Does How We Remember Predict How We Will Feel? A Longitudinal Study of the Influence of Overgeneral Memory on the Development of Depression in Young People.

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Abstract

An increased tendency towards overgeneral memory (OGM) has been associated with depression in young people. How this may impact the early development of depressive symptoms is unclear. This has been difficult to determine due to the lack of longitudinal research in this area, in particular with young people in the community prior to the development of significant depressive symptoms. The current study aimed to investigate how OGM related to the development of depression in a community sample of 235 young people aged 10- to 15-years at baseline. Measures of depression, OGM, and rumination were obtained at baseline and follow-up, one year later. As predicted, and consistent with past findings, an increased tendency towards OGM at follow-up was associated with greater depressive symptoms. However, despite indications from previous work that OGM may also predict depression prior to the emergence of symptoms, the reverse was found with depression predicting OGM over time. This suggests that among the general population, while OGM may be an associated and possible maintaining feature of depression, it appears to be a consequence of experiencing depressive symptoms rather than a significant early predictive or vulnerability factor. Contrary to evidence that rumination may also increase OGM, rumination was not significantly associated with OGM. Limitations, strengths and future directions based on these findings are discussed.

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"Ehara taku toa i te toa takitahi engari he toa takitini."

It is not my strength alone, but the strength of many that contribute to my success.

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Overview of the Current Study

Depression is a disorder that is prevalent and increasing among youth in New Zealand and overseas (Fortune et al., 2010; World Health Organisation, 2012). Rates of depression rise dramatically from early adolescence and are associated with a range of adverse consequences for young people including poorer health, educational and occupational outcomes that often extend into adulthood (Bardone, Moffitt, Caspi, & Dickson, 1996; Fergusson & Woodward, 2002; Kessler et al., 2003). Although there are several well-established treatments for depression, (Feliciano, Renn, & Arean, 2012) further understanding the factors that contribute to the development of this disorder is critical to improve treatment efficacy. Furthermore, this may enable early vulnerabilities to be targeted before the onset of significant symptoms and the associated cascade of negative consequences. This is particularly the case given that depression is already a leading cause of disability worldwide, and one that is projected to increase in the near future (World Health Organisation, 2012).

Overgeneral memory (OGM), a tendency to retrieve greater levels of general autobiographical memories compared to specific memories, is one specific factor that has been significantly associated with depression in both adults and young people (Hitchcock, Nixon, & Weber, 2013; Williams et al., 2007). Based on growing support for its association with depression, OGM has been hypothesized to present a possible maintaining and vulnerability factor for the development of depression. There is also evidence that rumination, a form of repetitive and analytical self-reflection implicated in depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), influences OGM (Sumner, Griffith, & Mineka, 2011). It remains unclear,

however, how these variables may influence the development of depression in the general population. This is particularly due to the absence of research with young people from the community prior to the development of significant depressive symptoms. The current study aimed to examine OGM, rumination and depression in a community sample of young people to investigate how these variables may influence each other over time.

Depression in young people

The term depression will be used here to refer to Major Depressive Disorder as classified by the DSM-5 and its associated symptoms (American Psychiatric Association, 2013). Depression is a mental disorder characterised by low mood and/or loss of interest and enjoyment (American Psychiatric Association, 2013). Other symptoms include disruption to eating and sleeping habits, fatigue, poor concentration, feelings of worthlessness or hopelessness, and suicidal ideation (American Psychiatric Association, 2013). Globally, depression is a leading, and growing, cause of disability, with a lifetime prevalence rate of approximately 15% and it is associated with considerable individual and social costs (Feliciano et al., 2012; World Health Organisation, 2012). Furthermore, in New Zealand, rates of depression have been found to be relatively high in comparison with other Western countries (Oakley Browne, Wells, Scott, & McGee, 2006).

While depression is uncommon in childhood, prevalence rises rapidly from early adolescence. In New Zealand, over 10% of young people report significant depressive symptoms (Fortune et al., 2010) with approximately 14% experiencing a major depressive disorder before age 24 (New Zealand Ministry of Health, 2009). Girls are at particularly high risk of developing symptoms in this period (Fortune et al., 2010; Kessler et al., 2003; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Lewinsohn, Rohde, & Seely, 1998). Depression is associated with

significant negative consequences for young people including emotional and relationship problems, poor health, decreased educational and employment success and increased risk of self-harm and suicide (Bardone et al., 1996; Bardone et al., 1998; Lewinsohn, Rohde, Klein, & Seeley, 1999; Trzesniewski et al., 2006). Adolescents who experience depression are also more likely to experience recurrent symptoms through adulthood, as well as associated psychopathology such as anxiety disorders (Costello, Copeland, & Angold, 2011; Fergusson & Woodward, 2002; Lewinsohn et al., 1999). Given the prevalence of depression both in New Zealand and overseas; the rapid increase in depression from early adolescence; and the consequences of an early onset of this disorder, understanding factors that contribute to the development of depression is critical in order to be better equipped to not only treat but potentially prevent its emergence.

Overgeneral Memory

There is growing evidence that Overgeneral Memory (OGM) is a specific factor associated with the development and maintenance of depression (Williams et al., 2007). First reported by Williams and Broadbent (1986) among suicidal patients, OGM refers to a tendency to retrieve general autobiographical memories. For example, if an individual is asked to provide a specific happy memory; instead of one particular memory such as "When I took my dog for a walk on Lyall Bay beach last Sunday", they may respond with something like, "When I take my dog for walks." The latter response is not actually referring to a specific memory but rather a whole cluster of memories grouped into a general category and is thus termed ‘overgeneral’.

Autobiographical memory and the Self-Memory System. OGM refers specifically to autobiographical memory. Autobiographical memory may be used to refer to conceptual information about ourselves (e.g. that our favourite colour is green), as well as memories for

events we have experienced (e.g. our first day at school). For the purposes of this review, it will refer to the latter type of information, that is "declarative, explicit memory for specific points in the past, recalled from the unique perspective of the self in relation to others," (Nelson & Fivush, 2004; p. 488). Autobiographical memory is integral to our everyday functioning and greater wellbeing as it forms the basis of our sense of who we are in the world, and how we act within it (Conway, 2005; Williams et al., 2007).

The relation of autobiographical memory to the self has been conceptualised as part of a larger Self-Memory System (Conway & Pleydell-Pearce, 2000). It is suggested that autobiographical memory is driven by attempts to achieve current goals as well as maintain a coherent sense of self-concept (Conway & Pleydell-Pearce, 2000). Within this system, autobiographical memory is arranged hierarchically from the general to the specific, moving from *themes* (e.g. educational) to *lifetime periods* (e.g. an overseas exchange), to *general-events*, *(*e.g. going on a ski trip) and finally to *episodic memories* or event-specific knowledge. (e.g. breaking my leg skiing; see Figure 1).

Memories may be accessed in a top-down, generative retrieval fashion (moving from the general to specific), or via a bottom-up, spontaneous activation prompted by a cue (straight to the specific). Using this model, OGM can be viewed as a failure to progress to the lower, more specific levels of memory during generative retrieval and instead to remain at the higher, more general levels of autobiographical memory (Williams et al., 2007).

