative self-thinking, the occurrence of negative self-thoughts, and implicit self-esteem measured by a self-esteem Implicit Association Test. Study 6 conceptually replicated Study 5 using the name letter effect as a measure of implicit self-esteem. In Study 7 we investigated response latencies to positive versus negative self-related information as a function of habitual negative self-thinking. In Study 8, habitual negative self-thinking and dysfunctional attitudes

(as content measure), together with the subsequent occurrence of negative life events, were used to predict anxiety and depressive symptoms nine months later.

Study 1

The purpose of Study 1 was to provide evidence for the content validity of the HINT, i.e., the assumption that the instrument taps into negative self-thoughts. This was done by relating the HINT to the content of spontaneous thoughts in response to an ambiguous story. As the HINT focuses on habitual negative *self*-thinking, it was expected to discriminate between self-directed negative thoughts and negative thoughts in general (thus excluding self-thoughts).

Method

Participants and procedure. Participants were one hundred and fifty-seven students at the University of Tromsø, Norway. There were sixty-one males and ninety-five females (one participant did not reveal gender). Participants received a lottery ticket for participation.

Participants were presented with a 160 word story about a wedding party, and were asked to identify themselves with the protagonist. A number of phrases made the story ambiguous as to how to interpret the protagonist's behavior. For instance, one of the guests walks out of the room when the protagonist makes a joke while giving a speech; the protagonist bumps against another person during a dance; his or her decoration falls off. Participants were then asked to write down the thoughts that came to mind while they read the story. They were then presented with a questionnaire, which contained a filler task, and finally the HINT. The order in which the story and the questionnaire were presented was fixed in order to avoid any reference to negative thinking during the story reading.

Measures. Each thought in the thought-listing protocols was categorized by two independent judges. The judges came from the study population (students), and were blind to participants' HINT scores. Four categories were defined; positive thoughts, general negative

thoughts, negative self-thoughts, and neutral thoughts. General negative thoughts and negative self-thoughts were mutually exclusive categories. Examples of general negative thoughts were “I don’t like people getting drunk at parties”, “Not a nice party”, and “Speeching is difficult”. Negative self-thoughts referred to thoughts that explicitly related the self to anything negative, e.g., “I think someone did not like my speech”, “My joke must have been lousy”, and “I did not relate well with the others”. The two judges showed a high reliability, as was indicated by an overall 90% agreement, Cohen’s *Kappa* = 0.86. For the four categories positive thoughts, general negative thoughts, negative self-thoughts, and neutral thoughts separately, agreements were 0.97, 0.93, 0.97, and 0.93, respectively, while Cohen’s *Kappas* were 0.91, 0.85, 0.90, and 0.82, respectively. Differences were solved by discussion with a third, independent, person. Negative self-thinking habit was measured by the twelve-item Habit Index of Negative Thinking (HINT; see Appendix). Seven-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (7). The scale had a high internal reliability, coefficient alpha = 0.943.

Results and discussion

The total number of thoughts generated varied between 1 and 22, $M = 5.89$, $SD = 3.17$. The mean number of thoughts in the positive, general negative, negative self, and neutral categories were 0.96 ($SD = 1.28$), 2.50 ($SD = 1.91$), 0.95 ($SD = 1.18$), and 1.48 ($SD = 1.58$), respectively. Because the distributions of the frequencies were skewed, these were nlog transformed. As was anticipated, the HINT correlated statistically significantly with the number of negative self-thoughts ($r = 0.295$, $p < .001$), whereas the correlations between the HINT and the other three categories were nonsignificant. The correlation between the HINT and negative self-thoughts was tested against the correlation between the HINT and general negative thoughts ($r = 0.069$), using the method for comparing correlations described by Meng, Rosenthal, and Rubin (1992). This difference was statistically significant, $z = 2.02$, $p <$

.05. Finally, the HINT was regressed on the number of positive, general negative, and neutral thoughts. These categories accounted for a nonsignificant 2% of the variance in the HINT. Adding the number of negative self-thoughts raised this percentage to 11%, F -change (1,152) = 15.88, $p < .001$. Only the number of negative self-thoughts obtained a significant beta weight, $\beta = 0.310$, $p < .001$. Because the HINT correlated with the occurrence of negative self-thoughts, and not with negative thoughts in general, it thus seemed sensitive to the kinds of thoughts to which it is supposed to refer.

Study 2

Study 2 focused on explicit self-esteem. Assuming that self-esteem is closely associated with the type of thoughts (positive and negative) a person has about oneself, the purpose of this study was to test whether the habitual aspect of negative thinking accounted for variance in self-esteem over and above the content of negative self-thoughts. Content of negative self-thinking was measured by the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980), which specifies negative self-thoughts. It was anticipated that negative self-thinking habit would account for a significant portion of variance in self-esteem over and above the ATQ.

Method

Participants and procedure. Participants were one hundred and forty-two students at the University of Tromsø, Norway. There were eighty-nine women and fifty-three men. A questionnaire was distributed during classes. Participants received a lottery ticket for participation. There were two versions of the questionnaire, which differed in the order in which the HINT and the ATQ was presented. Because there were no order effects, this variable henceforth will be ignored.

Measures. Negative thinking habit was measured by the twelve-item HINT (see Appendix). Seven-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (7). The scale showed high internal reliability, coefficient alpha = 0.944.

The content of negative self-thinking was measured by the ATQ (Hollon & Kendall, 1980). The ATQ consists of thirty specified negative self-thoughts. Some sample items are “I’m a loser”, “I wish I was a better person”, and “My future is bleak”. Participants rated how often they had each thought during the previous week on a five-point scale, ranging from “not at all” (1), “sometimes” (2), “moderately often” (3), “often” (4) to “all the time” (5).¹ The scale had a high internal reliability, coefficient alpha = 0.930.

Self-esteem was measured by the twenty-item Self-Liking and Competence Scale (Tafarodi & Swann, 1995). Responses were given on five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree). The items were coded such that high scores indicate positive self-esteem. The scale had a high internal reliability, coefficient alpha = 0.922.

Results and discussion

The mean scores on the HINT, ATQ, and self-esteem were 3.10 ($SD = 1.40$), 1.70 ($SD = 0.52$), and 3.82 ($SD = 0.62$), respectively. The correlations between the HINT and ATQ, and between HINT and self-esteem were 0.508, $p < .001$, and -0.625, $p < .001$, respectively, while the correlation between ATQ and self-esteem was -0.660, $p < .001$.

Self-esteem was regressed on age, gender, ATQ, and HINT in a three-step hierarchical multiple regression. Age and gender were entered in the first step. Gender obtained a statistically significant beta weight, $\beta = 0.234$, $p < .01$, $R^2\text{-change} = 0.073$, $p < .01$. Women had lower self-esteem than men. The ATQ was entered on the second step, and obtained a statistically significant beta weight, $\beta = -0.640$, $p < .001$, $R^2\text{-change} = 0.390$, $p < .001$. Finally, the HINT was entered at step 3. As was anticipated, the HINT contributed to the prediction of self-esteem over and above the previously entered variables, $\beta = -0.383$, $p < .001$.

