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ORIGINAL ARTICLE

Overgeneralization as a Predictor of the Course of Depression Over Time: The Role of Negative Overgeneralization to the Self, Negative Overgeneralization Across Situations, and Overgeneral Autobiographical Memory

Filip Raes[1] · James W. Griffith[2] · Miet Craeynest[3] · J. Mark G. Williams[4] · Dirk Hermans[1] · Tom J. Barry[5] · Keisuke Takano[6] · David J. Hallford[7]

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Abstract

Background Depression is characterized by different forms of overgeneralization that are all assumed to play a causal role in the development and course of depression.

Methods We examined, in a community sample of over 625 individuals, whether these different forms of overgeneralization are correlated and whether they are prospective predictors of depression at 6-month follow-up.

Results Negative overgeneralization to the self and across situations—two types of overgeneralized thinking processes—were significantly but weakly related, but neither of them was related to overgeneral memory—a memory-based form of overgeneralization. Overgeneralization to the self and overgeneral memory both predicted depression symptoms at follow-up. Further, two and three-way interactions indicated that higher levels of overgeneralization processes interact to predict depressive symptoms. Overgeneralization to the self and overgeneral memory both independently predicted probable recurrence of a major depressive episode during the follow-up period in individuals that formerly experienced depression.

Conclusions Findings suggest that overgeneralization in depression is not a unitary construct and that different overgeneralization processes play independent and interacting roles in the course of depression.

Keywords Depression · Overgeneralization · Cognitive distortion · Overgeneral autobiographical memory (OGM) · Prediction

✉ David J. Hallford
david.hallford@deakin.edu.au

1 Faculty of Psychology and Educational Sciences, University of Leuven, Leuven, Belgium

2 Department of Medical Social Sciences, Northwestern University, Evanston, USA

3 Department of Applied Psychology, Thomas More University College and Howest University College, Bruges, Belgium

4 Department of Psychiatry, University of Oxford, Oxford, UK

5 Experimental Psychopathology Lab, Department of Psychology, The University of Hong Kong, Pokfulam, Hong Kong

6 Division of Clinical Psychology and Psychotherapy, Department of Psychology, Ludwig-Maximilians-University Munich, Munich, Germany

7 School of Psychology, Deakin University, 221 Burwood Highway, Burwood, Melbourne, VIC 3125, Australia

Introduction

In 1963, Aaron Beck first described overgeneralization as a hallmark cognitive distortion in depression and defined it as "patients' pattern of drawing a general conclusion about their ability, performance or worth on the basis of a single incident" (Beck, 1963; pp. 328–329). In his later writings, it was further described as "drawing a general rule or conclusion on the basis of one or more isolated incidents and applying the concept across the board to related and unrelated situations" (Beck et al., 1979; p. 14) or simply as "unjustified generalization on the basis of a single incident" (Beck, 1976; p. 94). It is important to note here that Beck focuses on overgeneralizations following *negative* events, which we define as *negative overgeneralization*.[1] An example would

[1] *Positive* overgeneralization, or the tendency to overgeneralize the positive outcome of a single incident across situations and/or to a

be a person experiencing symptoms consistent with depression who, in response to a minor remark of his boss about a recent presentation, has the thought "you see, I'm a complete failure, I can't get anything right!". Another example of overgeneralized thinking by the same person, when his wife asks him later that day to fix the garden fence, would be: "My presentation at work was a disaster, so for sure I won't be able to repair the fence".

The evidence so far has largely supported the association between negative overgeneralization and depression.[2] A robust finding in the literature, primarily using the Attitudes Towards Self scale (ATS; Carver & Gannellen, 1983) is that there is a substantial positive association between negative overgeneralization to the self and severity of depressive symptoms, with *r*s ranging from 0.30 to 0.60 (e.g., Carver & Gannellen, 1983; Carver et al., 1988; Eisner et al., 2008; Ganellen, 1988; MacLeod & Williams, 1990). This cross-sectional association has been observed for individuals with current major depressive disorder (van den Heuvel et al., 2012) and individuals with a history of major depressive disorder (Eisner et al., 2008) compared to people who never had experiences consistent with depression. When examined over time, it has been found that negative overgeneralization prospectively predicts higher levels of depression (Carver, 1998; but see Carver et al., 1988). Further, there is some evidence for the specificity of the association between negative overgeneralization and depression. For example, negative overgeneralization to the self is not significantly related to anxiety (Ganellen, 1988), and is fully accounted for by current depressive symptoms in both bipolar disorder (Eisner et al., 2008) and borderline personality disorder (Van den Heuvel et al., 2012).

Other studies, however, have focused on a somewhat different form of overgeneralization and therefore used other measures, such as subscales of the Cognitions Questionnaire (CQ; Fennell & Campbell, 1984), the Cognitive Errors Questionnaire (CEQ; Lefebvre, 1981), or the Children's Negative Cognitive Error Questionnaire (CNCEQ; Leitenberg et al., 1986). These instruments measure *negative overgeneralization across situations*, which involves (over)generalizing the negative outcome of a situation (e.g., I didn't get the job I applied for last month) to a different situation (e.g., "I bet the new neighbors won't like me") which reflects seeing unpleasant events as typical for one's life (Fennell & Campbell, 1984), without necessarily making negative inferences about one's personal overall self-worth. To further distinguish, overgeneralization about the self involves broad negative inferences about oneself from singular circumstances, whereas overgeneralization across situations will involve broad negative inferences about circumstances external to the person, but potentially relevant to them, from singular situations (e.g., that's math's test was hard) to a broader range of situations (e.g., tests are generally too stress-inducing). Correlations between this negative overgeneralization across situations and depressive symptom severity have also been observed (MacLeod & Williams, 1990). In one of the rare studies examining overgeneralization in children, Leitenberg et al. (1986) found that children with elevated depressive symptoms showed higher levels of negative overgeneralization than a control group. Adults recovered from depression showed higher levels of negative overgeneralization across situations relative to people who never had experiences consistent with depression (Fennell & Campbell, 1984). Unlike negative overgeneralization to the self, to the authors' knowledge there currently are no prospective studies that also examine depressive symptoms.

Despite the fact that these types of overgeneralization, focusing on different aspects of negative cognition, can be distinguished, given that both fit with Beck's original definition of negative overgeneralization in depression, and they behave comparably in terms of their relation with depression one might expect an association between them. Yet we are aware of only one study to date that has explicitly examined the relation between both types of negative overgeneralization. MacLeod and Williams (1990) found that negative overgeneralization to the self and across situations were only weakly and non-significantly related, $r(41) = 0.24$.

Independent from the Beckian literature on cognitive distortions, there exists a literature in depression research on overgeneralization of memories. Research on overgeneralization of memory has grown ever since a seminal report by Williams and Broadbent (1986) on a phenomenon called *overgeneral autobiographical memory* (OGM). The basic observation is that when asked to describe a specific memory in response to an emotional cue-word, people with depression tend to respond, relatively more than healthy controls, with overgeneralized or so-called categoric memories. OGM is usually tested with the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), which consists of

Footnote 1 (continued)

broader sense of self-worth, and how this relates to depression, will be addressed in the discussion.