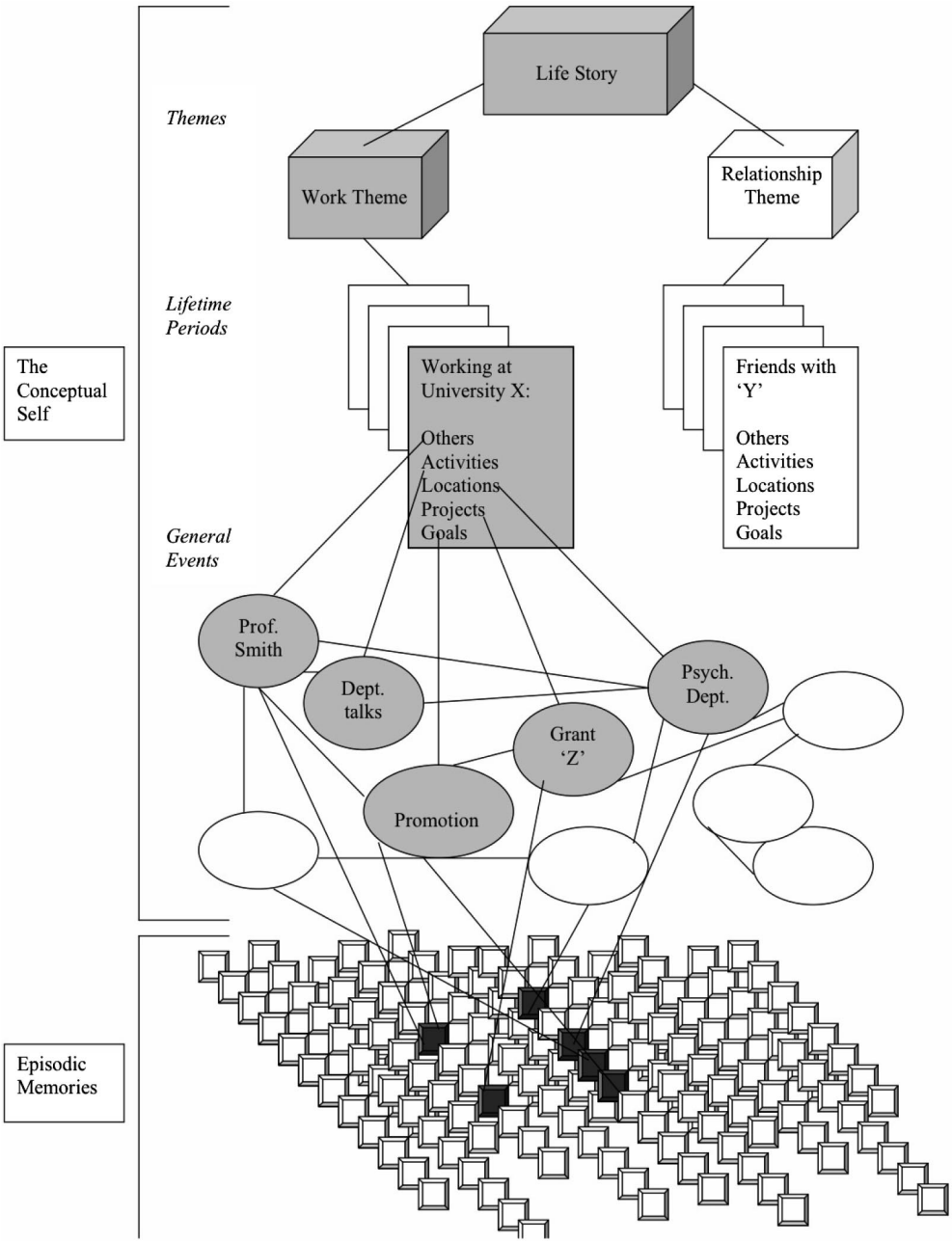

Figure 1. Hierarchical structure of autobiographical memory based on Conway (2005) and reproduced from Williams et al. (2007, p. 132)

Etiological models of OGM. It is normative, and indeed adaptive at times to remain at a general level of memory recall (for example, going to your favourite restaurant it is not likely to be necessary to recall all the specific times you ate there; Williams et al. 2007; Robinaugh, Lubin, Babic & McNally, 2013). OGM, however, refers to an increased tendency to recall higher rates

of overgeneral memories, and it is this increased tendency that has been particularly related to depression (Williams et al. 2007). Several etiological models have been proposed to account for why an individual may be more likely to fail to provide specific memories and remain at a general level of autobiographical memory.

Early functional avoidance model. An early model of OGM proposed a single factor mechanism suggesting that OGM may occur as a functional avoidance response to early traumatic memories and as a means of regulating affect (Williams, 1996). Williams proposed that recalling specific traumatic events was likely to cause distress, thus remaining at a more general level of memory would serve a protective function for an individual. This is consistent with the notion outlined in the Self-Memory System of specific memories as loaded with stronger sensory and affective content compared to general memories (Conway, 2005). Williams suggested that the negative reinforcement created by avoiding accessing these specific memories might then generalize over time across the recall of all memories regardless of whether or not they were negative leading to an overall greater tendency towards OGM.

There is some experimental evidence to support this affect-regulation theory. Following a negative event, a group of adults who demonstrated a greater tendency towards OGM did not experience as much distress as those who generated more specific memories (Raes, Hermans, Williams, & Eelen, 2006). As hypothesized by Williams (1996) this suggests that greater levels of OGM may have served an affect-regulation function for these individuals. This theory proposes, however, that trauma is a key factor in the development of OGM. While there is some evidence that OGM is related to trauma, inconsistent findings in this area and evidence that trauma alone is not sufficient or necessary for higher levels of OGM (for review see Moore & Zoellner, 2007), has led to the development of more complex models.

The CaR-FA-X model. Based on a growing body of evidence for the interactions between OGM and other processes linked with depression, Williams et al. (2007) developed a theoretical model of three key mechanisms hypothesized to influence OGM. The CaR-FA-X model builds on Conway and Pleydell-Pearce's (2000) Self-Memory System and Williams' (1996) single factor model of Functional Avoidance (FA) to include the mechanisms of Capture and Rumination (CaR) and impaired Executive Functioning (X; Figure 2).

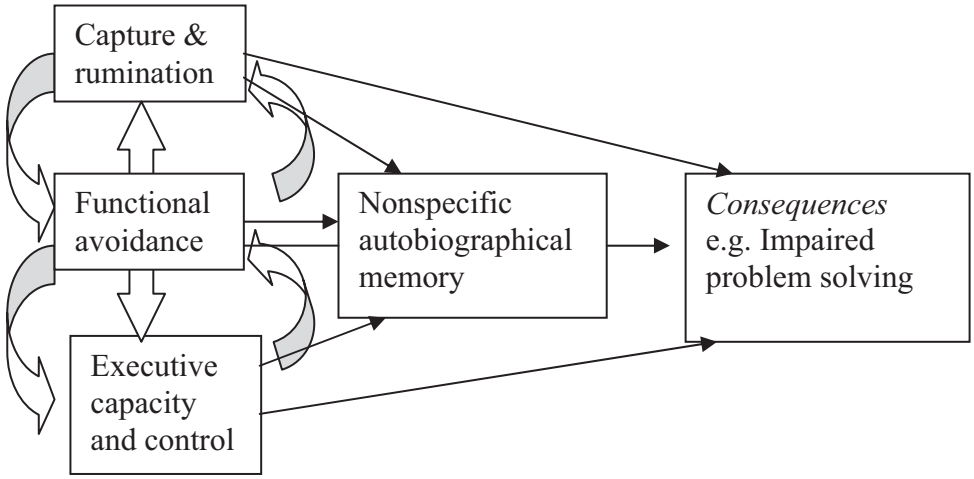

Figure 2. The CaR-FA-X model (reproduced from Williams et al. 2007, p. 141).

Capture and Rumination refers to the process of becoming 'captured' by cue words, which may then lead to ruminating (dwelling repetitively in a self-focused fashion; Nolen-Hoeksema, 1991) over these general level thoughts. The cue word "guilty", for example, may lead to an individual becoming stuck on a generalized thought such as "It always seems to be my fault" which keeps them from progressing past these general level thoughts to specific memories. It is hypothesized that more depressed individuals with highly active negative self-representations may be particularly likely to be captured in this fashion (Williams et al., 2007). Williams et al. also suggest that impaired executive capacity will also influence the ability to generate specific memories. The generative search processes required to retrieve specific memories require skills

such as the ability to inhibit irrelevant information, thus deficits in these may also increase likelihood of OGM (Williams et al., 2007). It is hypothesized that these mechanisms, individually and combined, contribute to symptoms of depression such as poor problem-solving well as to increasing OGM, which then further fuels symptoms (Williams et al. 2007; Figure 2).

Although further research examining this model is required, there is growing support for each of the three major mechanisms of the CaR-FA-X model (for review see Sumner, 2012) and particular attention will be given to rumination later in the current study. Although this model highlights key mechanisms that appear to contribute to OGM, it does not present a comprehensive etiological model that explains how OGM may develop over time.