.001, $R^2\text{-change} = 0.100$, $p < .001$, total $R^2 = 0.562$. The final beta weight of the ATQ remained statistically significant, $\beta = -0.433$, $p < .001$, suggesting that the effects of the HINT and the ATQ were independent. The variance inflation factors varied from 1.143 to 1.486, indicating that there were no multicollinearity problems. These results thus support the notion that habitual negative self-thinking accounts for variance in self-esteem over and above the cognitive content negative self-thinking.²

Study 3

A threat to the validity of the conclusions of the previous study is that the independent effect of the HINT in the prediction of self-esteem over and above the ATQ may stem from the possibility that the two instruments tap into different cognitive material. In other words, the thoughts that participants' HINT scores are based on, need not be the fixed set of thoughts that constitute the ATQ. To address this potential confound, participants in Study 3 generated their own set of negative self-thoughts. They then rated these thoughts in exactly the same way as is done for the ATQ, and in addition rated the way these thoughts occurred using the HINT. Three variables were then used to predict self-esteem; the number of generated negative self-thoughts, the subjective frequency of occurrence, and the HINT. It was expected that the HINT would account for variance in self-esteem over and above the number of generated negative self-thoughts and the subjective frequency of occurrence of these thoughts.

Method

Participants and procedure. Participants were ninety-seven students at the University of Tromsø, Norway. There were sixty-five women and thirty-three men, while one person did not disclose gender. A questionnaire was distributed during classes. There were two versions of the questionnaire, which differed in the order in which the self-esteem scale versus the other materials were presented.

Measures. Participants were asked to write down negative thoughts they sometimes had about themselves. The response sheet contained twelve boxes, for a maximum of twelve thoughts. Similarly to the ATQ, participants then indicated how often they had each thought during the previous week on a five-point scale, ranging from “not at all” (1), “sometimes” (2), “moderately often” (3), “often” (4) to “all the time” (5). Participants were then presented with the twelve items of the HINT, and were instructed to indicate *how* the thoughts they had generated usually emerge. In this case, five-point response scales were presented, ranging from “strongly disagree” (1) to “strongly agree” (5). The HINT showed high internal reliability, coefficient alpha = 0.925.

Self-esteem was measured by the ten-item Rosenberg Self-Esteem Scale (Rosenberg, 1965). Responses were given on five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree). The items were coded such that high scores indicate positive self-esteem. The scale showed high internal reliability, coefficient alpha = 0.919. In one version of the questionnaire, the self-esteem scale was presented in the beginning, whereas in the other version it was presented at the end. The two versions were randomly distributed.

Results and discussion

Participants elicited on average 4.25 negative self-thoughts ($SD = 2.49$). Questionnaire order had an effect on the number of thoughts generated. When the thought elicitation task came first, more thoughts were generated than when self-esteem was measured first, $M_s = 4.98$ and 3.42 , respectively, $t(94) = 3.21$, $p < .002$. Questionnaire order also had an effect on the measurement of self-esteem, $M_s = 3.42$ and 3.82 , with higher self-esteem when this was measured first, respectively, $t(94) = 2.48$, $p < .02$. Questionnaire order had no statistically significant effect on the frequency ratings of the thoughts, nor on the HINT scores. Table 1 presents means, standard deviations and intercorrelations of the number of generated thoughts, the average rated frequency of the thoughts, the HINT, and self-esteem.

In order to test the hypothesis that the HINT contributes over and above the number and perceived frequency of negative self-thoughts in the prediction of self-esteem, the latter was regressed on age, gender, questionnaire order, number of generated negative self-thoughts, perceived frequency of the thoughts, and the HINT in a three-step hierarchical multiple regression. Age, gender, and questionnaire order were entered in the first step, neither of which obtained a statistically significant beta weight, $R^2\text{-change} = 0.059$. Number and perceived frequency of negative self-thoughts were entered on the second step. Both variables obtained statistically significant beta weights, $\beta = -0.259, p < .05$, and $\beta = -0.232, p < .05$, for number and perceived frequency, respectively, $R^2\text{-change} = 0.127, p < .01$. Finally, the HINT was entered at step 3. As was anticipated, and similarly to Study 2, the HINT contributed to the prediction of self-esteem over and above all previously entered variables, $\beta = -0.650, p < .001$, $R^2\text{-change} = 0.290, p < .001$, total $R^2 = 0.476$. Neither number nor perceived frequency of negative self-thoughts retained a significant beta weight. The variance inflation factors varied from 1.162 to 1.714, indicating that there were no multicollinearity problems. These results suggest that the effect obtained in Study 2 should not be attributed to a confound of the content and process measures.

Study 4

The aim of Study 4 was to provide evidence of the discriminant validity of the HINT with respect to two other process-oriented constructs, i.e., mental rumination and mindfulness. While it was anticipated that all variables would be significantly correlated, it was tested whether habitual negative self-thinking contributed to the prediction of self-esteem over and above mental rumination and mindfulness.

Method

Participants and procedure. Participants were one hundred and fifty-five students at the University of Tromsø, Norway. There were eighty-eight women and sixty-six men, while

one participant did not disclose gender. Participants filled out a questionnaire individually in the laboratory, and received a lottery ticket for participation.

Measures. Negative thinking habit was measured by the twelve-item HINT (see Appendix). Five-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (5). The scale had a high internal reliability, coefficient alpha = 0.945. Mental rumination was measured by the twelve-item rumination subscale of the Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999). This scale measures individual differences in mental rumination, and has been developed in nonclinical samples. Five-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (5). The items were coded such that high scores indicate a strong tendency to ruminate. The scale had a high internal reliability, coefficient alpha = 0.906. Mindfulness was measured by the 15-item Mindful Attention Awareness Scale (Brown & Ryan, 2003). Five-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (5). The items were coded such that high scores indicate a high tendency for mindfulness. The scale showed an acceptable internal reliability, coefficient alpha = 0.755. Self-esteem was measured by the ten self-liking items of the Self-Liking and Competence Scale (Tafarodi & Swann, 1995). Five-point response scales were used, ranging from “strongly disagree” (1) to “strongly agree” (5). The items were coded such that high scores indicate positive self-esteem. The scale showed high internal reliability, coefficient alpha = 0.930.

Results and discussion

Descriptive results and correlations are presented in Table 2. As expected, all process-oriented variables were statistically significantly correlated with self-esteem, while their intercorrelations were moderately strong. Self-esteem was regressed on age, gender, rumination, mindfulness, and habitual negative self-thinking in a three-step hierarchical multiple regression. Age and gender were entered on the first step neither of which obtained a

statistically significant beta weight, $R^2\text{-change} = 0.024$. Rumination and mindfulness were entered on the second step. Rumination obtained a statistically significant beta weight, $\beta = -0.486, p < .001$, whereas the originally significant association between mindfulness and self-esteem disappeared, $\beta = 0.145, R^2\text{-change} = 0.316, p < .001$. Finally, the HINT was entered at step 3. As was anticipated, the HINT contributed to the prediction of self-esteem over and above all previously entered variables, $\beta = -0.369, p < .001, R^2\text{-change} = 0.069, p < .001$, total $R^2 = 0.409$. The beta weight of rumination remained statistically significant, $\beta = -0.261, p < .01$, suggesting that the effects of HINT and rumination were largely independent. The variance inflation factors varied from 1.028 to 1.980, indicating that there were no multicollinearity problems. These results thus suggest that the HINT has discriminant validity with respect to both rumination and (lack of) mindfulness.

Study 5

Habitual negative thinking was found to be strongly associated with explicit self-esteem in the previous three studies. The purpose of Study 5 was to investigate whether negative self-thinking habit was associated with *implicit* self-esteem, and, if such an effect existed, whether it would be independent of a measure of negative cognitive content. We anticipated that the features of automaticity which characterizes negative self-thinking habit would be stronger associated with implicit structures than the explicit content of negative self-thinking. The Implicit Association Test (IAT) was used as a measure of implicit self-esteem (Greenwald & Farnham, 2000). An IAT was used that tested the relative ease with which self versus other stimuli could be categorized together with positive and negative stimuli (Greenwald & Farnham, 2000; Pinter & Greenwald, 2005). We anticipated that habitual negative self-thinking would correlate negatively with the IAT effect. Similarly to Study 2, ATQ was included as a mental content measure of negative self-thinking.