[2] For reasons of length and score, we have decided to focus on the literature on (over)generalization as defined here and not to focus on work that is related to psychological processes, such as attribution style. We acknowledge that, for example, global attributions are related to overgeneralization. We also recognize, however, that these constructs are conceptually different (Kernis, Brockner and Frankel, 1989, p. 707). Also, Carver, Ganellen and Behar-Mitrani (1985) have shown that partialling out global attribution (as measured with the Attributional Style Questionnaire, ASQ; Peterson et al., 1982), did not affect the association between overgeneralization and depression, whereas the association between globality and depression was reduced by two thirds when overgeneralization was partialled out. Eisner et al., (2008, p. 161) concluded that this indicates that "[over] generalization per se, rather than attribution, is the core of the link between [over] generalization and mood related outcomes".

a set of positive and negative cue-words. Whereas a specific memory refers to a single event that occurred at a particular place and time and lasted less than one day (e.g., "The moment that the instructor informed me that I didn't pass my driving test", in response to the cue 'failed'), an overgeneral categoric memory refers to a class or summary of similar events (e.g., "the times that I failed important tests"; see Williams et al., 2007, for a review). A recent review has shown that OGM persists in people who have recovered from, or formerly experienced depression (Hallford et al., 2021a). A recent meta-analysis, including 32 prospective studies, concluded that OGM is a predictor of the course of depression, in that OGM predicts higher follow-up symptoms (Hallford et al., 2021b). However, it remains unclear whether OGM occurs prior to the very first onset of depression, or is a 'scar' of prior episodes that predicts later episodes simply because it is a marker of previous depression.

Although the research tradition on overgenerality in the retrieval of autobiographical events convincingly points to an important role of overgeneralized processing in depression at the level of memory functioning, the association of this memory overgeneralization with the Beckian type of overgeneralized thinking processes in depression (negative overgeneralization to the self and across situations) has never been examined despite strong theoretical arguments that make a relationship between them highly plausible.

According to Beck et al. (1979), cognitive distortions, such as overgeneralization, are triggered by the activation of a dysfunctional schema, especially in reaction to a stressful or negative experience. These schemas are believed to direct current self-evaluative thinking, as well as influence memory functioning, such as the retrieval or recollection of past personal experiences: "Whether the particular cognitive process [is] recollection [of memories], evaluation of [one's] current status or attributes, or prediction of the future, the thoughts [bear] the imprint of [the] schema" (Beck et al., 1979; p. 565). It is a central tenet of information processing accounts in cognitive psychology that schemas give rise to (schema-congruent) biased or selective processing in the domains of attention, interpretation and memory.

The question then arises whether OGM and overgeneralized thinking are actually one and the same thing. Dalgleish et al. (2003) indicated that they may be. They suggest that cue-words on the AMT may map onto the content of self-schemas, which consist of generic negative aspects of the self. Certain cue words like 'failed' and 'unsuccessful' may then further activate negative schemas. As they state, "participants' responses on the cue-word task could amount to a propositional 'read-off' of the activated self-schemas. Such a read-off would essentially look like a categorical autobiographical memory" (Dalgleish et al., 2003, p. 220). Similarly, Ramponi et al. (2004) provided evidence to show that people who have less differentiated affect-related schematic models retrieve more categoric memories on the AMT. In sum, it is not clear whether these different domains of overgeneralization derive from the same underlying process. More recent theorizing suggests that OGM may be explained by a tendency for people with negativity emotionality/affectivity to process information in a way that is low in sensory-perceptual details, allowing threat-related information in prior categorical beliefs to dominate conscious recall of self-related information (Van den Bergh et al., 2021). This may be somewhat adaptive in that it reduces the threshold of being aware of self-related aversive experiences in a 'better safe than sorry' type of strategy. One important way of clarifying the issue is not only to examine the associations between them, but to see whether they independently predict the course of later depression.

Overview of the Present Study

The present study focused on the three following forms of overgeneralization: negative overgeneralization to the self, negative overgeneralization across situations, and overgeneral autobiographical memory (OGM). These overgeneralization variables were studied in a large community sample with a follow-up assessment six months later. We also measured probable depression at baseline and at follow-up using both dimensional measures of symptom severity, and diagnostic criteria (to assess the probable presence or absence of a major depressive episode).

The study had three main aims. The first aim was to examine the correlations between the different forms of depression-relevant overgeneralization. For negative overgeneralization to the self and across situations we expected a positive, but weak association based on prior findings of MacLeod and Williams (1990). As for OGM, our study is the first to test its association with the Beckian type of overgeneralization. Based on theoretical arguments from schema-based accounts (Dalgleish et al., 2003; Ramponi, et al., 2004), we hypothesized that OGM would be positively associated with both forms of negative overgeneralization.

The second aim was to further examine the correlations by testing the predictive association between our different overgeneralization variables and the course of depression. Based on the findings of Carver (1998), and the putative causal role for negative overgeneralization in depression (e.g., Beck et al., 1979), we hypothesized that both forms of negative overgeneralization would predict levels of depression symptoms prospectively, as well as the probable *recurrence* of such episodes in participants with a history of major depressive disorder. For overgeneralization at the level of memory functioning (i.e., OGM), we hypothesized, given the findings of the meta-analysis of Hallford et al., (2021a, 2021b, 2021c, 2021d), that OGM would also predict higher

follow-up symptoms and probable recurrence of a major depressive episode. As mentioned above, we also assessed probable diagnostic status and history of depression. This allowed us to fulfill our third aim, which was to examine for the first time whether OGM predicts the probable first onset of a major depressive episode. Given OGM's associations with various aspects of depression, we hypothesized that OGM would predict the probable first onset of a depressive episode. Exploratory analyses were also conducted to tests for possible interaction effects between the three overgeneralization variables.

Method

Participants

Participants were a convenience sample of 625 community-dwelling adults (413 women; 212 men) that were recruited by students using their personal social networks, including in classes, and social media such as Facebook, Instagram etc., and through the process of snowballing.[3] The sample size was estimated to enable testing for moderate to large effects ($R^2 = 0.20$) in multiple regression models, with 500 participants providing adequate power (0.90) to detect this with an alpha of 0.05. This was feasible to recruit, and some oversampling was done to account for likely dropout at T2. The average age was 33.6 years ($SD = 13.7$; range 17–84). In terms of education, 45.6% had a higher education degree (either a university degree, 12.1%, or a university college degree, 33.5%), 2.7% followed a specific professional education after secondary school, 41.0% completed secondary school, 8.7% completed the first three years of secondary school, and 2.1% completed grammar school (education data missing for four participants). There was no compensation for participants.

Measures

Overgeneralization Subscale of the Attitudes Toward Self Scale (ATS-OG; Carver & Gannellen, 1983)

The ATS-OG assesses the tendency to generalize from a specific failure to a broader sense of worthlessness. All 7 items are rated on a 1 (*extremely untrue*) to 5 (*extremely true*) scale. A sum score is calculated (range: 7–35). A sample item is: "When even one thing goes wrong I begin to feel bad and wonder if I can do well at anything at all" (Carver & Gannellen, 1983). This scale has been shown to have good internal reliability and validity in previous Dutch-speaking samples (Van Der Gucht et al., 2017; van den Heuvel et al., 2012). Cronbach alpha in the present study was 0.91 ($N = 618$).