A developmental psychopathology model of OGM Valentino (2011) has presented the framework for a comprehensive etiological model of OGM (Figure 3). This is based both on the literature on autobiographical memory development more generally, as well as that related specifically to OGM. This model proposes that OGM, as with any other psychological process, is likely to arise from a complex and dynamic set of interactions at all levels of an individual's world, of which the individual plays an active part (c.f. Bronfenbrenner, 1979).

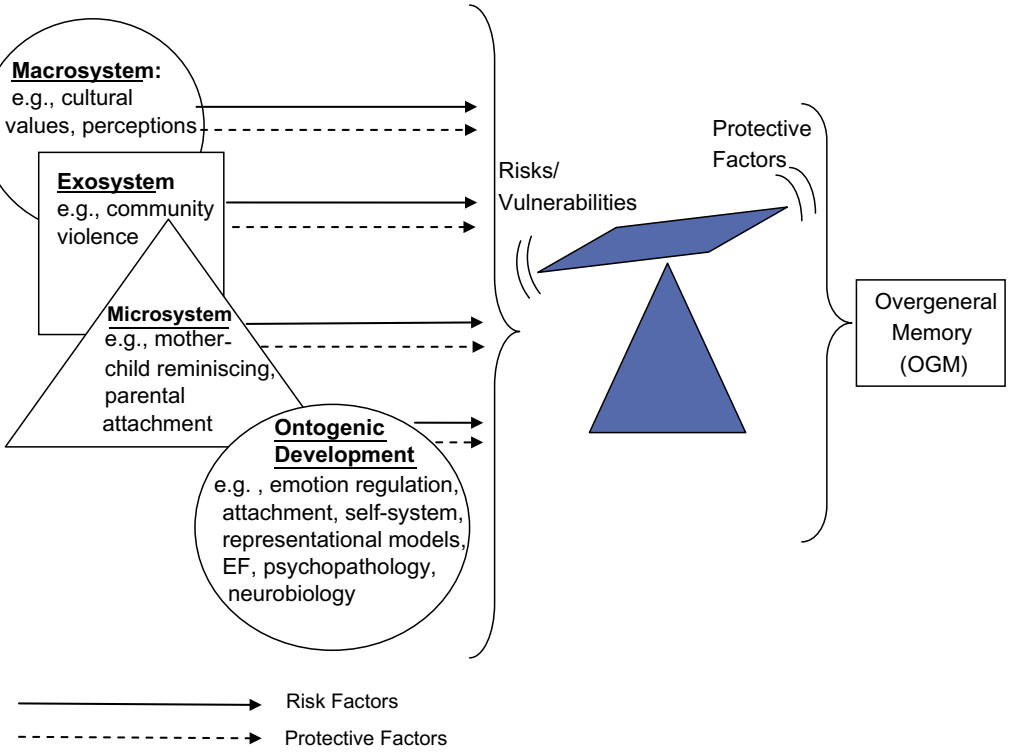

Figure 3. A developmental psychopathology framework of the development of OGM highlighting possible risk and protective factors (from Valentino, 2011; p. 38).

While much of this model is currently speculative, there is some evidence as to how specific factors at different levels may contribute to the development of OGM. At the macrosystem level (culture, values, beliefs) for instance, there is evidence for cultural differences in autobiographical memory with a tendency for more collectivistic cultures to be less likely to relate specific autobiographical memories compared to more individualistic cultures (Dritschel, Kao, Astell, Neufeind, & Lai, 2011; Wang, 2004). At the microsystem level (family), there are several factors known to influence the development of autobiographical memory that are likely to also influence OGM such as the style of parent-child reminiscing (Harley & Reese, 1999; Reese, Haden, & Fivush, 1993) and parental attachment (Alexander et al., 2002). In support of the role of family factors on OGM, there is recent evidence that the quality of mother-child reminiscing is associated with memory specificity (Valentino et al., 2013).

At an ontogenic (individual) level there are also various factors associated with differences in autobiographical memory. These include emotion regulation and knowledge (Goodman, Quas, & Ogle, 2010; Wang, 2006) and child and parent attachment styles (Alexander et al., 2002; Harley & Reese, 1999) that may also influence OGM. While further research is required to determine how factors at each level of development may act and interact to influence the process of OGM, a developmental psychopathology framework provides a rich means for both incorporating existing research and theory as well as directing future work to gain a more comprehensive understanding of OGM across development.

Measuring OGM: The Autobiographical Memory Test. Williams and Broadbent (1986) employed a method of examining autobiographical memory based on a cue word paradigm, initially developed to assess mood congruence effects. This Autobiographical Memory Test (AMT) has come to be adopted as the most widely used method of assessing OGM. In its general form, the AMT involves presenting individuals with a range of cue words (usually a mix of positive and negative) and asking for a specific memory related to each word. At the start of the AMT, participants are asked to provide specific memories to cues and instructed that a specific memory is a particular event that occurred in a certain time and place and lasted for less than a day. At least one example of a specific memory is also usually given.

Responses to the AMT are then coded based on their specificity. A specific response is classed as one specific event that took place over no longer than a day for example, “Going to my best friends’ birthday party last Friday”. Overgeneral responses can be broken down into two subtypes: categoric and extended. "When I go to parties" is an example of a categoric overgeneral memory. That is, it refers to a whole 'category' of similar events ("going to parties"), rather than one specific event from this larger category. An extended overgeneral memory does

refer to one event, but it takes place over a longer, or extended, time period. "When we went on holiday to Fiji" is an example of an extended memory, as while this refers to one specific event, that event took place over a period longer than one day (Heron et al., 2012; Williams et al., 2007). Other responses that tend to be coded separately are semantic associates (general word associations to a cue rather than a memory); omissions (no recorded response) and errors (failing to complete the task).

While the above describes the general paradigm used in AMT tasks, across studies there is significant variation in its use. Variations in the methodology include which cue words are used, how they are presented, what instructions are given, the mode of responding, and time limits (Griffith et al., 2012). There are also variations in scoring, for instance whether categoric and extended memories are analysed together and how omissions are scored (Griffith et al., 2012). There is some evidence regarding how certain changes may influence results, for instance, leaving out the instruction to be specific in a "Minimal Instructions" version of the AMT generates more overgeneral memories (Debeer, Hermans, & Raes, 2009; Raes, Hermans, Williams, & Eelen, 2007). This has been suggested as a more sensitive measure among non-clinical populations due the low levels of OGM and frequent floor effects found amongst these (Raes et al., 2007). However, the exact impact of each variation is still unclear and due caution is advised when directly comparing results across studies (Griffith et al., 2012).

Results from the AMT are often compared by cue valence, that is responses to positive versus negative words. There is significant inconsistency across the literature as to the effects of this, with some finding OGM only to negative cues significantly related to depression, others to positive only, and others finding no difference (Williams et al. 2007). A factor analysis with a large sample of adolescents found, however, that the AMT is a measure of a single underlying

factor across cue words and thus should be analysed as such. Nevertheless, as Williams (1995) functional avoidance theory, is based partly on OGM emerging first to negative memories, further efforts to detangle reasons for possible valence effects may yet prove to be informative.

Despite the issues with methodological inconsistency in using the AMT, a recent review of the psychometric properties of this measure found it to be a reliable and valid measure and as such reasonable confidence can be had in its utility (Griffith et al., 2012). Furthermore, and importantly for the current study, the psychometric properties of the AMT have also been investigated in a large sample of young adolescents where it was found to be a reliable measure of one underlying characteristic (Heron et al., 2012).

OGM and depression: findings with adults

Since William and Broadbent's (1986) initial report of an elevated tendency to retrieve more overgeneral memories among suicidal patients, this finding has been replicated and extended to other populations, with the strongest association found among samples of depressed adults. Depressed adults tend to show higher levels of OGM than non-depressed adults and this is a robust and consistent finding across studies with a large average effect size of approximately .94, regardless of the measure of OGM used (Cohen's *d;* Williams et al. 2007). While most research has focused on Major Depressive Disorder and its symptoms, there is also some evidence that other depressive disorders are also linked with OGM in adults, for instance Bipolar Disorder (Mowlds et al., 2010).