The present study also included a measure of explicit self-esteem. Therefore, in addition to testing the main hypothesis, this study provided an opportunity to investigate the discriminant validity of habitual negative self-thinking and explicit self-esteem with respect to their relation with implicit self-esteem. The HINT shows sizable correlations with measures of explicit self-esteem. However, we consider the HINT above all as a measure that relates to the process of self-thinking, rather than a self-evaluative measure in the first place. Therefore, differential relations with implicit self-esteem would provide important evidence for discriminant validity of the two measures.

Method

Participants, design, and procedure. Participants were one hundred and twenty-five students at New Mexico State University, USA. They received extra course credit for participation. There were seventy-nine women and forty-six men. Eleven participants were left-handed. Participants were randomly assigned to a 2 (Block Order: compatible-incompatible versus incompatible-compatible) x 2 (Key Designation: positive right-hand key versus positive left-hand key) factorial design (Greenwald, McGhee, & Schwartz, 1998). Instructions were given on the computer. Participants were told that the study was on categorizing words. The instruction stressed that participants should respond as quickly as possible, while remaining accurate. After performing the IAT, participants received a questionnaire containing the HINT, the ATQ, and explicit self-esteem.

The IAT. A self-esteem IAT was programmed and presented using E-Prime 1.1 (see for a more elaborate description of the IAT, Greenwald et al., 1998, and Greenwald, Nosek, & Banaji, 2003, and of the self-esteem IAT, Greenwald & Farnham, 2000, and Pinter & Greenwald, 2005). The words appeared in bold capitals and Courier New 18pt font. Category labels appeared on the respective sides of the screen. Participants received error feedback. The IAT consists of seven blocks.

The first block contained twenty trials, and practised the classification of self (“I”, “me”, and “mine”) versus other pronouns (“they”, “them”, and “their”). The category labels that were used were “self-words” and “other-words”, respectively. The pronouns were randomly presented. Depending on the key designation condition, participants were instructed to press either a marked left-hand key (“x”) or right-hand key (“m”) when encountering a self or other pronoun. The second block also contained twenty trials, and practiced the classification of positive and negative words. An attempt was made to match the positive and negative words on length and word image. The ten positive words were “good”, “right”, “strong”, “success”, “winner”, “cheerful”, “smart”, “loved”, “worthy”, and “proud”. The ten negative words were “bad”, “wrong”, “weak”, “failure”, “loser”, “depressed”, “stupid”, “hated”, “rotten”, and “guilty”. The category labels that were used were “positive” and “negative”, respectively. Depending on the block order condition, the left-hand key (“x”) or right-hand key (“m”) was designated to the positive or negative words. The third block contained twenty practise trials for the first combined task, in which self/other pronouns and positive/negative words were randomly presented. Depending on the block order condition, compatible (the same key for self pronouns and positive words) or incompatible (the same key for self pronouns and negative words) instructions were given for this block. The fourth block contained forty test trials of the first combined task. The fifth block again contained twenty practise trials, in this case with the reverse instructions for the classification of self versus other pronouns. Finally, the sixth and seventh block contained twenty practise and forty test trials, respectively, and comprised the alternative (compatible or incompatible) combined task.

The response latencies of test blocks 4 and 7 were then used to calculate the IAT effect. Error latencies (trials on which participants classified incorrectly) were replaced by block means plus an ‘error penalty’ of 600 ms (Greenwald et al., 2003). Response latencies

longer than the mean + 3**SD* were removed as outliers. Participants were screened on having more than 10% of latencies less than 300 ms, on which criterion all participants passed. Three participants (2.4%) were removed because they made more than 25% errors in the test trials, leaving one hundred and twenty-two participants. The IAT effect was calculated by subtracting the mean latencies of the compatible block from the incompatible block, and dividing the result by the standard deviation of the test block latencies. The latter operation yields a metric that is calibrated by each participant's latency variability. This measure of the IAT effect is denoted as *D* (see for further details and a discussion of this measure, Greenwald et al., 2003). A large and positive *D* stands for a large IAT effect, i.e., in the present case, a relatively high implicit self-esteem.³

Other measures. The questionnaire contained the HINT (see Appendix) to measure habitual negative self-thinking, the ATQ (Hollon & Kendall, 1980) to measure mental content of negative self-thinking, and the twenty-item Self-Liking and Competence Scale (Tafarodi & Swann, 1995) as a measure of explicit self-esteem. All internal reliabilities were high. Coefficient alphas were 0.947 (HINT), 0.957 (ATQ), and 0.934 (explicit self-esteem).

Results

Table 3 presents descriptive results and correlations between the HINT, ATQ, explicit self-esteem, and the IAT effect. Moderately strong correlations were found between HINT, ATQ, explicit self-esteem. As was anticipated, the IAT effect correlated statistically significantly and negatively with the HINT. The ATQ nor explicit self-esteem appeared significantly correlated with the IAT effect. The correlations between the HINT and the IAT effect and between the ATQ and the IAT effect differed statistically significantly (Meng et al., 1992), $z = 3.29, p < .001$. The same was true for the correlations between the HINT and the IAT effect versus explicit self-esteem and the IAT effect, $z = 2.19, p < .05$. These tests

support the discriminant validity of the HINT both with respect to the ATQ and explicit self-esteem.⁴

In a four-step hierarchical multiple regression, the IAT effect was regressed on gender, age, and handedness (step 1), block order and key designation (step 2), ATQ and explicit self-esteem (step 3), and the HINT (step 4). None of the variables entered on step 1 obtained a significant beta weight, $R^2\text{-change} = 0.021$. Block order contributed statistically significantly on step 2, which represents a well-known effect in the IAT paradigm (e.g., Greenwald et al., 1998), $\beta = 0.384$, $p < .001$, $R^2\text{-change} = 0.147$, $p < .001$. Neither the ATQ nor explicit self-esteem were related to the IAT effect, and thus did not obtain a significant beta weight on step 3, $R^2\text{-change} = 0.005$. Importantly, the HINT contributed statistically significantly on step 4, $\beta = -0.328$, $p < .01$, $R^2\text{-change} = 0.064$, $p < .01$, total $R^2 = 0.241$. Block order retained its significant weight on this step, $\beta = 0.384$, $p < .001$. The variance inflation factors varied from 1.041 to 1.673, indicating that there were no multicollinearity problems.

Discussion

The present study demonstrated that the HINT was not only associated with explicit but also with implicit self-esteem. Whereas the ATQ was associated both with the HINT and explicit self-esteem, it did not show any relation to the IAT. Neither was explicit self-esteem significantly correlated with the IAT, which is consistent with other studies (e.g., Bosson, Swann, & Pennebaker, 2000; Greenwald & Farnham, 2000; Hetts, Sakuma, & Pelham, 1999). This result is important, because it supports the assumption that the HINT relates to processes that occur automatically. Implicit self-esteem, or more precisely, instances when implicit self-esteem leaves traces in conscious experiences, is one such process. In the general discussion we will further discuss this finding. Another important result was that the HINT showed discriminant validity with respect to explicit self-esteem. In spite of the correlations between the two constructs, habitual negative thinking was associated with implicit self-evaluations,

whereas explicit self-esteem was not. This issue too will be further elaborated in the general discussion.