Overgeneralization Subscale of the Cognitive Errors Questionnaire-Revised (CEQ-R-OG; Moss-Morris & Petrie, 1997; Dutch Version by Goubert et al., 2005; Original CEQ by Lefebvre, 1981)

The CEQ-R-OG assesses overgeneralization across situations, using three vignettes, describing three general life experiences. Each of the three vignettes ends with a thought reflecting overgeneralized thinking. Participants are asked to indicate how similar that thought is to how they would typically think in such a situation, using a scale from 1 (*not at all like I would think*) to 5 (*almost exactly like I would think*). Therefore, the question assesses to what extend someone will generalize a pessimistic, negatively-valenced view of a situation from one event to another event. A sum score is calculated for the three vignettes (range 3–15). Vignettes translated to Dutch in this manner have been shown to be internally reliable, and have content validity and predictive validity (Goubert et al., 2005). A sample vignette is the following: "You have just started a new job and were obliged to attend the annual office Christmas party. You didn't really know anybody there and had a terrible time. When new neighbours invite you to their housewarming party, you think, *'I will have a terrible time, just like at the office party'*." Cronbach alpha in the present study was 0.74 (N = 616).

Autobiographical Memory Test (AMT; Williams & Broadbent, 1986)

The AMT assesses the specificity with which personal memories are being retrieved. For each of ten emotional cue-words (five positive and five negative, presented in alternating order) respondents were asked to write a specific memory the cue reminds them of. In the instructions it is clearly explained what a specific memory is. Participants completed a written, self-report AMT (e.g., Henderson et al., 2002; Raes et al., 2009) with the following cues: self-confident, alone, competent, desperate, successful, jealous, surprised, ashamed, satisfied, and failed.[4] As

[3] The original sample size was 630 participants, but was reduced to 625 after exclusion of cases with missing data on age or gender.

[4] Dutch cue-words were: zelfverzekerd (confident), alleen (alone), bekwaam (capable), wanhopig (desperate), geslaagd (succeeded), jaloers (jealous), verrast (surprised), beschaamd (ashamed), tevreden (satisfied), and gefaald (failed). These were derived using the standard procedure (e.g., Henderson, Hargreaves, Gregory & Williams, 2022; Williams & Broadbent, 1986), matched for emotional extremity, familiarity, and imageability.

typical of the AMT, memories were coded objectively and independently of the participants by a trained coder using the categories: specific (referring to a particular event that lasted less than one day) and categoric (referring to a summary or type of similar events). We focused on the amount of *categoric memories* retrieved for two reasons. First, research has shown that it is especially this type of non-specific response which marks vulnerability. OGM observed in clinical groups, such those experiencing depression or those who having suicidal ideation, is attributable to an increase in the categoric type of non-specific or overgeneral memories (e.g., Barnhofer et al., 2002; Williams & Dritschel, 1992). The phenomenon of OGM has often been seen as synonymous with the retrieval of categoric memories. Second, overgeneralizing as a cognitive error is all about applying a general rule or across a whole class or *category* of related events. Therefore, it seemed especially relevant to look at the AMT-index of categoric memories since this memory type is also about collapsing or summarizing across related/similar events. Researchers in the AMT/OGM community often examine the number of specific memories, as a reversed index for OGM. However, it should be noted that the amount of categoric memories is not the simple reverse of the amount of specific memories. Nevertheless, we also reported descriptive statistics for number of specific memories retrieved on the AMT, and bivariate correlations with negative overgeneralization to the self (ATS-OG) and across situations (CEQ-R-OG). Number of response types within each category are summed, and this scoring procedure has previously been used by our lab and showed good reliability with interrater agreement ranging from 92 to 99% (kappa = 0.83—0.96; Griffith et al., 2009), and acceptable internal reliability of Cronbach's alpha 0.88 for specific memories and 0.75 for categoric memories.

Depression Subscale of the Depression Anxiety Stress Scales (DASS-D; Lovibond & Lovibond, 1995)

The DASS-D assesses the severity of depressive symptoms for the past 7 days. All 7 items are scored on a 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*) scale. We used the Dutch version by de Beurs et al. (2001), which has been found to have good psychometric properties (e.g., de Beurs et al., 2001; Wardenaar et al., 2018). Cronbach alpha in the present study was 0.88 at T1 ($N = 623$) and 0.88 at T2 ($N = 541$).

Major Depression Questionnaire (MDQ; Van der Does et al., 2003)

The MDQ is a self-report questionnaire assessing the probable presence of current and past major depressive episodes. It contains questions that cover all DSM-IV criteria for past and current major depression (APA, 1994) and has shown convergent validity in a Dutch sample with diagnoses from the Structured Clinical Interview for DSM-IV (positive predictive value = 79%, negative predictive value = 100%, Cohen's kappa = 0.75; Williams et al., 2008).

Procedure

Following written informed consent, participants completed all of the above questionnaires (ATS-OG, CEQ-R-OG, AMT, DASS-D and MDQ) at home in written paper and pen form, alongside other questionnaires not of interest in this study (e.g., see Griffith & Raes, 2015). Six months later, the DASS-D and MDQ were completed a second time (also at home). The MDQ at T1 assessed the probable current (at T1) and probable past depressive episode; The MDQ at T2 assessed probable current depressive episode (at T2) and at any point during the 6-month follow-up period. The study was approved by the Ethical Committee of the Faculty of Psychology and Educational Sciences, University of Leuven.

Results

Descriptive Statistics, Group Comparisons and Baseline Associations

Means, standard deviations and scoring ranges for all measures (at T1 and T2) are presented in Table 1. The sample size varied because of missing data. There was no difference on depressive symptoms at T1 for those that were missing data at T2, $t(621) = 0.2$, $p = .819$. According to the MDQ, 23.9% (145 of 606) likely suffered from a major depressive episode (MDE) in the past. Based on the MDQ completed at T1, 6.6% could be labelled as probably currently experiencing depression (40 of 605), 18.7% as formerly, but not currently experiencing depression (i.e., recovered from experiencing depression; 113 of 605), and 74.7% as never experiencing depression (452 of 605). Between T1 and FU, 7.8% of participants had a probable experience of MDE (42 of 536; 15 new onsets, 12 recurrences, and 15 persistent from T1).