The significant association between OGM and depression has lead to investigation into how OGM may influence the symptoms of depression. There is some evidence that OGM contributes to aspects of poor functioning observed in depression. It is associated with impaired problem solving ability (Goddard, Dritschel, & Burton, 1996; Kao, Dritschel, & Astell, 2006;

Raes et al., 2005) as well as problems imagining future events (Williams et al., 1996). As proposed by Williams et al. (2007) in the CaR-FA-X model, OGM may also interact with other mechanisms associated with depression such as rumination. Based on these existing findings, it appears that OGM may exacerbate depressive symptoms through decreasing function in these, and potentially other, areas.

Besides depression, the other significant association found with OGM is trauma. The evidence in this area is inconsistent, however, with some researchers finding a history of trauma is associated with OGM even when controlling for depressive symptoms (Aglan, Williams, Pickles, & Hill, 2010) whilst others have failed to find that OGM is related to trauma beyond depressive symptoms (Mowlds et al., 2010). A review of research in this area found that overall, trauma alone is not a sufficient and or necessary mechanism behind OGM (Moore & Zoellner, 2007). While disparities in this area are partly likely due to methodological variations (Moore & Zoellner, 2007), and trauma may play a unique role in the development of OGM, the association with depression currently has more consistent support and is the focus of the current study.

Importantly, OGM has not been found to be significantly associated with other forms of psychopathology such as anxiety disorders (Heidenreich, Junghanns-Royack, & Stangier, 2007; Wessel, Meeren, Peeters, Arntz, & Merckelbach, 2001). This suggests that OGM may uniquely relate to depression. Furthermore, rather than simply occurring as an epiphenomenon of depressive symptoms, there is evidence that OGM exists as a relatively stable trait-like characteristic even when an individual is not currently experiencing depression (Mackinger, Pachinger, Leibetseder, & Fartacek, 2000), and that this moderately predicts both how long current episodes of depression last (Brittlebank et al. 1993; Dalgliesh et al. 2001; Peeters et al. 2002), and whether future depressive episodes will occur (Gibbs & Rude, 2004; van Minnen,

Wessel, Verhaak, & Smeenk, 2005). Based on this, a greater tendency towards OGM may be present before the onset of depression and predictive of this. Alternatively, OGM may merely be a result of experiencing depression, or associated factors, that then has a maintaining effect. Which of these is the case remains unclear, particularly as the majority of research has utilized adults who are either currently, or have been, depressed making it difficult to rule out the latter 'scarring' hypothesis. (Williams et al. 2007). In order to determine whether OGM does precede depression, it is critical to examine younger populations before the onset of major symptoms.

OGM and Depression: findings with young people

Investigating OGM in younger populations is crucial in order to clarify the role of OGM in the development and maintenance of depression. Although OGM has not been extensively studied among youth populations, existing evidence is generally consistent with findings with adults. Young people experiencing depression also display significantly higher levels of OGM than those not experiencing depression among both clinical (Swales, Williams, & Wood, 2001; Valentino, Toth, & Cicchetti, 2009; Vrielynck, Deplus, & Philippot, 2007) and community samples (Drummond, Dritschel, Astell, O'Carroll, & Dalgleish, 2006; Johnson, Greenhoot, Glisky, & McCloskey, 2005; Rawal & Rice, 2012a) with ages ranging from 7- to 18-years. To date, a review of seventeen studies examining OGM and depression in youth found that fourteen of these supported a significant relationship between OGM and depression with moderate to large effect sizes (Hitchcock et al., 2013).

As with adults, there is also mixed evidence for the relationship between OGM and trauma among young people. There is some evidence that trauma is independently associated with greater levels of OGM (Valentino et al., 2009) while others have found an increased rate of OGM is uniquely present even in the absence of trauma (Kuyken, Howell, & Dalgleish, 2006),

or when trauma is controlled for (Vrielynck et al., 2007). As with the adult literature, this discrepancy is likely in part due to methodological variation (Moore & Zoellner, 2007). There is also some evidence that type of trauma may be important with one study finding abuse significantly related while maltreatment and neglect were not significantly related (Valentino et al., 2009). While further research is needed to investigate this which is not the focus of the current study, it is important to bear in mind that as described by Valentino's (2011) developmental psychopathology model multiple factors are likely to interact to lead to OGM and there may be specific pathways related to trauma.

There is some indication that the unique association between OGM and depression compared to other psychopathology may not be as distinct in younger people. Park, Goodyer, and Teasdale (2002) found that while adolescents aged 12- to 17-years with first episode MDD displayed more overgeneral categoric memories than a healthy community sample, they did not display more than a psychiatric group with other diagnoses. This finding may reflect the general nature of psychopathology in younger people, which tends to be marked by high degrees of comorbidity and less discrete boundaries between disorders (Carr, 2006). However, more recent studies have since found that OGM is specific to young people with depression and is not evident in other diagnostic groups including those with anxiety and externalizing disorders (Rawal & Rice, 2012a; Vrielynck et al., 2007). As found with adults, OGM then appears to have a unique relationship with depression among young people.

There is also some tentative evidence that levels of OGM may differ by age and gender among young people. While even very young children are capable of retrieving specific autobiographical memories (Nelson & Fivush, 2004), Drummond et al. (2006) compared 7- to 8-year olds with 10- to 11- year olds and found that the younger group had higher levels of OGM.

Johnson et al. (2005), however, found that in a sample aged 12- to 18-years old, levels of OGM increased with age. Likewise, inconsistent results for gender differences in OGM have also been found. Some studies have found that females display lower levels of OGM (Heron et al., 2012; Hipwell, Sapotichne, Klostermann, Battista, & Keenan, 2011), while others have found either the opposite (Stange, Hamlat, Hamilton, Abramson, & Alloy, 2013), or no significant difference (Park et al., 2002; Swales et al., 2001). Levels of psychopathology are also likely to influence developmental changes, given the relation between OGM and depression and the change in rates of this disorder across both age and gender (Feliciano et al., 2012). Overall, there is currently insufficient evidence to make any conclusions regarding normative gender and age differences in OGM, and large community samples of young people are required to further elucidate this.

OGM as a potential early vulnerability factor for depression. While as in adults, OGM is significantly associated with depression in young people, establishing whether OGM exists before the development of depression is critical in order to determine whether OGM is an early vulnerability factor, and not just a consequence of experiencing depression or associated factors (Hitchcock et al., 2013). There is some evidence that an increased tendency towards OGM may be present before the development of depression. Kuyken and Dalgleish (2011) found that among a sample of 14- to 18-year olds, those at risk of developing depression but not currently meeting criteria, had greater tendency towards OGM (as measured by the AMT), than those not at-risk. This was found both for those deemed high-risk due to scoring high on a measure of neuroticism and for those deemed high-risk due to having a previous history of depression. As this was an at-risk sample it may be, however, that this increased rate of OGM was a result of either already experiencing some low-level symptoms (particularly as diagnostic criteria rather than symptomatology was the depression measure), or some associated feature of being at high-

risk for depression (for instance family environment). Whether OGM does actually predict depression over time, and if it precedes depression for those in the general population requires both longitudinal data and community samples to test this further.

To date, three longitudinal studies investigating OGM in young people have been carried out, two of which also utilized high-risk samples (Hipwell et al., 2011; Rawal & Rice, 2012a; Stange et al., 2013). Hipwell et al. (2011) examined 195 girls aged 11- to 12-years over a period of one year, who were deemed to be at-risk of developing depression due to being recruited from impoverished areas and scoring high on mood screening measures. A written AMT was administered to the participants consisting of ten emotional cue words, alternating negative and positive. Depressive symptoms and verbal intelligence were also measured. A greater tendency to recall overgeneral memories (defined by categoric and extended overgeneral memories) at age 11 predicted depressive symptoms at age 12, controlling for symptoms at age 11, race, poverty and verbal IQ. This gives some support for the predictive value of OGM, however this was of limited generalizability given the sample consisted only of at-risk girls and a small age range.