Study 6

This study aimed at providing a conceptual replication of the finding that negative self-thinking habit is related to implicit self-esteem. Whereas in the previous study the IAT was used as an implicit measure of self-esteem, in this study we used the name letter effect for that purpose. The name letter effect refers to the phenomenon that people tend to like their name letters and birth date numbers better than people who do not have these letters as name letters or birth dates (e.g., Hoorens & Nuttin, 1993; Kitayama & Karasawa, 1997; Nuttin, 1985). The size of this effect has been found to be a valid measure of implicit self-esteem (Koole & DeHart, in press; Koole, Dijksterhuis, & van Knippenberg, 2001; Koole & Pelham, 2003). We anticipated that the HINT would predict the size of the name letter effect over and above a measure of negative cognitive content. In this study we used again the self-elicitation paradigm employed in Study 3.

Method

Participants and procedure. Participants were two hundred and six students at the University of Tromsø, Norway. There were ninety-three women and one hundred and eight men, while five persons did not disclose gender. Seven persons had not completely filled out the questionnaire, leaving one hundred and ninety-nine participants. Participants were invited to the lab. They filled out a questionnaire individually in a closed cubicle.⁵ Participants received a lottery ticket for participation.

Measures. The procedure to measure cognitive content and process was similar to Study 3. Thus, the number and subjective frequency of occurrence of negative self-thoughts were used as content measures, while the HINT served as a process measure. The HINT showed high internal reliability, coefficient alpha = 0.907.

The procedure to measure implicit self-esteem was introduced as a study on esthetical judgments of symbols. Participants were presented with a list containing the 29 letters of the Norwegian alphabet, and a list with the numbers 1 to 35. The stimuli were presented in a random order in each respective list. Participants were asked to indicate how beautiful or ugly they found each letter and number on an eight-point scale ranging from “very ugly” (1) to “very beautiful” (8). At the end of the session, we obtained participants’ initials and birth date. Initials, and not full names, were used in order to deal with anonymity concerns. The evaluations of the letters that formed his or her initials and the numbers that formed his or her day and month of birth were averaged. Following the procedure outlined by Kitayama and Karasawa (1997; see also Koole et al., 2001), the average evaluations of these letters and numbers provided by all others in the sample who did not have these name letters and birth date numbers, were subtracted from the participant’s average. This measure differed statistically significantly from zero, $M = 0.531$, $t(198) = 7.17$, $p < .001$, which demonstrated the name letter/birth date number effect, and thus formed a measure of implicit self-esteem.

Results and discussion

Table 4 presents means, standard deviations and intercorrelations of the number of generated thoughts, the average rated frequency of the thoughts, the HINT, and implicit self-esteem. The HINT showed a modest correlation with number of negative thoughts and a strong correlation with perceived frequency, while the latter two were unrelated (cf., Study 3). In order to test the hypothesis that the HINT contributes over and above the number and perceived frequency of negative self-thoughts in the prediction of self-esteem, the latter was regressed on age, gender, number of generated negative self-thoughts, perceived frequency of the thoughts, and the HINT in a three-step hierarchical multiple regression. Age and gender were entered on the first step, neither of which obtained a statistically significant beta weight, $R^2\text{-change} = 0.005$. Number and perceived frequency of negative self-thoughts were entered

on the second step, neither of which obtained a statistically significant beta weight, R^2 -change = 0.001. Finally, the HINT was entered at step 3, and made a statistically significant contribution to the prediction of implicit self-esteem, $\beta = -0.215$, $p < .05$, R^2 -change = 0.033, $p < .05$, total $R^2 = 0.040$. The variance inflation factors varied from 1.004 to 1.377, indicating that there were no multicollinearity problems. Although the effect size was relatively small, this result is theoretically important in that it replicates that of Study 5, thereby supporting the hypothesis that it is the habitual aspect of negative self-thinking, and not the negative cognitive content, that is associated with implicit self-esteem.

Study 7

The correlation between the HINT and the IAT effect that was found in Study 5, suggested that those who had a strong negative thinking habit had more difficulties to categorize self-pronouns together with positive words and other pronouns together with negative words. However, the relative nature of the IAT does not allow a conclusion about whether habitual negative self-thinkers respond faster to associations between self and negative words, or slower to self and positive words, compared to those who do not have a negative self-thinking habit. The purpose of Study 7 was to answer this question by investigating response latencies with respect to positive versus negative self-related information.

Although an intuitively appealing prediction might be that the HINT would correlate primarily with attention to negative information, we anticipated that individuals with *low* HINT scores would respond particularly fast to *positive* self-related information, whereas high HINT individuals would not show that effect. We have two arguments for this hypothesis. First, the presence of a positivity bias among well-adapted individuals and the absence of such a bias in low self-worth individuals, has been demonstrated in a variety of arenas. In their seminal article, Taylor and Brown (1988) argued that mentally healthy individuals hold

unrealistically positive views of oneself, have illusions of control, and are unrealistically optimistic. In the depression domain, a growing body of research suggests that depressed persons are characterized by diminished emotional reactivity to positive *and* diminished emotional reactivity to negative stimuli (e.g., Alloy & Abramson, 1988; Rottenberg, Gross, & Gotlib, 2005; Wang et al., 2005; Wang, Brennen, & Holte, 2006). Confining to research on self-relevant information, Vallacher, Nowak, Froehlich, and Rockloff (2002) found a strong positivity bias (i.e., more attention to positive than negative material) among participants with high self-worth, whereas this asymmetry was absent among low self-worth participants.

Our second argument pertains to how the self of high versus low self-worth individuals is organized. It is reasonable to assume that high self-esteem individuals' self consists of a relatively high percentage of positively valenced elements compared to negatively valenced elements. Nowak, Vallacher, Tesser, and Borkowski (2000) demonstrated in simulations that such a configuration has a tendency to become organized such that less central negative elements are eliminated and the remaining negative elements are concentrated. The result is a well organized and predominantly positively valenced self. Low self-esteem individuals' selves, which contain relatively fewer positive elements, are thus less likely to be that well organized. Other evidence for less well organized selves among low self-worth persons comes from studies on self-clarity, which show positive correlations between self-esteem and the degree to which self-beliefs are clearly and confidentially defined, and are internally consistent and stable (Campbell et al., 1996). Because of less structured and integrated selves, low self-worth persons may have more difficulty to process and integrate self-relevant information, no matter whether this is positive or negative information.

Given the evidence for a positivity bias among high self-worth individuals and less well organized selves of low self-worth individuals, we anticipated that low negative self-thinking habit participants would be relatively fast in endorsing positive self-relevant stimuli,

and that those with a strong negative self-thinking habit would show more balanced decision latencies with respect to positive and negative stimuli.

Method

Participants, design, and procedure. Participants were one hundred and forty-two students at New Mexico State University, USA. They received extra course credit for participation. There were ninety-three women and forty-eight men, while one person did not disclose gender. Fourteen participants were left-handed. The study had a 2 (Key Designation: “belong” right-hand key versus “belong” left-hand key) x 2 (Word Order: pronoun-valenced word versus valenced word-pronoun) x 3 (Pronoun: “I” versus “he” versus “she”) x 3 (Valence: positive versus negative versus neutral words) mixed design with Word Order, Pronoun, and Valence as within-participants factors. Participants worked and received all instructions on the computer. The instruction stressed to respond as quickly as possible, while remaining accurate, which in this case meant pressing the key that actually represented participant’s true decision. After performing the computer task, participants received a questionnaire, which contained the HINT and the ATQ.