We assessed demographic variables of sex and age, given they have been found to be factors in depression in previous research (e.g., Bonnewyn et al., 2007; Salk et al., 2017). Women scored significantly higher with respect to negative overgeneralization to the self and generalization across situations (see Table 1). In contrast, however, women retrieved more specific memories on the AMT than men. There was no difference between men and women with respect to the number of categoric memories retrieved. Contrary to meta-analytic research showing small to moderate differences in depressive symptoms between men and and women (Salk et al., 2017),

Table 1 Means, standard deviations, scoring ranges and sex differences for all measures included

Measure	N	Min	Max	Mean	SD	Sex	N	M	(SD)	t(df)	Cohen's d
ATS-OG	618	7	35	15.44	6.63	Men	209	14.13	(5.68)	3.79 (500.9[a])***	0.30
						Women	409	16.11	(6.98)		
CEQ-R-OG	616	3	15	7.29	3.02	Men	208	6.88	(3.20)	2.37 (614)*	0.20
						Women	408	7.49	(2.91)		
AMT-C	622	0	9	1.05	1.57	Men	212	1.00	(1.57)	0.62 (620)	0.05
						Women	410	1.08	(1.58)		
AMT-S	622	0	10	6.56	3.30	Men	212	5.96	(3.36)	3.32 (620)**	0.28
						Women	410	6.88	(3.22)		
DASS-D T1	623	0	20	3.65	4.03	Men	210	3.46	(3.59)	0.82 (621)	0.07
						Women	413	3.47	(4.24)		
DASS-D T2	541	0	21	2.79	3.55	Men	183	2.78	(3.69)	0.05 (539)	0.01
						Women	358	2.80	(3.48)		

ATS-OG = OverGeneralization subscale of the Attitudes Toward Self scale; CEQ-R-OG = OverGeneralization subscale of the Cognitive Errors Questionnaire-Revised; AMT-C = Autobiographical Memory Test Categoric memories; AMT-S = AMT Specific memories; DASS-D = Depression subscale of the Depression Anxiety Stress Scales; T1 = time 1 or baseline; T2 = time 2 or 6-month follow-up

*$p < .05$; **$p < .01$; ***$p < .001$

[a]Corrected for unequal variances

there was no difference in symptom levels at baseline or follow-up and in the sample overall these symptom levels were low. We also examined associations with age. There were significant associations for age with negative overgeneralization to the self, $r(618) = -0.19$, $p < .001$, and overgeneral memory, $r(622) = 0.15$, $p < .001$ (categoric memories) and $r(622) = -0.33$, $p < .001$ (specific memories). These correlations are consistent with previous findings of increases in overgeneral thinking as age increases, particularly in the context of elevated depressive symptoms, and hypothesised to be related to changes in executive functioning (Wilson & Gregory, 2018). Age was not significantly related to generalization across situations and depressive symptoms, and all effect sizes were trivially small, $|r|s < 0.05$.

One-way F-tests were conducted to explore differences between participants categorized on the MDQ as probably never, probably formerly, and probably currently experiencing depression on all baseline measures. These F-tests yielded significant main effects for negative overgeneralization to the self, generalization across situations and depression symptoms, $9.15 \leq F \leq 97.11$ (all ps $< .001$), $0.28 \leq$ partial eta squared ≤ 0.25. With respect to AMT scores, there was a significant main effect for specific memories, $F(2, 599) = 4.67$, $p < .05$, partial eta squared = 0.16, but not for categoric memories, $F < 1$, partial eta squared = 0.002. As shown in Table 2, Bonferroni-corrected post-hoc comparisons indicated that individuals probably currently experiencing depression score significantly higher than both individuals who never and probably formerly experienced depression in terms of negative overgeneralization to the self and depression symptoms. Individuals who probably formerly experienced depression scored significantly higher than those that never had experiences consistent with depression for negative overgeneralization to the self and depression symptoms. Individuals who probably formerly experienced depression did not differ from Individuals who probably currently experienced depression in terms of overgeneralization across situations; both groups score significantly higher on this scale than those who probably never experienced depression. Individuals who probably formerly experienced depression retrieved more specific memories than those who probably never experienced depression; Individuals who probably currently experienced depression did not differ in terms of specific memories retrieved from either the probable formerly or never having experiences consistent with depression.

With respect to our first aim, negative overgeneralization of the self was positively correlated with generalization across situations, $r(612) = 0.24$, $p < .001$ (Table 2). This was not explained by a shared association with depressive symptoms; when controlling for depressive symptoms, both remain significantly related, $r(df = 607) = 0.21$, $p < .001$. The number of categoric memories on the AMT, in contrast, was not significantly associated with the other two forms of overgeneralization, $|r|s < 0.05$. Overgeneral memory when measured by specific memories, was related to negative overgeneralization to the self, but in the opposite direction than predicted, with a small effect size: The more specific memories retrieved on the AMT, the more negative overgeneralization to the self, $r(615) = 0.17$, $p < .001$. To assess if valence was a factor confounding the results, we did check,

Table 2 Means and standard deviations by diagnostic status at T1 and bivariate zero-order Pearson correlations for all measures included

Measure	Never Dep	Formerly Dep	Currently Dep	CEQ-R-OG	AMT-C	AMT-S	DASS-D T1	DASS-D T2
ATS-OG	14.25_a (5.85) (451)	17.50_b (7.19) (112)	24.13_c (6.03) (38)	.24*** (612)	− .03 (615)	.17*** (615)	.47*** (616)	.35*** (536)
CEQ-R-OG	6.97_a (2.91) (446)	7.94_b (3.12) (113)	8.58_b (2.75) (40)	–	− .05 (613)	.02 (613)	.12** (614)	.15** (534)
AMT-C	1.09_a (1.60) (449)	0.91_a (1.43) (113)	1.10_a (1.72) (40)		–	− .45*** (622)	− .03 (620)	.07 (538)
AMT-S	6.43_a (3.34) (449)	7.46_b (2.79) (113)	6.80_{ab}(3.20) (40)			–	.06 (620)	.01 (538)
DASS-D T1	2.92_a (3.29) (450)	3.90_b (3.61) (113)	11.00_c (5.35) (40)				–	.41*** (540)

ATS-OG = OverGeneralization subscale of the Attitudes Toward Self scale; CEQ-R-OG = OverGeneralization subscale of the Cognitive Errors Questionnaire-Revised; AMT-C = Autobiographical Memory Test Categoric memories; AMT-S = AMT Specific memories; DASS-D = Depression subscale of the Depression Anxiety Stress Scales; T1 = time 1 or baseline; T2 = time 2 or 6-month follow-up

*$p < .05$; **$p < .01$; ***$p < .001$

$_a$Means in the same row with different subscript differ significantly at $p < .05$

post-hoc, whether results were any different when we only considered negative AMT-cues. The number of categoric memories to negative AMT-cues was also not associated with negative overgeneralization to the self (ATS-OG), $r = -0.01$ or across situations (CEQ-R-OG), $r = -0.05$. The pattern was the same for positive AMT-cues.

Overgeneralization to the self and across situations showed significant associations with concurrent and prospective levels of depression symptoms, with the association being stronger for negative overgeneralization to the self than for generalization across situations. The zero-order correlations between both indices of overgeneral memory and levels of depression symptoms (concurrent and prospective) were not significant.

Prediction of Depression at Follow-Up

A hierarchical regression analysis was performed with DASS-D scores at T2 as the criterion variable. DASS-D scores at T1 were included in Step 1, alongside sex, given this is commonly found to predict depression (male coded as 1, female as 2) and probable history of a major depressive episode (no previous episode(s) coded as 0, previous depressive episode(s) coded as 1). In Step 2, the three forms of overgeneralization were included. In Steps 3 and 4, interaction terms created from the centered overgeneralization variables were entered into the model. Table 3 summarizes the results of this analysis. Notably, in the last step, all two-way interactions were being tested as adjusted by the three-way interaction.