In broader sample of high-risk youth, Rawal and Rice (2012a) also found that OGM predicted depression symptoms at a one-year follow-up. This sample consisted of 277 adolescents aged 10- to 18-years, both males and females. In this case, they were deemed at high-risk of developing depression due to being offspring of parents with recurrent unipolar depression. A similar AMT was used as in Hipwell et al. (2011). A categorical measure of depression, rather than a continuous measure of symptoms as in Hipwell et al. was used such that adolescents were compared based on whether or not they met criteria for a depressive disorder. Minor depression, defined as 2 weeks of low mood with one other symptom and impairment was included in the depressed group. Adolescents in this depressed group were found to have a

greater tendency to OGM (defined by categoric and extended memories) than the non-depressed group. As found by Hipwell et al. (2011), levels of OGM also predicted depression at follow-up, with effects independent of the other predictors included in the study (negative life events and rumination). Those who had not recovered from a depressive disorder at follow-up compared to those who had were also found to display higher levels of OGM. Contrary to a scarring hypothesis, that is OGM as a consequence of depression, baseline levels of depressive symptoms did not predict memory specificity. While these results support the hypothesis that OGM may both predict the emergence of depression, and contribute to its maintenance, as both of these studies utilized high-risk samples, this may not extend to community samples. It may be that at-risk samples have either already been exposed to low-level symptoms or associated factors commonly comorbid with depression that have in turn increased OGM.

To date, only one longitudinal study of OGM in youth has used a community sample. Stange et al. (2013) examined 174 12- to 13-year olds over 8-months. An AMT comprising 9 cue words (3 positive, 3 neutral and 3 negative) was administered along with a measure of depressive symptoms (the Children's Depression Inventory; Kovacs, 1992), and measures assessing emotional abuse and neglect. Here, OGM (as defined by categoric, extended and other general memories) was not found to predict depressive symptoms after 8-months. An interaction between OGM and emotional abuse predicted depressive symptoms, however, suggesting that OGM alone may not predict depression in community samples, but may in combination with other vulnerabilities. The lack of a direct predictive relationship found in this study compared with Hipwell et al. (2011) and Rawal and Rice (2012a) may reflect methodological differences (for example using an AMT that included neutral cue words). Alternatively, it may be that a direct relationship between OGM and depression is not present in community samples, which

requires further investigation.

Rumination and OGM

Rumination is a cognitive process that is also significantly associated with depression (Nolen-Hoeksema et al., 2008). Rumination is a form of self-reflection that is defined by repetitively dwelling on feelings and difficulties and their causes and consequences in a verbal and analytical manner (Nolen-Hoeksema et al., 2008). This style of thinking is commonly found among those with depression and, as has been found with OGM remains relatively stable outside of depressive episodes and predicts the onset and course of depression (Nolen-Hoeksema et al., 2008). Rumination appears to exacerbate and maintain depressive symptoms through various mechanisms including increasing the influence of depressed mood on thinking, decreasing effective problem solving and decreasing instrumental behaviour (Nolen-Hoeksema et al., 2008). Females are particularly prone to rumination and there is evidence this largely explains the increased rate of depression among females from early adolescence (Jose & Brown, 2007; Nolen-Hoeksema et al., 2008).

There is also growing evidence that rumination may also influence OGM. In adults, rumination has been found to significantly correlate with OGM (Raes, Herman, Williams, Geypen, & Eelen, 2006; Sumner, Griffith, & Mineka, 2011). Experimental evidence has also supported a causal link between these variables as inducing ruminative versus non-ruminative styles of processing in depressed adults has been found to increase OGM (Raes, Watkins, Williams, & Hermans, 2008; Sutherland & Bryant, 2007; Watkins & Teasdale, 2004). On the contrary, Kao et al. (2006) in a community sample did not find that individuals scoring higher on a measure of depression symptoms displayed higher levels of OGM in a ruminative compared to non-ruminative condition. This may have been due to differences in the measurement of memory

specifity as no AMT was used, and instead participants were merely ask to report memories that came to mind while completing a problem-solving task. Alternatively, it may be that rumination does not exert significant effects on OGM in non-clinical samples.

The increase in OGM with rumination has been replicated in a younger population ((Park, Goodyer, & Teasdale, 2004). Adolescents aged 12- to 17-years were given an attention manipulation task with a ruminative condition (e.g. “think about your character and who you strive to be”) and non-ruminative condition (e.g. “think about and imagine a boat slowly crossing the Atlantic”; Park et al. 2004, p. 1000). Depressed adolescents exhibited higher levels of OGM in the rumination condition. Furthermore, as with adults, there is evidence with young people that there is a bidirectional relationship occurring such that inducing an OGM style also increased rumination (Raes, Herman, et al., 2006). Thus those prone to ruminating may be more likely to exhibit OGM, and an increase in OGM may further increase rumination potentially further fuelling depressive symptoms over time.

To date, the relationship between OGM and rumination over time has only been investigated by one longitudinal study (Rawal & Rice, 2012b). In a sample of 259 adolescents aged 10- to 18-years at high-risk of developing depression (due to being offspring of parents with recurrent unipolar depression), measures of rumination, executive functioning and depressive symptoms were obtained with a follow-up period of 1-year. Here, an interaction between rumination and executive functioning was found to significantly predict memory specificity. Specifically, adolescents low in executive functioning and with higher levels of rumination had higher levels of OGM at follow-up (controlling for age, gender, IQ, baseline memory specificity and depressive symptoms). While this adds to evidence that rumination plays a significant role in the development of both depression and OGM, as this utilised a high-risk

sample of adolescents, these results may not generalize. Given that rumination is known to influence the development and maintenance of depression in the general population (Nolen-Hoeksema et al., 2008), rumination may mediate a relationship between OGM and depression. As this has not been tested, it remains uncertain whether and how rumination may influence OGM and this relates to the development of depression in the general population.

The current study

The current study aimed to investigate the relation between OGM, rumination and the development of depression over time in a community sample of young people. In the first wave of this study with a sample of 302 students aged 10- to 14-years from the Wellington and Nelson regions, no significant relationship between OGM and depression was present (Gutenbrunner, 2012). The current study aimed to follow-up this sample a year later to enable investigation into whether as the sample aged, and depressive symptoms were likely to increase, a relationship between these variables would emerge. Based on existing research, there were four primary hypotheses. First, there would be changes in rates of depression, rumination and OGM over time. It was predicted that depression and rumination would increase, particularly for females (Jose & Brown, 2007) while a change in OGM may be in either direction (Drummond et al., 2006; Johnson et al., 2005). Second, at follow-up, a significant correlational relationship between OGM and depression would emerge, as found with adults (Williams and al. 2007) and young people (Hitchcock et al., 2013). Third, given evidence for rumination influencing OGM (Park et al., 2004; Raes, Herman, et al., 2006), that rumination would also significantly relate to OGM and mediate any relationship with depression. Fourth, as found by existing youth longitudinal studies (Hipwell et al., 2011; Rawal & Rice, 2012b) OGM would predict later depressive symptoms.

Method

Participants

Ethical approval was obtained from the Victoria University of Wellington Human Ethics committee. In the first wave of this study at Time 1 (T1), data was collected from 302 (54.10% male) young people from Intermediate and High Schools in the Wellington and Nelson regions. Participants ranged from 10.08- to 15.60-years old (M = 12.80; SD = 1.40). At this time, the parents or caregivers of participants were informed they may be contacted regarding follow-up.

At Time 2 (T2), information regarding the follow-up was sent out to the parents of those who had participated at T1 via email. This included the opportunity to opt out of participating. For those students who remained at the same schools, schools were contacted to obtain consent to return and collect follow-up data. For those students who had moved on to other schools since T1, where possible, information regarding their current schools was obtained and these schools were contacted to gain consent to collect follow-up data from these students.

Data were collected from participants at T2 approximately 12 months following data collection at T1 (M= 12.14 SD =1.79*).* In total, 235 of the original participants provided follow-up data, giving a retention rate of 78%. The final sample was comprised of the 235 participants for whom full data from T1 and T2 were available. There were no significant differences in gender or age between those who were followed up and those who were not, and these groups also did not significantly differ on reported overgeneral memories, depression, or, rumination scores at T1.

The final sample was composed of 235 young people (55.50% males) with an age range of 11.08 to 16.33 years (M = 13.82 ; SD = 1.20). Participants came from thirteen schools, eleven from the Wellington region and two from Nelson. Schools ranged in socieoeconomic deciles

from 4 to 10, with higher deciles representing higher socioeconomic catchment areas and a possible range of 1 to 10 (New Zealand Ministry of Education, 2009). The measures and procedure of the study was kept identical to T1.