The computer task. Participants were told that the study was on the role of intuition in language.⁶ This cover story allowed us to present seemingly meaningless combinations of words. Each trial consisted of a combination of two stimuli, i.e., a pronoun and a valenced word. The two stimuli were presented on the screen sequentially with a 2000 ms delay in between. The first stimulus was printed in black, while the second stimulus was printed in blue. The stimuli appeared in bold capitals and Courier New 18pt font. In half of the trials the first stimulus was a pronoun and the second stimulus a valenced word, whereas the reverse was the case in the other half of the trials. Participants were instructed to decide “intuitively” and as quickly as possible whether or not the second (blue printed) stimulus “belonged” to the

first stimulus by pressing, depending on the key designation condition, either a left-hand key (“x”) or right-hand key (“m”). The pronouns were “I”, “he”, or “she”.

There were six positively valenced words (“good”, “smart”, “strong”, “success”, “winner”, and “cheerful”), six negatively valenced words (“bad”, “stupid”, “weak”, “failure”, “loser”, and “depressed”), and six neutral words (“bird”, “lamp”, “street”, “apple”, “garden”, and “portrait”). An attempt was made to match the words on length and word image. The 54 combinations of pronoun and valenced words were presented twice in a different order. The resulting 108 trials were randomly presented, preceded by six practice trials. Response latencies longer than the mean + 3*SD were removed as outliers. Participants were screened on having more than 10% of latencies less than 300 ms, on which criterion all participants passed. Because we were interested in the pronoun combinations that referred to self versus non-self, response latencies for “he” and “she” were collapsed, and will further be referred to as “other”. Twelve mean response latencies were calculated, i.e., for each of the Pronoun (“I”, “other”) and Valence (positive, negative, neutral words) combinations for each Word Order condition. There were no effects of Key Designation, Word Order, or Handedness, and these factors will thus be ignored. Response latencies and perceived associations were collapsed across the Key Designation and Word Order conditions.

Measures. The questionnaire contained the HINT (see Appendix) to measure habitual negative self-thinking, and the ATQ (Hollon & Kendall, 1980) to measure the content of negative self-thinking. Both internal reliabilities were high. Coefficient alphas were 0.951, and 0.959, respectively. The correlation between HINT and ATQ was 0.545, $p < .001$.

Results and discussion

Preliminary analyses were conducted on the number of “yes” responses of the combinations of self and other, respectively, with positive, negative, and neutral words, and on their relations with the HINT and ATQ. The mean number of “yes” responses were 9.51,

6.63, and 3.36 for the combinations of self and positive, negative, and neutral words, respectively, and 9.07, 7.22, and 3.29 for the combinations of other and positive, negative, and neutral words, respectively, overall $F(5,135) = 45.02, p < .001$. All contrasts were statistically significant, except for the self-other contrast for neutral words. There were no statistically significant correlations between the ATQ and any of the number of “yes” responses measures. The HINT correlated statistically significantly with the number of “yes” responses of self-negative words combinations, $r = 0.243, p < .01$. No other correlations were significant. The number of “yes” responses on self-negative words combinations were regressed on the ATQ and HINT simultaneously, controlling for other-negative words combinations, age and gender. The HINT obtained a significant beta weight for the number of “yes” responses of self-negative words combinations, $\beta = 0.314, p < .02, R^2 = 0.089$.

The mean response latencies were 997, 1061, and 1052 milliseconds for the combinations of self and positive, negative, and neutral words, respectively, and 1011, 1051, and 1019 milliseconds for the combinations of other and positive, negative, and neutral words, respectively, overall $F(5,135) = 5.08, p < .001$. There were no statistically significant correlations between the ATQ and any of the response latency measures. Importantly, the HINT correlated statistically significantly with response latencies of self-positive words combinations, $r = 0.192, p < .03$. No other correlations were significant. The response latency measures were regressed on the ATQ and HINT simultaneously, controlling in addition for age, gender, handedness, and the number of “yes” responses. The latter variable was included in order to control for a possible effect that affirmative responses are made faster than negative responses. In addition, response latencies of ‘other’ combinations were included when regressing ‘self’ combinations, and vice versa. As can be expected, these latter response latencies obtained highly significant regression weights. Importantly, only the HINT further obtained a significant beta weight in the prediction of self-positive words latencies, $\beta =$

0.104, $p < .02$. No significant effects were present when regressing the remaining latencies. The results thus suggested that, while controlling for the potential confound of a speed advantage of affirmative responses, those without a negative self-thinking habit responded faster to self-positive material, whereas habitual negative self-thinkers seemed to pay more even-handed attention to the positive and negative self-related material. These results thus confirmed that the process-oriented HINT, but not the content-oriented ATQ, was related to the size of the asymmetry effect in the speed of responding to positive versus negative self-relevant information.

Study 8

The purpose of this final study was to test our basic hypothesis in a longitudinal study, in which negative self-thinking habit and dysfunctional attitudes (as cognitive negative content measure; Weismann & Beck, 1978) predicted anxiety and depression symptoms as a criterion nine months later. Our measures were included in a larger study on resilience, stress, and symptoms of mood disorder. More specifically, anxiety and depressive symptoms on the second measurement (T2) were predicted from demographic variables, the presence of anxiety and depressive symptoms, work-related and home-related stress, dysfunctional attitudes, and habitual negative self-thinking, all measured nine months earlier (T1), and from negative life events that occurred between T1 and T2. It was thus tested whether habitual negative self-thinking predicted the presence of anxiety and depressive symptoms nine months later over and above dysfunctional attitudes, which is a traditional predictor of such symptoms. Although the etiology and functions of depression and anxiety are quite different, both disorders do have important elements in common, most notably cognitive distortions of reality, e.g., thinking in terms of all-or-nothing patterns, overfocusing on irrelevant cues, contrafactual thinking, and affective reasoning. We thus anticipated that negative self-thinking habit related to both anxiety and depression symptoms.

Method

Participants and procedure. At T1, a questionnaire was sent to 5,000 Norwegian citizens, which formed a representative sample of the Norwegian population in the age range of 25-50 years. One hundred and six questionnaires returned undelivered, while 1,719 individuals responded, thus giving a response rate of 35.1%. Whereas the number of women and men that were contacted were equal, a slightly higher proportion of women versus men (55.7% versus 44.3%) responded, $\chi^2(1) = 34.13, p < .001$. Respondents and non-respondents did not statistically significantly differ in age. Thirty-seven respondents were removed due to incomplete responding, leaving 1,682 respondents. There were 939 women and 736 men, while seven persons did not disclose gender. Ages ranged from 25 to 51 years, $M = 40.27, SD = 8.23$.

Nine months later (T2) the respondents of the T1 measurement received a second questionnaire. From the original 1,682 usable respondents, 1,183 responded to the second request (70.3%). Eighty-one participants had not completely filled out the measures of interest, leaving a study sample of 1,102 respondents (641 women and 461 men).