Unsurprisingly, depression symptoms at baseline significantly predicted depression symptoms at follow-up. Negative overgeneralization to the self and overgeneral memory (AMT categoric memories) each independently significantly predicted depression symptoms at T2. The more negative overgeneralization and the more overgeneral memory at T1, the higher the level of depression symptoms at T2, when baseline symptomatology, sex, and probable history of past depressive episode were used as covariates. Notably, OGM was a significant predictor in the model despite a non-significant zero-order correlation with depressive symptoms at T2 ($r = .07$, $p = .125$). This could be explained, in part, because of variation in sampling error given a different sample used in zero-order correlations vs. regression analysis (N = 536 vs. N = 514), although the zero-order correlation was almost identical in the regression sample: $r = .065$, $p = .141$). We also assessed for potential statistical suppression. The regression model was run a series of times, each time removing one of the predictor variables while leaving the others in the model. In all of those models, OGM remained a significant predictor ($p < .05$). Therefore, any statistical suppression likely resulted from some combination of variables, with each of these suppressors having only a trivially small impact on their own. It is also likely that other variables in the model controlled for irrelevant variance, increasing power for this predictor to account for relevant variance. Entering the interaction terms in Step 3 and 4 predicted significantly more variance in depressive symptoms, with two significant interactions at Step 4: OGM and overgeneralisation to the self, and a three-way interaction between overgeneralisation variables. On probing for the conditional effect of OGM on depressive symptoms, simple slopes tests were used, and it was found to be strongest at higher levels of negative overgeneralisation to the self (+ 1 SD: $B = 0.41$, $SE = 0.13$, $p = .003$), relative to average (mean: $B = 0.17$, $SE = 0.09$, $p = .065$) or lower levels (-1 SD: $B = -0.06$,

Table 3 Summary of hierarchical regression analysis for variables predicting depression symptoms at *T2*

	B (SE)	β	R^2
Step 1			
Constant	1.93 (0.53)		
Sex	−0.30 (0.30)	−0.04	
DASS-D T1	**0.32 (0.03)**	**0.37*****	
Past MDE	**0.79 (0.35)**	**0.09***	0.16***
Step 2: $\Delta R^2 = .04$ ($p < .001$)			
Constant	0.33 (0.63)		
Sex	−0.48 (0.30)	−0.06	
DASS-D T1	**0.25 (0.04)**	**0.28*****	
Past MDE	0.54 (0.35)	0.06	
ATS-OG	**0.10 (0.02)**	**0.19*****	
CEQ-R-OG	0.06 (0.05)	0.05	
AMT-C	**0.20 (0.09)**	**0.08***	0.20***
Step 3: $\Delta R^2 = .01$ ($p = .048$)			
Constant	2.45 (0.54)		
Sex	−0.41 (0.30)	−0.05	
DASS-D T1	**0.25 (0.04)**	**0.29*****	
Past MDE	**0.71 (0.35)**	**0.08***	
ATS-OG	**0.10 (0.02)**	**0.19*****	
CEQ-R-OG	0.04 (0.05)	0.03	
AMT-C	**0.19 (0.09)**	**0.08***	
ATS-OG × CEQ-R-OG	−0.01 (0.01)	−0.05	
AMT-C × ATS-OG	**0.04 (0.02)**	**0.10***	
OGM × CEQ-R-OG	−0.002 (0.03)	−0.002	0.21***
Step 4: $\Delta R^2 = .01$ ($p = .023$)			
Constant	2.38 (0.54)		
Sex	−0.37 (0.30)	−0.04	
DASS-D T1	**0.24 (0.04)**	**0.28*****	
Past MDE	0.60 (0.35)	0.07	
ATS-OG	**0.11 (0.02)**	**0.21*****	
CEQ-R-OG	0.03 (0.05)	0.02	
AMT-C	0.16 (0.09)	0.06	
ATS-OG × CEQ-R-OG	−0.01 (0.01)	−0.01	
AMT-C × ATS-OG	**0.04 (0.01)**	**0.10****	
OGM × CEQ-R-OG	−0.01 (0.03)	−0.01	
AMT-C × ATS-OG × CEQ-R-OG	**0.01 (0.00)**	**0.08***	0.22***

All rows in bold indicate a statistically significant predictor variable

ATS-OG = OverGeneralization subscale of the Attitudes Toward Self scale; CEQ-R-OG = OverGeneralization subscale of the Cognitive Errors Questionnaire—Revised; AMT-C = Autobiographical Memory Test Categoric memories; DASS-D = Depression subscale of the Depression Anxiety Stress Scales; T1 = Time 1 or baseline; T2 = Time 2/6-month follow-up

*$p < .05$; **$p < .01$; ***$p < .001$

$SE = 0.14$, $p = .662$). On probing the three-way interaction, again, simple slopes tests were used to indicate that the interaction effect of higher OGM at higher levels of overgeneralisation to the self was larger at higher levels of overgeneralisation to situations (+ 1 SD: $B = 0.59$, $SE = 0.18$, $p = .001$; mean: $B = 0.38$, $SE = 0.13$, $p = .005$; -1 SD: $B = 0.17$, $SE = 0.20$, $p = .383$). In summary, these interactions indicated that OGM more strongly predicted depressive symptoms over time when overgeneralisation to the self and across situations were higher.

We then examined the predictive value of the overgeneralization measures for probable depressive episode during the follow-up period. The presence or absence of a probable major depressive episode at any point during the follow-up was coded with a dummy variable (1 = present, 0 = absent). A logistic regression was conducted in the subgroup of people who probably formerly had experiences consistent with depression or had recovered from depression to investigate the predictive value of our measures for recurrence while covarying sex and baseline depression (Table 4). For prediction of probable recurrence of depressive episode, categoric memories were a significant predictor, with more categoric memories associated with a higher likelihood of a recurrence of depression. Negative overgeneralization to the self, measured by the ATS-OG, was also, independently, a predictor of probable depression recurrence. There were no significant interactions between the overgeneralization variables. Notably, in the fourth step, all two-way interactions were being tested as adjusted by the three-way interaction. To achieve the third aim of the study, the same model of logistic regression was conducted in the subgroup of those who probably never experienced depression. This served to examine the predictive value of our measures for first onset (Table 4). For prediction of first onset, the group of three generalization measures did not significantly improve the predictive value of the model, either as independent predictors or as interaction terms.