Measures

OGM. An adapted Autobiographical Memory Test (AMT) was used based on Debeer et al. (2009) with ten cue words that had been piloted and used by Gutenbrunner (2012) and Ponniah (2012) at T1. Following Debeer et al., five of these were positively valenced: happy, lucky, proud, excited and relaxed; and five of these were negatively valenced: guilty, angry, scared lonely and sad. The AMT was provided in written form in a booklet consisting of a page for demographic information, a page of instructions and then a page for each of the ten cue words where the cue word was written at the top with blank lines beneath for participants to fill in their memories (Appendix A). AMTs of a similar length and format have been found to be a reliable measure of autobiographical memory specifity in children of similar age ranges (Hipwell et al., 2011; Raes, Verstraeten, Bijttebier, Vasey, & Dalgleish, 2010).

Reponses to the AMT were coded based on Heron et al. (2012) which was derived and adapted from Williams and Broadbent's (1986) original coding of autobiographical memory (Crane, 2012). Memories were coded into one of six different categories as described in Table 1. Two trained raters scored each memory independently and a random sample of 25% of the memories was checked for reliability, with high interrater reliability observed ($\kappa = 0.90$). In cases of disagreement on items, researchers discussed the item and resolved any discrepancy, following the prescribed coding guidelines (Appendix C). For each participant the total type of memories given was calculated. OGM was calculated as the total number of extended and categoric memories given.

Table 1

Memory specifity coding scheme based on Heron et al. (2012)

Memory Category	Criteria	Example(s)
Specific	A discrete event lasting one day or less	When I went to the zoo last Saturday
Extended	Events which occurred over more than a day or over an extended period of time	When we went on holiday to Australia
Categoric	Categories of events, or repeated events (that have occurred at least twice) that are grouped together	When I go to the zoo
Associates	Responses that are not clearly related to a recalled memory; for instance random associations to the cue word	Animals, fun, cute, happy,
Errors	Statements that do not fulfil the task, are incomprehensible, or future orientated	I can't remember; Next weekend I'm going to the zoo
Omission	Blank spaces, no memory recorded	

Questionnaire booklet

A self-report questionnaire booklet including all other measures for the study was used (Appendix B).

Depression. The Children's Depression Inventory short-form (CDI:2:SR[S]; Kovacs, 1992), was used to assess participants' levels of depression symptoms. This measure contained 12 self-report items with three possible response options per item, representing a range in the presence and severity of depressive symptomatology. Participants were asked to select the item that best described how they had been feeling in the last 2 weeks; for example, select one of: "I am sad once in a while", "I am sad many times", or, "I am sad all the time." The maximum score on this measure was 24, with higher scores indicating higher levels of depressive symptoms. The CDI short-form has been found to have high internal consistency in clinical and community samples (Masip, Amador-Campos, Gómez-Benito, & del Barrio Gándara, 2010). In the current sample, this scale had comparable high internal consistency ($\alpha = .80$).

Children's Thinking styles Questionnaire. Included in the self-report questionnaire booklet was a 28-item questionnaire developed to assess a range of thinking styles based on several measures.

Rumination. As part of this questionnaire, a rumination measure was developed based on the brooding rumination subscale from the Children's Response Styles Questionnaire (CRSQ; Abela, Brozina, & High, 2002). This scale consisted of six items from this subscale intended to measure brooding rumination in children, defined as passively comparing current negative situations with ideal situations (Nolen-Hoeksema, 1991), such as "When I am sad, I go away by myself and think about why I feel this way." All six items had a four-option response scale with 0 coded as *almost never*, 1 as *sometimes*, 2 as *often* and 3 as *always*. A mean score for each

participant's responses to this score was calculated with higher scores representing a higher degree of brooding rumination and a highest possible mean score of 3. The rumination subscale of the CRSQ has been found to have high internal consistency in previous research with young people ($\alpha = 0.87$; Hilt, McLaughlin, & Nolen-Hoeksema, 2010). In the current sample, this was also observed ($\alpha = .85$).

Other measures included that were not analysed in the current study.

Besides the depression and rumination measures described above, the questionnaire booklet also included items assessing distraction, problem solving, denial, behavioural avoidance, experiential avoidance and proactiveness, inhibitory control, activation control and attention. This questionnaire also included random filler items that were inserted among the above measures but which were not coded or included in any analyses. Finally, a word fluency task was included.

Procedure

For each testing session, the procedure was identical to that of T1 and was consistent between different schools and testing sessions. A general testing script was followed for each session (Appendix D). Each session took approximately 45 minutes and involved approximately 10 children. A minimum of two researchers were present at each session and each researcher had been trained to the procedure used at T1 by one of the original researchers. Participants completed the task in a quiet room away from other students, and were given an information and assent form (Appendix E). This was also read through with participants and they were informed about issues of confidentiality and consent. Once participants had given assent, the session tasks commenced.

The session involved two tasks: first, assessment of memory with the AMT and second, the completion of the questionnaire booklet assessing depression, rumination, and other included measures. For the first task, participants were given the AMT in booklet form. The instructions were written at the start of the booklet as well as read aloud to the participants as follows: "We are interested in your memory for events that have happened in your life. For each of the following words we would like you to think of an event that happened to you which the word reminds you of. The event could have happened recently (e.g., yesterday, last week) or a long time ago. It might be an important event, or a trivial event. The memory you write down should be for a real event. So if we said 'good' – it would not be okay to say "I always enjoy a good party" because this does not mention a specific event. But it would be okay to say "I had a good time at Jane's party" because that is a real event. Please don't use the same event more than once." Finally, participants were informed that they would have about a minute to complete each word and that the researchers would inform them when to start and stop writing. For each of the ten cue words, the word was read aloud by the experimenter and then one minute was given for a response. At the end of a minute, participants were asked to move on to the next page where the same procedure was repeated for each cue word.

The second part of the session involved completing the self-report questionnaire booklet. Instructions for each part of the questionnaire were written down and read aloud by the researchers along with response options as required. The researcher then read through each item of all the questionnaires as participants completed these. The final task of the questionnaire was the word fluency task where participants were instructed they would be given a letter and must come up with as many words starting with this letter as possible, except names and places. They were also asked not to use different forms of the same word (e.g. walk and walking). An example

was given and participants were then told the target letter and given one minute to provide their responses. This was then repeated with participants given a category (animals) instead of a letter.

Finally, participants were instructed to write down something they were looking forward to in the near future in order to end the session on a positive note. Following completion of the questionnaire, booklets were collected and participants debriefed. Participants were reminded of the confidential nature of their responses, and informed how the data would be collated and analysed for the study. A debrief sheet (Appendix F) summarising this information was also provided and participants were given the opportunity to ask any further questions at this time.

Results

Overview of statistical strategy

To test the key hypotheses the following steps were taken. First, in order to examine whether variables had changed over time, descriptive statistics and tests of significance of mean differences were carried out. Second, to examine both the presence of a relationship between OGM and depression and also whether rumination related to OGM and would mediate the relationship between OGM and depression, correlational analyses were conducted. Finally, a path model analysis was conducted to determine whether OGM predicted depression over time.

Descriptive statistics

Types of autobiographical memories. The distribution of types of autobiographical memory is displayed in Table 2. At both T1 and T2, the majority of reported memories were categorised as specific. Based on previous research with comparable samples (Hipwell et al., 2011; Rawal & Rice, 2012a), OGM was operationalized as the total number of overgeneral memories, that is, categoric and extended memories summed. The number of overgeneral

memories correlated highly with reported specific memories (r= -.86, p < . 001) and all results that follow were comparable when replicated using number of specific memories as a predictor instead. Proportions of specific memories to overgeneral memories were comparable to previous studies, however, overall rates of overgeneral memories were somewhat lower (e.g. see Raes et al., 2010 with a comparable method and age range).

Table 2.

Mean and proportions of types of autobiographical memory at baseline and follow-up.