Measures at T1. Work-related and home-related stress were two subscales of a stress instrument developed by Mårdberg, Lundberg, and Frankenhaeuser (1990). Responses were given on 7-point scales ranging from “Not at all” (1) to “Very much” (7). Internal reliabilities of the two scales were acceptable; coefficient alphas were 0.745 and 0.766 for the work- and home-related scales, respectively. The presence of anxiety and depressive symptoms was measured by the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The scale consists of fourteen items, which are accompanied by four-point response scales. There are two subscales of seven items each, measuring the presence of anxiety symptoms (HADS-A), and depressive symptoms (HADS-D), respectively. The internal reliabilities were acceptable. Coefficient alphas were 0.818 and 0.709, respectively. Dysfunctional attitudes

were measured by the Dysfunctional Attitude Scale (DAS, form A; Oliver & Baumgart, 1985; Weismann & Beck, 1978). The DAS contains forty items. Examples are “My value as a person depends greatly on what others think of me” and “I can only be happy if I’m perfect”. Responses were given on 7-point Likert scales (1-7). The items were coded such that high numbers indicate dysfunctional attitudes. The DAS showed a high internal reliability, coefficient alpha = 0.892. Finally, the HINT (see Appendix) was included, which was accompanied by 7-point Likert scales (1-7), coefficient alpha = 0.951.

Measures at T2. Two sets of measures were used from the T2 questionnaire, i.e., the presence of anxiety and depressive symptoms (measured again by the HADS; Zigmund & Snaith, 1983), and the occurrence of negative life events during the previous nine months. Seventeen negative life events were presented in the form of a check list, and respondents indicated whether or not these had occurred during the previous nine months. Examples of negative life events were partner’s death, divorce or separation, having been fired, having been bullied, sexual problems, serious illness in the family, or victim of violence or physical attack. Participants were classified by whether or not they had experienced at least one negative life event during the previous nine months. Four hundred and ninety-six respondents (45%) had experienced at least one such event.

The HINT was included in the T2 measurement as well in order to obtain a test-retest reliability over the nine month period. Coefficient alpha at T2 was 0.955.

*Results and discussion*⁷

A high test-retest reliability of the HINT was obtained, $r = 0.801$, $p < .001$. This suggests that the habit of negative self-thinking is a stable individual difference variable within the time frame of nine months.

In Table 5, the correlations between all variables are presented. Two sets of analyses were conducted. The first set involved the T1 measures only, and thus provided a conceptual

replication of Study 2. In this case, the presence of anxiety and depression symptoms at T1 was regressed on gender, age, work-related stress, and home-related stress (step 1), dysfunctional attitudes (step 2), and habitual negative self-thinking (step 3). These results are presented in Table 6. As was the case for the prediction of self-esteem in Study 2, the HINT accounted for a sizable portion of variance (i.e., 13.6% and 10.5% for anxiety and depression, respectively) over and above a measure of negative cognitive content, in this case dysfunctional attitudes, while controlling for gender, age, and the two stress measures.

The second set of regressions tested longitudinal effects, i.e., whether the HINT predicted changes in anxiety and depression symptoms nine months later over and above the other T1 measures. Anxiety and depression symptoms at T2, respectively, were regressed on gender, age, work-related and home-related stress, and the presence of anxiety and depression symptoms at T1 (step 1), negative life events that occurred between T1 and T2 (step 2), dysfunctional attitudes at T1 (step 3), and habitual negative self-thinking at T1 (step 4). These results are presented in Table 7. Controlling for all other predictors, the HINT showed a small but statistically significant effect in predicting changes in anxiety and depressive symptoms at T2.⁷ The effect was stronger for depression (3.3%) than for anxiety (1.6%). The variance inflation factors varied from 1.015 to 1.659 across the four analyses, indicating that there were no multicollinearity problems. These results support our prediction that habitual negative self-thinking as a process aspect contributes to the prediction of self-worth over and above a measure of negative mental content. In this case, the results were obtained in a large adult sample, and over a time span of nine months.

General discussion

Habitual negative self-thinking may be defined by three key elements; (1) the negative cognitive content of self-thoughts; (2) the frequent occurrence of such thoughts; and (3) the fact that these thoughts occur with a high degree of automaticity (e.g., Haaga et al., 1991;

Moretti & Shaw, 1989). Drawing on the conception of habit as repetitive and automatic responses, the latter two elements may qualify such thinking as a mental habit. The habitual quality of negative self-thinking was thus defined as a process aspect that can be distinguished from the content of such thinking. The present studies provided strong evidence for the basic tenet that metacognitive reflections on the habitual aspects of negative self-thinking explain variance in self-worth over and above measures of negative cognitive content. These results were obtained for a variety of phenomena, i.e., explicit self-esteem, implicit self-esteem, the asymmetry in the speed of response to positive versus negative self-related stimuli. In addition, similar results were obtained for the prediction of symptoms of anxiety and depression nine months later. We also tested a variety of content measures, i.e., the Automatic Thoughts Questionnaire, self-elicited negative self-thoughts, and the Dysfunctional Attitude Scale. Importantly, negative self-thinking habit was found to be empirically distinct from two other process-oriented measures, i.e., rumination and (absence of) mindfulness.

Whereas negative self-thinking has mostly been studied in the realm of depression and other psychopathological conditions, the role of negative thinking in self-esteem in nonclinical populations has received relatively little attention. The present studies suggest that low self-esteem is not only built on negative self-related cognitions, but also on the way such cognitions emerge, i.e., the degree to which such thinking is a mental habit. This process aspect may be subject to metacognitive reflection, and may thus be measured by an instrument such as the HINT. The results suggest that considering negative self-thinking as a mental habit contributes to the understanding of feelings of self-worth over and above the cognitive content that underlies such feelings. The studies also provided support for our assumption that metacognitive beliefs play an important role in cognitive and affective self-related processes. Negative self-thinking habit may thus be a new and interesting concept to consider in the large and complex domain of self-esteem and self-regulation.

An important finding was that negative self-thinking habit seems related to *implicit* self-esteem as measured by the implicit association test and the name letter effect. Negative mental content did not relate to these implicit measures. The relationship between explicit and implicit self-evaluation has received much attention in recent years (e.g., Bosson et al., 2000; Epstein, 1994; Jordan, Spencer, & Zanna, 2003; Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; Koole & DeHart, in press; Koole et al., 2001; Koole & Pelham, 2003; Pelham et al., 2005; Smith & DeCoster, 2000). Why would a metacognitive self-report instrument such as the HINT be related to implicit self-esteem? Although the implicit self is not directly accessible by means of conscious thinking, it does manifest itself in a variety of ways. To begin with what happens in the laboratory, the IAT and the name letter effect are based on the assumption that implicit self-esteem unintentionally influences the categorization and evaluation of stimuli. However, implicit self-esteem also affects attitudes, moods, and behavior in everyday life. This occurs mostly outside our awareness, but implicit self-esteem may sometimes surface into more conscious experiences (e.g., Jordan, Spencer, & Zanna, 2003; Jordan, Spencer, Zanna et al., 2003). As the implicit self is large and complex, such experiences may take many forms, such as recurrent intuitive feelings, hunches, nagging doubts, vague memories, responses to everyday hassles, and other forms of non-concentrated thinking (see e.g., Koole & DeHart, in press). We think that the self-perceptive nature of the HINT may make this measure sensitive to such instances of surfacing self-esteem. Instances of surfacing implicit self-esteem may especially become apparent when these are negatively valenced, and thus are relatively salient (Nowak et al., 2000). Such instances, particularly when these happen frequently, are more likely to be detected compared to instances when positive implicit material (which is predominant in well adapted individuals' implicit self-esteem) surfaces.