Discussion

Aim 1: Examine the Relationship Between Two Types of Depressotypic Overgeneralization: Overgeneralized Thinking (About the Self and Across Situations) and Overgeneral Memory

We observed that the two types of negative overgeneralized thinking (i.e., cognitive errors or distortions) were significantly but only weakly associated. The correlation remained significant once depressive symptoms were controlled for. One explanation for why both aspects of negative overgeneralized thinking are only weakly related was put forward MacLeod and Williams (1990). They noted that the ATS, which is used to measure negative overgeneralization to the self, assesses respondents' awareness of their tendency to negatively overgeneralize (i.e., negative overgeneralization

Table 4 Logistic regressions, (a) prediction of probable depression recurrence (Total N = 97, recurrence *n* = 12) and (b) prediction of probable depression onset (Total N = 381, first onset *n* = 15)

	B (SE)	Odds ratio	95% CI for odds ratio
(a)			
Step 1: χ^2 (2) = 9.16*			
Constant	−3.40 (0.66)		
Sex	1.3 (0.73)	4.03	0.95, 17.05
DASS-D T1	**0.19 (0.07)**	**1.21*** **	**1.04, 1.41**
Step 2: $\Delta\chi^2$ (3) = 10.6*			
Constant	−8.23 (2.31)		
Sex	**2.1 (0.91)**	**8.29***	**1.36, 50.27**
DASS-D T1	0.13 (0.09)	1.14	0.94, 1.37
ATS-OG	**0.15 (0.06)**	**1.17***	**1.03, 1.32**
CEQ-R-OG	0.13 (0.13)	1.14	0.88, 1.48
AMT-C	**0.53 (0.24)**	**1.70***	**1.05, 2.77**
Step 3: $\Delta\chi^2$ (3) = 4.72, *ns*			
Constant	−4.49 (1.04)		
Sex	**2.45 (1.01)**	**11.66*** **	**1.59, 85.44**
DASS-D T1	0.21 (0.11)	1.23	0.99, 1.53
ATS-OG	**0.14 (0.06)**	**1.15***	**1.01, 1.32**
CEQ-R-OG	0.04 (0.16)	1.04	0.75, 1.45
AMT-C	0.45 (0.37)	1.58	0.75, 3.31
ATS-OG × CEQ-R-OG	0.01 (0.01)	1.01	0.96, 1.05
AMT-C × ATS-OG	0.10 (0.06)	1.10	0.97, 1.25
AMT-C × CEQ-R-OG	0.20 (0.14)	1.22	0.91, 1.63
Step 4: $\Delta\chi^2$ (4) = 0.64, *ns*			
Constant	−4.72 (1.14)		
Sex	**2.69 (1.0)**	**14.79*** **	**1.77, 123.52**
DASS-D T1	0.21 (0.11)	1.23	0.99, 1.53
ATS-OG	**0.16 (0.07)**	**1.17***	**1.01, 1.36**
CEQ-R-OG	0.01 (0.18)	1.01	0.71, 1.44
AMT-C	0.39 (0.38)	1.49	0.69, 3.18
ATS-OG × CEQ-R-OG	0.01 (0.02)	1.01	0.97, 1.05
AMT-C × ATS-OG	0.10 (0.06)	1.11	0.97, 1.27
AMT-C × CEQ-R-OG	0.22 (0.15)	1.24	0.92, 1.67
AMT-C × ATS- OG × CEQ-R-OG	−0.01 (0.02)	0.98	0.94, 1.02
(b)			
Step 1: χ^2 (2) = 10.06**			
Constant	−4.13 (0.49)		
Sex	3.6 (0.54)	1.43	0.49, 4.13
DASS-D T1	**0.19 (0.05)**	**1.21*** **	**1.08, 1.35**
Step 2: $\Delta\chi^2$ (3) = 6.48, *ns*			
Constant	−5.54 (0.54)		
Sex	0.51 (0.57)	1.67	0.54, 5.17
DASS-D T1	**0.16 (0.06)**	**1.18** **	**1.04, 1.33**
ATS-OG	0.03 (0.04)	1.03	0.94, 1.13
CEQ-R-OG	0.14 (0.08)	1.15	0.97, 1.37
AMT-C	−0.41 (0.30)	0.66	0.36, 1.21
Step 3: $\Delta\chi^2$ (3) = 1.60, *ns*			
Constant	−4.40 (0.61)		
Sex	0.38 (0.59)	1.47	0.46, 4.69
DASS-D T1	**0.17 (0.06)**	**1.19** **	**1.04, 1.34**
ATS-OG	0.05 (0.06)	1.05	0.94, 1.18
CEQ-R-OG	0.21 (0.11)	1.23	0.99, 1.53

Table 4 (continued)

	B (SE)	Odds ratio	95% CI for odds ratio
AMT-C	−0.57 (0.42)	0.56	0.24, 1.28
ATS-OG × CEQ-R-OG	0.01 (0.01)	0.99	0.96, 1.01
AMT-C × ATS-OG	0.01 (0.05)	1.01	0.91, 1.11
AMT-C × CEQ-R-OG	0.10 (0.11)	1.11	0.89, 1.38
Step 4: $\Delta\chi^2$ (4) = 1.75, *ns*			
Constant	−5.30 (0.68)		
Sex	0.24 (0.60)	1.27	0.38, 4.20
DASS-D T1	**0.17 (0.06)**	**1.19****	**1.05, 1.35**
ATS-OG	−0.01 (0.08)	0.98	0.83, 1.16
CEQ-R-OG	0.24 (0.13)	1.27	0.97, 1.66
AMT-C	−0.78 (0.51)	0.45	0.16, 1.24
ATS-OG × CEQ-R-OG	0.01 (0.02)	1.01	0.96, 1.05
AMT-C × ATS-OG	−0.07 (0.08)	0.93	0.79, 1.09
AMT-C × CEQ-R-OG	0.13 (0.12)	1.14	0.89, 1.47
OGM × ATS- OG × CEQ-R-OG	0.02 (0.01)	1.02	0.98, 1.06

All rows in bold indicate a statistically significant predictor variable

ATS-OG = OverGeneralization subscale of the Attitudes Toward Self scale; CEQ-R-OG = OverGeneralization subscale of the Cognitive Errors Questionnaire-Revised; AMT-C = Autobiographical Memory Test Categoric memories; DASS-D = Depression subscale of the Depression Anxiety Stress Scales; T1 = Time 1 or baseline

*$p < .05$; **$p < .01$; ***$p < .001$; Sex was coded as male = 1, female = 2; For the second regression (first onset), because Step 2 was not significant, we did not flag individual covariates as significant

as a 'metacognitive phenomenon'; MacLeod & Williams, 1990, p. 444). Negative overgeneralization across situations, in contrast, is assessed using hypothetical situations and assesses current cognitive distortions with respect to those specific situations. MacLeod and Williams (1990) reasoned that an individual may indeed show negative overgeneralized thinking using a measure like the CEQ-R with hypothetical real-life situations but may not really be aware of doing so (as measured with the ATS). Alternatively, people might be convinced that they overgeneralize (on the ATS) as part of a sense of low self-worth, but do not do so when confronted with concrete examples (CEQ-R).

Another explanation could be that individuals who overgeneralize across situations may not necessarily overgeneralize to the self. The latter type may represent a more severe form of negative overgeneralization or indicative of a later stage in the development of a negative overgeneralized thinking style. The fact that negative overgeneralization to the self was more strongly correlated with depressive symptoms than negative overgeneralization across situations may indirectly support this idea.