	Time 1		Time 2	
Type of Memory	M (SD)	%	M (SD)	%
Specific	7.37 (2.43)	73.66	7.09 (2.15)	70.89
Extended	0.63 (0.85)	6.38	1.19 (1.13)	11.87
Categoric	1.30 (2.00)	12.94	1.11 (1.68)	11.11
Semantic	0.15 (0.51)	1.49	0.00 (.00)	0.00
Error	0.25 (0.96)	2.51	0.40 (.88)	4.04
Omission	0.30 (0.70)	3.02	0.21 (0.60)	2.09

Note. N=235

Overgeneral memories, depression and rumination over time. Depression was calculated based on mean scores for the CDI-2 for each participant. Rumination was calculated based on mean scores for the CRSQ-rumination subscale. Both of these scales had good internal reliability, (for depression, α =.80; for rumination α =.85; Giles, 2002). Descriptive statistics for these variables and overgeneral memories (as measured by categoric and extended memories summed) are presented in Table 3, for the whole sample and divided by gender to test predictions regarding differences between males and females.

Table 3.

Descriptive statistics for variables of interest at baseline and follow-up for whole sample and by gender.

Variable	Whole sample		Males		Females	
	T1	T2	T1	T2	T1	T2
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
OGM	1.93 (1.98)	2.30 (1.83)	2.10 (2.12)	2.30 (1.85)	1.74 (1.78)	2.30 (1.81)
Depression	4.22 (2.97)	4.61 (3.66)	3.91 (2.78)	4.09 (3.09)	4.58 (3.15)	5.23 (4.16)
Rumination	1.95 (.64)	2.00 (.74)	1.90 (.64)	1.88 (.69)	2.01 (.64)	2.12 (.78)

Note. N =235; OGM = overgeneral categoric and extended memories summed; Depression= CDI-2; Rumination= CRSQ-Brooding Rumination subscale

Hypothesis 1: Increase in variables over time

In order to investigate whether overgeneral memories, depression and rumination had increased over time in the sample, a repeated measures MANOVA was computed. This included gender as a fixed factor to investigate whether, as hypothesized, changes also varied by gender. A multivariate main effect for time was found, Wilk's l= .95, $F(2, 227) = 3.71$, $p < .05$, partial $h^2 = .05$. A significant univariate effect was found for both depression, $F(1, 234) = 4.12$, $p < .05$, partial $h^2 = .02$, and overgeneral memories, $F(1, 234) = 6.10$, $p < .05$, partial $h^2 = .03$, but not for rumination. Thus, while rumination did not significantly increase over time, depression and overgeneral memories did, as indicated in Table 3. No time by gender interaction was present, suggesting similar changes occurred for both males and females.

However, as predicted, a significant main effect of gender emerged for depression ($F(1, 234) = 5.67$, $p < .05$, partial $h^2 = .02$) and rumination ($F(1, 234) = 4.21$, $p < .05$, partial $h^2 = .02$).

No significant difference was found for overgeneral memories. As displayed in Table 3, and as predicted, females reported higher levels of both rumination and depression. A one-way ANOVA comparing means at T1 and T2 also found that these significant gender differences between depression and rumination were only present at T2.

Hypothesis 2: Concurrent relationship between OGM and Depression

Correlational analyses. To investigate whether a significant relationship was present between OGM and depression, correlational analyses were conducted. Given the hypothesized mediating role of rumination, correlational analyses were also conducted between rumination, depression and overgeneral memories to test for this. Correlational analyses are presented in Table 4. At T1, overgeneral memories and depression were not significantly correlated. At T2, as predicted, depression scores were significantly related to overgeneral memories.

Table 4.

Correlation coefficients amongst variables of interest

Variable	1	1	3	4	5	6
1. OGM T1	-	-0.03	0.05	0.34**	0.05	0.01
2. Depression T1		-	0.45**	0.21**	0.60**	0.39**
3. Rumination T1			-	0.11	0.34**	0.61**
4. OGM T2				-	0.21**	0.07
5. Depression T2					-	0.52**
6. Rumination T2						-

Note. *N*=235; *p <.05, **p <.01; OGM = overgeneral categoric and extended memories summed; Depression= CDI-2; Rumination= CRSQ-Brooding Rumination subscale

Post-hoc exploratory analyses into gender differences in relationship between OGM and Depression at T2. As at T2, females experienced significantly greater rates of depression, and to investigate whether differences in the relationship between OGM and gender exist as found previously (Heron et al., 2012), correlational analyses were then split by gender. In general, the pattern of results was the same for males and females with one notable exception. While for males, overgeneral memories and depression at T2 remained significantly positively correlated ($r = .29$, $p < .01$); for females, this was not significant ($r = .02$, $p > .05$).

Although no specific predictions were made regarding a difference in the relationship between OGM and depression by gender, this correlational analysis indicated a significant relationship between overgeneral memories and depression for males but not females at T2. A hierarchical multiple regression was then calculated with overgeneral memories as the dependent variable for males and females to examine whether any quadratic relationships were present.

For males, the simple positive linear association between overgeneral memories and depression was significant ($b = .46$, $p < .001$), and remained marginally significant when included in the second model with the quadratic term ($p = .06$), with the quadratic term nonsignificant ($p = .46$). The significant linear association between overgeneral memories and depression for males was plotted using ModQuad (Jose, 2013b) and is represented graphically in Figure 4, showing that as rates of OGM increased, so too did depression scores.

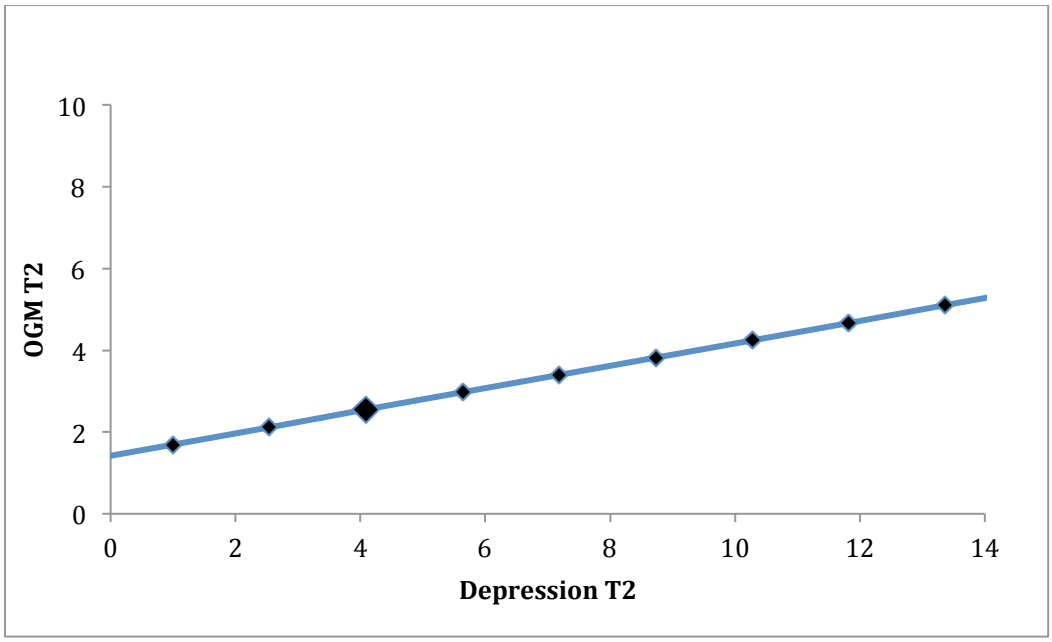

Figure 4. Linear relationship between OGM and depression for males at T2.

Note: Large diamond represents mean

For females, the simple positive linear association between overgeneral memories and depression was nonsignificant ($p = .13$), however in the second model, both depression and the quadratic term were significantly associated with overgeneral memories ($b = 1.38$, $p < .001$; $b = -1.30$, $p < .001$ respectively) indicating the presence of a significant quadratic relationship between overgeneral memories and depression at T2 for females. This significant quadratic relationship was plotted using ModQuad (Jose, 2013b) and is represented graphically in Figure 5. Initially, as female's depression scores increased so too did overgeneral memories, however this relationship reversed at higher levels of depression, demonstrating an inverse relationship such that those with the highest levels of depression had lower rates of overgeneral memories. The range for females' depression scores was also higher (0-19) compared with males (0-14).