On the other hand, measures of cognitive content and explicit self-esteem are less likely to relate to instances of surfacing implicit self-esteem, as these focus on conscious thoughts rather than on the unfocused modes of thinking that characterizes instances of surfacing implicit self-esteem. In terms of Epstein's (1994) cognitive-experiential self-theory, cognitive content falls in the realm of the rational system, at least to the extent that the content depends on language for verbalization, which may thus be addressed in a deliberate and conscious manner. The habitual aspect of negative self-thinking may be more akin to the experiential system, which is of an implicit and schematic nature, and is founded on emotionally significant past experiences. The HINT may 'have it both ways'; on the one hand it relates to the conscious negative self-thoughts, and thus feeds into explicit self-esteem, and on the other hand, it taps into implicit self-esteem, which is generally believed to be inaccessible to direct introspection. Although the relations between the HINT and measures of implicit self-esteem were much weaker compared to relations between the HINT and measures of explicit self-esteem, the former appeared detectable and statistically reliable. By relating both to explicit and implicit self-esteem, the HINT may prove useful in investigating how these two systems relate to each other, such as in research on the distinction between secure and defensive self-esteem (Jordan, Spencer, & Zanna, 2003; Jordan, Spencer, Zanna et al., 2003), narcissism (Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004), and discrimination (Jordan, Spencer, & Zanna, 2005).

Negative self-thinking habit was found inversely related to a positivity bias in the processing of self-relevant stimuli. Note that the effect was confined to the self-relevant positive stimuli, and did not occur for other-relevant positive stimuli. There may be cognitive, affective, as well as more fundamental behavior-regulation reasons for this effect. As we discussed earlier, low self-worth individuals' selves may be less well cognitively organized (e.g., Campbell et al., 1996; Nowak et al., 2000), which may thus impede efficient processing

of both positive and negative self-relevant information. Rottenberg et al.'s (2005) emotion context insensitivity perspective suggests that depressed individuals exhibit diminished emotional reactivity to both positive and negative stimuli. Although their model focuses on explaining major depressive disorder, similar mechanisms may occur in non-clinically depressed but low self-worth persons. Our results thus may reflect the difficulty habitual negative self-thinkers may have in regulating positive affect, something that occurs relatively efficiently in other individuals. These results may also be seen in the view of two fundamental systems of behavior regulation, i.e., the Behavioral Approach System (BAS) and the Behavioral Inhibition System (BIS; Gray, 1994). The former system regulates approach behavior, whereas the latter regulates the withdrawal and inhibition of behavior. It has been suggested that depression is particularly associated with a deactivation of the BAS, i.e., a general shutdown of appetitive behavior (Abramson et al., 2002; Wang et al., 2006). Although we realize that a strong negative self-thinking habit should be distinguished from being clinically depressed, our results are in line with similar findings in that area.

An auxiliary assumption in our studies is that the metacognitive beliefs the HINT measures do have at least some validity in reflecting the operation of automatic processes. An intricate question is whether what we refer to as metacognitive reflection signifies a degree of metacognitive *awareness* of automatic processes, or, rather, beliefs about such processes that may not be accurate at all. Clearly, our studies cannot provide unequivocal evidence that answers this question. However, the relationships between the HINT and the implicit measures at least suggests the possibility that responses to the HINT reveal some degree of metacognitive awareness. We do not wish to claim that people have introspective insight in automatic processes per se (e.g., priming or retrieval mechanisms). But given the proper set of questions, people may be able to report on the fact that an automatic process has been in operation, e.g., as suggested by the realization of a lack of awareness, difficulty to control or

lack of conscious intent. Such instances must be sufficiently salient in order to be detected, which thus determines the boundary conditions of the validity of this paradigm. Importantly, even if the metacognitive beliefs the HINT measures are completely inaccurate, the present studies show that these beliefs do have importance to people's self-evaluations, and are thus worth further studying.

Future studies may test the potential contribution of the habitual negative self-thinking construct in the clinical domain, for instance as a marker of cognitive vulnerability to depression (e.g., Ingram et al., 1998). Whereas the prevalence of automatic negative thoughts is a core feature of a depressive episode (e.g., as measured by the ATQ), such thoughts tend to disappear when a depression has receded (e.g., Teasdale & Barnard, 1993). Dysfunctional attitudes are also more state than trait dependent, i.e., they tend to be activated in response to negative events or dysphoric mood (e.g., Ingram et al., 1998; Miranda & Persons, 1988). Consequently, on the basis of negative cognitive content, it may be difficult to distinguish previously depressed from never depressed persons. Negative self-thinking habit, on the other hand, might be more trait than state dependent. As cognitive vulnerability to depression or relapse should be considered as a trait (Ingram & Siegle, 2002), negative self-thinking habit may be a better marker of vulnerability than cognitive content. The way this works may be similar to the mechanism we discussed with respect to implicit self-esteem. Previously depressed persons may have built up a history of small depressive relapses, for instance in the form of responses to daily hassles or mood swings. These small relapses may not necessarily lead to a new depressive episode, but may imprint a sense of habitual negative self-thinking in the experiential system (Epstein, 1994). The construct of negative self-thinking habit may thus prove useful in monitoring over time the way formerly depressed individuals relate to negative thoughts, perhaps as the result of interventions such as mindfulness-based cognitive therapy (e.g., Teasdale et al., 2002).

Conclusion

One of the most important recent advances in research on the habit construct is that it is now conceptualized as a mental construct rather than as the frequency of previous performances of a behavior (Verplanken, 2006; Verplanken & Orbell, 2003). This realization, in turn, made three other ideas possible. In the first place, habits need not be restricted to overt behaviors; there can be mental habits too. Secondly, it is possible to distinguish between mental contents and mental processes. Thirdly, mental habits may be subject to metacognitive reflection, and may thus play a role in self-evaluative processes. The combination of these insights led to some predictions that otherwise would not have been made, which is what theorizing is supposed to accomplish (Meehl, 1997; Trafimow, 2003, 2005). Although the predictions were strongly supported, there remain some unsolved issues. For example, it is not immediately clear which mental processes qualify as habits and which do not. For the moment, researchers could use measures such as the HINT to settle this on an empirical basis for the mental process of concern, though it would be more elegant to have a general, *a priori* solution that works for all mental processes. Although we recognize these limitations, we also believe that the successful predictions that were reported here testify that progress is being made, and bode well for future research on mental habits.

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Footnotes

1. According to the traditional conception of habit, the ATQ might qualify as a measure of habit. However, rejecting the notion that frequency of occurrence equates habit, and given that the ATQ contains thirty carefully selected thoughts, we considered the ATQ first and foremost as a content measure of negative self-thinking. If our conceptualization of habit is wrong (i.e., if previous frequency of occurrence is a sufficient feature of habit), the HINT would not show an additional effect, which thus would work against our hypothesis.
2. We also tested the interaction between ATQ and HINT (i.e., a multiplication of standardized ATQ and HINT scores). Including this interaction term did not make a statistically significant contribution. We neither found interaction effects in the studies that follow, and will not further report these analyses.
3. Although we followed most of Greenwald et al.'s (2003) recommendations concerning the scoring algorithm for the IAT, i.e., we did not include the practice trials as these contained relatively many long RTs and errors. However, including the practice trials did not alter the main results. In that case too, the HINT contributed to the prediction of implicit self-esteem over and above all other predictors, R^2 -change = 0.043, $p < .009$.
4. This study also provided the opportunity to replicate the main results of Study 2. As expected, the HINT accounted for variance in explicit self-esteem over and above the contribution of gender, age, and ATQ, R^2 -change = 0.090, $p < .001$.