We were especially interested to see to what extent both forms of negative overgeneralization would be related to overgeneral autobiographical memory retrieval (OGM). There are several theoretical (e.g., schema-based) arguments that suggests that link might exist. Also, an unpublished small-sample study in children found that both types may indeed be related, although the association may be accounted for by depressed mood (Drummond, 2006). Despite this, our results were clear: no.

One explanation is that OGM was assessed across negative and positive cue-words, whereas the ATS and CEQ-R only deal with negative overgeneralization. So, the latter instruments, unlike the AMT, only consider negative situations or outcomes. In fact, other research that also focused on positive (over)generalized thinking, has shown in some cases the opposite pattern; that is, those experiencing depression generalizing *less* from positive events than people who had never had experiences consistent with depression (e.g., Klar et al., 1997). Our exploratory analysis did not support this. Further, people experiencing depression have been found to be overgeneral with respect to both negative and positive cue-words (see Williams et al., 2007; Van Vreeswijk & De Wilde, 2004, for reviews) and psychometric analyses of the AMT have supported a one-factor model of OGM (Griffith et al., 2009, 2012a, 2012b; Heron et al., 2012).

We used the standard version of the AMT (Williams & Broadbent, 1986) in which respondents are asked to generate personal, specific memories. Thus, memories can refer to important events but may also describe fairly trivial events. For example, a specific memory like "when I bought a bread two weeks ago on that rainy Sunday morning" or a categoric memory like "buying bread on Sundays" describe trivial events, despite the fact that they are autobiographical memories. It is therefore possible that OGM is only related to overgeneralized thinking for memories that are really

important, self-relevant or self-defining (e.g., Singer & Moffitt, 1991–1992; Conway & Pleydell-Pearce, 2000; also see Griffith et al., 2012a, 2012b), rather than trivial memories. This could be tested in future research by asking participants to rate their own memories for personal significance and seeing if this moderates any effects.

A final note is in order here on the index we used for OGM. We focused on the amount of *categoric memories* retrieved, however, interestingly we found that the higher respondents scored in terms of negative overgeneralization to the self (ATS-OG) the *more* specific memories they retrieved on the AMT. What this finding with specific memories suggests is that memory specificity does not necessarily or automatically provide protection against overly general negative conclusions with respect to the self. In the literature on (over)generalization, researchers often refer to the ability to make important discriminations in that generalization and discrimination would be two sides of the same coin (Hermans et al., 2013): "A person who characteristically overgeneralizes fails to make important discriminations and therefore arrives at incorrect conclusions and draws inappropriate lessons from experience" (Epstein, 1992, p. 827). And at the same time memory specificity has also been mentioned as a potentially crucial concept in relation to this issue of discrimination and generalization, in that a higher level of memory specificity would allow an individual to better discriminate or memorize important differences between more or less similar or related personal learning experiences which in turn would lead to less generalization (Hermans et al., 2013; also see: Lenaert et al., 2012). Future research needs to include other measures of (over)generalization than the ATS-OG to further clarify the importance and exact role of memory specificity or OGM in (over)generalization, whether or not in relation to the concept of discrimination.

Aim 2: Investigate to What Extent These Types of Overgeneralization Predict the Development or Course of Depression

Higher levels of negative overgeneralization to the self and OGM at baseline predicted higher levels of depressive symptoms after six months when covarying baseline depressive symptoms and a probable history of major depression. With respect to the former, this finding is in line with the results of the study by Carver (1998) in showing that the pattern can be generalized from a sample of undergraduate students (Carver, 1998) to a more heterogeneous (and larger) community sample. Further, it shows that this remains a significant predictor even when taking into account prior probable history of major depression, important given that people who have suffered from major depression in the past show higher levels of negative overgeneralization to the self than people who did had experiences consistent with depression (Eisner et al., 2008). OGM predicted higher follow-up depressive symptoms when accounting for baseline symptomatology. Moreover, this relationship also held when probable prior history of depression was used as a covariate. All of our overgeneralization indices were taken into consideration in a single model, which means that negative overgeneralization to the self and OGM are independent predictors of depression at follow-up. This shows for the first time that OGM has predictive value even when accounting for people's tendency to negatively overgeneralize as a thinking style (Beckian cognitive error). Importantly, interaction effects indicated that OGM was a stronger predictor of depressive symptoms at follow-up at higher levels of overgeneralisation to the self. Further, although negative overgeneralization across situations did not itself predict depressive symptoms, a three-way interaction did indicate that OGM predicted depressive symptoms most strongly at higher levels of overgeneralisation to the self *and* across situations. This suggests that negative overgeneralization across situations in isolation may not be a good indicator of depressive vulnerability. However, negative overgeneralization to the self may emerges as a predictor of depression in combination with other overgeneralised processes and in the case of more severe depressive symptoms.

What about the predictive power of the overgeneralization variables for diagnostic status at follow-up? Two out of three overgeneralization variables were significant predictors of probable recurrence of a major depressive episode for those who had probably experienced depression in the past but were not experiencing depression at baseline (i.e. recovered or formerly experiencing depression). Again here, it was negative overgeneralization to the self and OGM, not negative overgeneralization across situations, that independently predicted probable recurrence of depression in those who had recovered from depression. This is the first study to examine negative overgeneralization (to the self and across situations) as a predictor of diagnostic status.

Aim 3: Investigate Whether OGM Predicts Probable First Onset of a Major Depressive Episode

Regarding our third aim, none of the included overgeneralization variables were significant predictors, although notably power was likely to be low (see below). Our study is the first to look at the predictive value of OGM for probable first onset of depression. A previous study did, however, investigate the predictive value of OGM for recurrence of depression, and failed to find a predictive association between OGM in people formerly experiencing depression and recurrence during a 2-year follow-up (Spinhoven et al., 2006). The different results may be explained, in part, by the different cues that were used. Whilst we used the sort of emotionally valenced cues that are most commonly

used in the AMT/OGM literature, following Williams and Broadbent (1986), Spinhoven et al. (2006) used the McNally variant of the AMT (McNally et al., 1995) consisting of negative and positive cues that all reflect personal traits. As mentioned by Spinhoven et al. (2006), the McNally-cues are especially relevant for self-representations in traumatized individuals, whereas our cues clearly seem more relevant to self-representations in depression (e.g., alone, desperate, successful, failed, self-confident). As such, the predictive power of categoric responses to AMT-cues for the course of depression may critically depend upon the depression-relevance of the cues that were used.

Neither the logistic regression model for recurrence nor the model for first onset had significant interaction effects between overgeneralization variables. This may be reflective of the relatively smaller sample and reduced statistical power. This seems particularly likely given that the observed main effects in all models were typically small in magnitude.

Secondary Findings

Our study had some secondary findings that may be of interest to the field. We looked at group differences on our overgeneralization variables according to probable diagnostic status: never experienced, formerly experienced, and currently experienced depression. Replicating earlier findings, individuals with probable current depression and a history of depression scored significantly higher than those who probably never experienced it in terms of negative overgeneralization to the self (Eisner et al., 2008; van den Heuvel et al., 2012). Although scoring higher than those who probably never experienced depression on negative overgeneralization, and thus potentially reflecting some form of latent vulnerability, people who probably formerly experienced depression did score lower than people probably currently experiencing depression. This may potentially indicate that negative overgeneralization is in part, also some kind of scar of a past depressive episode. This would fit with our observation that negative overgeneralization did not predict first onset. Those who probably formerly experienced depression did not differ from those who were probably currently experiencing depression in terms of overgeneralization across situations and both groups showed higher levels for this aspect of negative overgeneralization than those who probably never experienced depression.

The three groups did not differ with respect to OGM in terms of categoric memories, which may suggest that categoric memories may not always be maladaptive. Combined with the prospective results on categoric memory retrieval predicting recurrence, however, this may suggest that categoric retrieval may only be maladaptive in vulnerable individuals, such as those probably recovered from the experience of depression. The fact that people who had a probable prior experience of depression did not differ from those who had probably never experienced depression indicates that OGM normalizes upon recovery from depression (e.g., Williams et al., 2005), which is inconsistent with meta-analytic findings (Hallford et al., 2021a), albeit indicating only small to moderate group differences. This may have to do with the fact that we used a written AMT that is administered under less well-controlled conditions (respondents fill it out at home, at their own pace). To our own surprise, those who probably formerly experienced depression retrieved more specific memories than individuals who probably never experienced depression. We have no explanation for this unexpected finding. Again, it may have to do with the fairly less well-controlled conditions under which respondents filled out the AMT at home.

Implications, Limitations, and Future Directions

The central finding that negative overgeneralization to the self and OGM are both predictors of depressive symptomatology and of probable recurrence of depression in individuals who had formerly experienced it shows that both phenomena are valuable treatment targets in depression. Interventions targeting negative overgeneralized thinking routinely form part of standard cognitive therapy. In terms of the remediation of OGM, for example, early studies suggested that Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2002) is effective in reducing OGM (e.g., Heeren et al., 2009; Williams et al., 2000), but a recent meta-analysis casts doubt on this conclusion (Hitchcock et al., 2022). A more recent innovative approach to remediate OGM is a training program called Memory Specificity Training (MeST; Raes et al., 2009). Findings to date are encouraging, in that they suggest that MeST not only reduces OGM, but also decreases levels of depressive symptoms (Barry et al., 2019). This has now been computerized and found to be effective in samples with major depression in improving memory specificity and decreasing symptoms (Hallford et al., 2021c, 2021d).

Two notes of caution are in order here. First, recall that both negative overgeneralization to the self and OGM did not predict first onset but did predict probable recurrence of depression. Therefore, it seems especially important to focus on the remediation of both vulnerability markers in those vulnerable to depressive relapse (e.g., currently and formerly experiencing depression, i.e., treatment and secondary prevention) rather than to heavily invest in the remediation of these processes at a general population level (i.e., primary prevention). Second, our findings indicate that negative overgeneralization and OGM are not related, therefore, interventions focusing on one of these processes would not necessarily have an impact on the other process (also see MacLeod & Williams, 1990). For example, an approach like

MeST (Raes et al., 2009) may indeed reduce OGM, but it remains to be tested whether it would also reduce levels of negative overgeneralization to the self.

The current study has notable strengths including the large sample size and the use of a categorical/probable diagnostic variable in predicting depression. We note some limitations as well. All measures used were self-report, which may have introduced problems such as social desirability biases. We used a convenience sample which may limit generalizability. Although the MDQ, which was used to assess probable presence or probable absence of major depressive episodes, has shown some convergent validity with diagnosis from the Structured Clinical Interview for DSM-IV (SCID), it is not a substitute for a clinical examination, and does not assess comorbid psychiatric diagnoses. We stress that this does not indicate certainty of diagnosis, but only as *probable* current or previous clinical depression should further assessment be undertaken. The ethnicity/race of the participants was not recorded, and therefore significantly limits the generalisability of the results. It can be noted that the majority of students in the faculty from which students were recruited tend to be of White-European background, although this cannot be confirmed for this particular sample. Logistic regression analyses examining recurrence and first onset during follow-up had groups that deviated markedly from 50–50 balanced, and this likely had effects on the power of the analyses. Therefore, the results, particularly of first onset, must be interpreted cautiously. No post-hoc corrections were applied, with the authorship preferring to publish raw statistical values and leave the interpretation to readers. Notably, most effects were highly significant.

Future research is needed to examine some of the following important questions. We suggested that negative overgeneralization to the self might be a more pronounced or detrimental form of negative generalization than negative overgeneralization across situations. Future studies are needed to test whether this is indeed the case and whether, for example, negative overgeneralization to the self is preceded, from a developmental point of view, by generalization across situations. Large samples will be necessary to provide statistical power to confirm the presence of interaction effects. Future research should also examine to what extent OGM is related to negative overgeneralization when the latter is not exclusively assessed via self-report questionnaire-type scales (ATS, CEQ). Klar et al. (1997), for example, developed a paradigm to assess (over)generalization using real-life hypothetical scenario's (vignettes) where participants need to make an estimate of the probability that if a similar antecedent would occur in the future, the same outcome would follow (also see van den Heuvel et al., 2012). Other avenues for future research are experimental and intervention studies. A key question here is whether manipulations or interventions targeting OGM would also have an impact on other aspects of generalization in depression and vice versa. In all further studies examining interrelations of various aspects of (negative) generalization in depression in will be important to use an AMT that prompts for more *personally-relevant* memories or which respondents are invited to generate *self-defining* memories (e.g., Singer & Moffitt, 1991–1992), which may be more important in investigating the association between OGM and other forms overgeneralized processing in depression. Further, the occurrence of stressful events and their interpretation could be assessed as part of a longitudinal study assess for an interaction between this and a tendency for negative overgeneralisation in the prediction of depression.

In summary, the present study is the first large-scale exploration of the relationship between two well-known and documented markers of depression that are both related to overgeneralization processes: negative overgeneralization as a cognitive thinking error and overgeneral autobiographical memory (OGM) as a memory retrieval bias. Our results showed that they are not related, and thus suggest that (over)generalization in depression is not a unitary construct (also see MacLeod & Williams, 1990) and suggests that there is not a single underlying cross-modal overgeneralizing factor in depression. Importantly, two different aspects of overgeneralization (negative overgeneralization to the self and OGM) were found to independently predict the course of probable depression (both in terms of symptoms and in terms of probable depression recurrence in recovered individuals with depression). Thus, in addition to overgeneralization in depression not being a homogeneous construct (MacLeod & Williams, 1990) these data indicate that different overgeneralization processes may play important independent roles in the course of depression.

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Author Contributions FR developed the study concept and study design. FR and MC organized and supervized testing and data collection. FR, JWG, and DJH performed the data analysis and interpretation. FR and JWG drafted the paper, and MC, JMGW, TJB, KT, and DJH provided critical revisions. All authors approved the final version of the paper for submission.

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Declarations

Conflict of Interest Filip Raes, James W. Griffith, Miet Craeynest, J. Mark G. Williams, Dirk Hermans, Tom J. Barry, Keisuke Takano, and David J. Hallford declare that they have no conflict of interest.

Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

Animal Rights No animal studies were carried out by the authors for this article.

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