5. We also attempted to manipulate self-focus; half of the participants filled out the questionnaire in front of a mirror. Because there were no effects of this manipulation on the dependent variables, the data were collapsed across the two conditions.
6. The literal instruction was as follows: “We want to learn more about the role of intuition in language. Language comes very natural. However, we assume that intuitive associations play an important role.” This was followed by a description of the task procedure. Participants then read: “We want you to decide intuitively and as quickly as possible whether you feel the second word (the blue word) does or does not belong to the first word. You may find it strange, difficult, or illogical, to make these decisions. Yet, this is exactly what we want you to do. Remember, we study intuition. There are no right or wrong answers”.
7. Because of the large sample size, an alpha level 0.001 was used for all significance tests in this study.
8. According to diathesis stress models of depression, it might be expected that negative life events would moderate the relation between negative self-thinking and anxiety/depression (e.g., Miranda & Persons, 1988). However, a HINT * negative life events interaction term (based on standardized scores) did not make a statistically significant contribution.

Table 1: Means, standard deviations, and correlations of the variables included in Study 3.

Variable and range	<i>M</i>	<i>SD</i>	2	3	4
1. HINT (1-5)	2.79	0.89	0.411***	0.474***	-0.668***
2. N of negative self-thoughts	4.25	2.49		0.140	-0.380***
3. Perceived frequency (1-5)	2.76	0.66			-0.300**
4. Self-esteem (1-5)	3.61	0.81			

Note: ** = $p < .01$, *** = $p < .001$. HINT = Habit Index of Negative Thinking.

Table 2: Means, standard deviations, and correlations of the variables included in Study 4.

Variable and range	<i>M</i>	<i>SD</i>	2	3	4
1. HINT (1-5)	2.70	1.05	0.665	-0.416	-0.555
2. Rumination (1-5)	3.44	0.84		-0.428	-0.554
3. Mindfulness (1-5)	2.75	0.54			0.352
4. Self-Esteem (1-5)	3.80	0.73			

Note: All correlations are statistically significant at $p < .001$. HINT = Habit Index of Negative Thinking.

Table 3: Means, standard deviations, and correlations of the variables included in Study 5.

Variable and range	<i>M</i>	<i>SD</i>	2	3	4
1. HINT (1-7)	3.03	1.36	0.537***	-0.473***	-0.279**
2. ATQ (1-5)	1.68	0.62		-0.408***	-0.012
3. Explicit self-esteem (1-5)	3.88	0.72			0.065
4. Implicit self-esteem	0.48	0.53			

Note: ** = $p < .01$; *** = $p < .001$. HINT = Habit Index of Negative Thinking. ATQ = Automatic Thoughts Questionnaire. Implicit self-esteem was measured by the Implicit Association Test, using the *D* measure (Greenwald et al., 2003).

Table 4: Means, standard deviations, and correlations of the variables included in Study 6.

Variable and range	<i>M</i>	<i>SD</i>	2	3	4
1. HINT (1-5)	2.95	0.84	0.245***	0.473***	-0.166*
2. N of negative self-thoughts	4.96	2.39		0.022	0.006
3. Perceived frequency	2.73	0.56			-0.031
4. Implicit self-esteem	0.53	1.04			

Note: * = $p < .05$, *** = $p < .001$. HINT = Habit Index of Negative Thinking. Implicit self-esteem was measured by the size of the Name Letter/Birth Date Number effect.

Table 5. Means, standard deviations, and correlations of the variables included in Study 8.

Variable and range	<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8	9
1. HINT at T1 (1-7)	2.72	1.56	0.508	0.153	0.188	0.552	0.461	0.088	0.509	0.447
2. DAS at T1 (1-7)	2.49	0.69		0.141	0.198	0.462	0.387	0.028	0.404	0.355
3. Work-Related Stress at T1 (1-7)	4.76	1.09			0.230	0.150	0.159	0.057	0.151	0.125
4. Home-Related Stress at T1 (1-7)	2.81	1.31				0.236	0.272	0.022	0.197	0.226
5. Anxiety Symptoms at T1 (7-28)	12.51	3.27					0.594	0.095	0.694	0.478
6. Depression Symptoms at T1 (7-28)	10.98	2.80						0.067	0.458	0.634
7. Negative Life Events* (0,1)	0.45	0.50							0.145	0.122
8. Anxiety Symptoms at T2 (7-28)	12.33	3.40								0.594
9. Depression Symptoms at T2 (7-28)	10.95	2.83								

Note: Correlations > 0.10 and < -0.10 are statistically significant at $p < .001$. HINT = Habit Index of Negative Thinking. DAS = Dysfunctional Attitude Scale. HADS-A = Hospital Anxiety and Depression Scale, anxiety subscale. HADS-D = Hospital Anxiety and Depression Scale, depression subscale.* The occurrence of at least one of eleven negative life events between T1 and T2.

Table 6. Hierarchical multiple regression analyses predicting anxiety and depression symptoms at T1 (Study 8).

Predictor	Anxiety symptoms				Depression symptoms			
	<i>Beta</i>	<i>R</i> ²	<i>R</i> ² -change	<i>Final beta</i>	<i>Beta</i>	<i>R</i> ²	<i>R</i> ² -change	<i>Final beta</i>
<i>Step 1:</i>								
Gender	-0.102	0.080	0.080***	-0.088	0.037	0.084	0.084***	0.053
Age	-0.061			0.002	0.034			0.087
Work stress	0.093			0.018	0.084			0.023
Home stress	0.219***			0.115***	0.252***			0.166***
<i>Step 2:</i>								
DAS	0.410***	0.237	0.158***	0.213***	0.324***	0.182	0.099***	0.151***
<i>Step 3:</i>								
HINT	0.430***	0.373	0.136***	0.430***	0.379***	0.288	0.105***	0.379***

Note: *** = $p < .001$. DAS = Dysfunctional Attitude Scale. HINT = Habit Index of Negative Thinking.

Table 7. Hierarchical multiple regression analyses predicting anxiety and depression symptoms at T2 (Study 8).

Predictor	Anxiety symptoms at T2				Depression symptoms at T2			
	<i>Beta</i>	<i>R2</i>	<i>R2-change</i>	<i>Final beta</i>	<i>Beta</i>	<i>R2</i>	<i>R2-change</i>	<i>Final beta</i>
<i>Step 1:</i>								
Gender	-0.006	0.498	0.498***	-0.007	0.052	0.406	0.406***	0.073
Age	-0.043			-0.028	-0.017			0.017
Work stress at T1	0.042			0.024	0.042			0.018
Home stress at T1	0.023			0.013	0.046			0.032
Symptoms at T1	0.687***			0.568***	0.611***			0.489***
<i>Step 2:</i>								
Negative Life Events T1-T2	0.071	0.503	0.005	0.066	0.068	0.411	0.005	0.056
<i>Step 3:</i>								
DAS at T1	0.103***	0.511	0.008***	0.055	0.118	0.422	0.012***	0.038
<i>Step 4:</i>								
HINT at T1	0.165***	0.528	0.016***	0.165***	0.229***	0.456	0.033***	0.229***

Note: *** = $p < .001$. DAS = Dysfunctional Attitude Scale. HINT = Habit Index of Negative Thinking.

Appendix

The Habit Index of Negative Thinking (HINT)

Instruction: "Occasionally we think about ourselves. Such thoughts may be positive, but may also be negative. In this study we are interested in *negative* thoughts you may have about yourself. Please indicate how much you agree or disagree with the following statements."

Thinking negatively about myself is something

1. I do frequently.
2. I do automatically.
3. I do unintentionally.
4. that feels sort of natural to me.
5. I do without further thinking.
6. that would require mental effort to leave.
7. I do every day.
8. I start doing before I realize I'm doing it.
9. I would find hard not to do.
10. I don't do on purpose.
11. that's typically "me".
12. I have been doing for a long time.