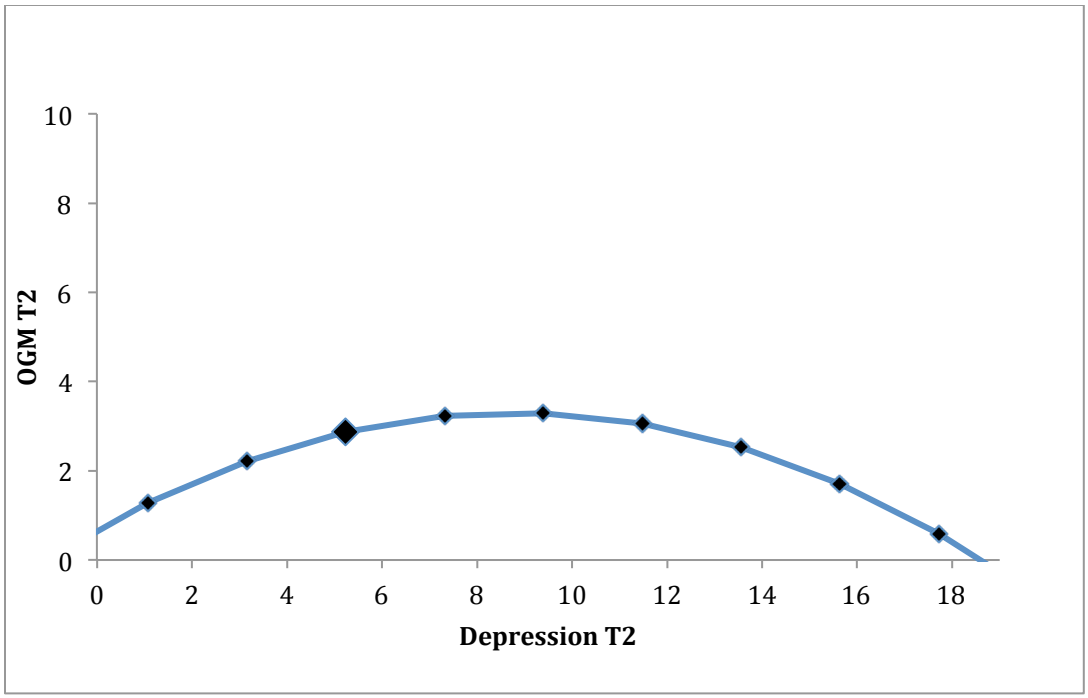

Figure 5. Quadratic relationship between OGM and depression for females at T2.

Note: Large diamond represents mean

Hypothesis 3: Rumination as related to OGM and a mediator beteween OGM and depression

Contrary to predictions, while significantly related to depression, rumination was not significantly related to overgeneral memories at T1 or T2. As rumination did not meet the basic assumptions for mediation (Jose, 2013a), meditation analyses were unable to be conducted and rumination was not a mediator of the relationship between OGM and depression.

Hypothesis 4: Predictive relationships between OGM and depression

To investigate whether OGM predicted depression a path model of these observed variables at T1 and T2 was constructed. To control for its influence, rumination was also included in this model. Initially, a fully saturated model was analysed, after which non-significant paths were deleted sequentially leaving a model comprising only significant paths (Kline, 2005). This model is depicted in Figure 6 below. This model fit the data well : c^2 (4) =

4.50, p = >.05, c^2/df ratio = 1.12, NFI = .99, IFI =.1.00 , CFI = 1.00 , RMSEA = .02 , Critical N = 496 (Figure 6). In order to investigate whether the model fit across gender groups, gender differences were tested by checking equality constraints between males and females for all variables in the model. There were no significant differences found, thus it can be assumed that the model fit for both males and females.

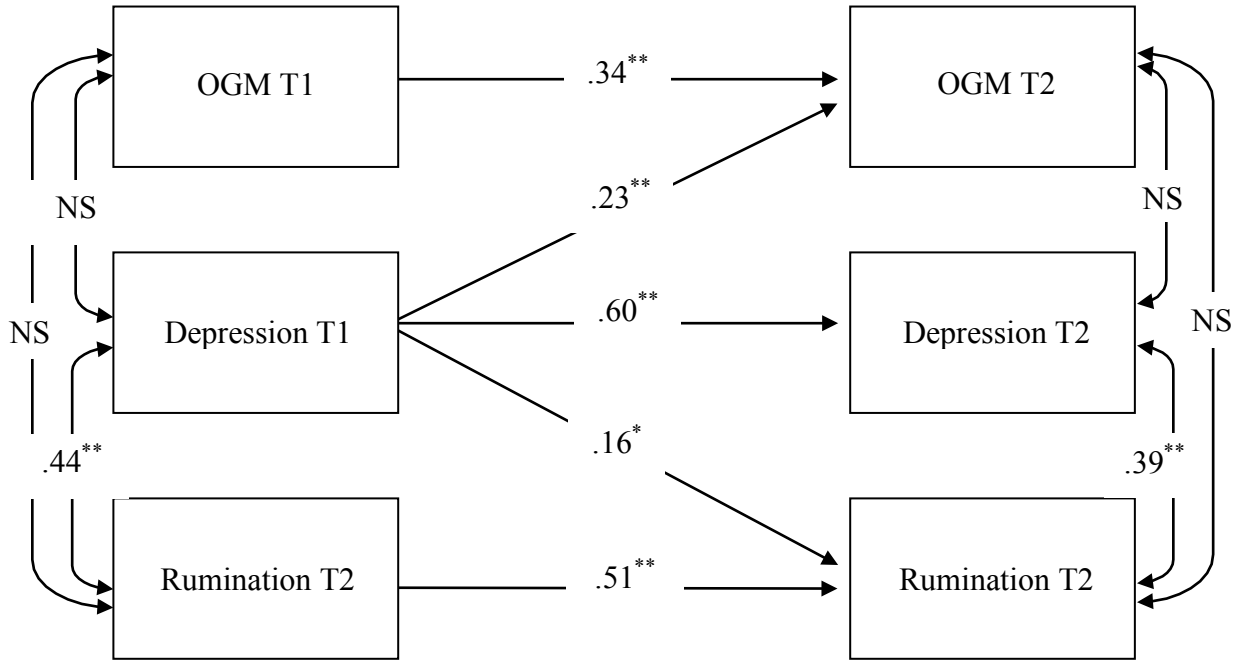

Figure 6. Path analysis model for relationship between OGM, depression and rumination over time with standardised path coefficients, significance of the parameter estimates: *p <.05, **p < .01, NS = non-significant.

As depicted in the model, there was significant stability in all variables across time. The only significant predictive relationships emerged from depression, with depressive symptoms at T1 predicting both rumination and overgeneral memories at T2. This suggests a relationship in

the opposite direction to the hypothesis, with depression at T1 predicting overgeneral memories at T2.

Post-hoc analysis by cue word valance. As mixed findings with regard to cue valence have been found in existing longitudinal research (Rawal & Rice, 2012; Hipwell et al. 2011), the model was tested with overgeneral memories to positive only and to negative only cues to examine if any differences were present in the current sample. When examining the relationships with overgeneral memories in response to negative cues only, a significant predictive relationship between OGM at T1 and depression at T2 emerged, but only for males ($b = .12$, $p > .05$). This was not evident for overgeneral memories given in response to positive cues for either males or females. Depression at T1 significantly predicted OGM at T2 for both males and females to negative cues and positive cues. Thus for males, overgeneral memories in response to negative cues only at T1 predicted depression at T2, while for both males and females, depression at T1 predicted overgeneral memories in response to both negative and positive cues at T2.

Discussion

Summary of the current study and key findings

There is evidence that OGM, a tendency to recall overgeneral autobiographical memories instead of specific ones, is significantly associated with depression in young people (Hitchcock, Nixon, & Weber, 2013). This, alongside evidence of the same association in adults and that OGM can predict depression (Williams et al., 2007) has led to the suggestion that OGM may be both a maintaining and vulnerability factor for the development of depression. While existing longitudinal work with youth has offered some support for this (Hipwell et al., 2011; Rawal & Rice, 2012a), this has emerged primarily from clinical or high-risk populations. The current

research aimed to investigate a community sample of young people in order to further clarify what the relationship of OGM to depression may be in the general population. In line with previous research and as predicted, depressive symptoms and OGM were significantly associated. Contrary to the prediction that OGM would predict depressive symptoms, however, the reverse was found with depressive symptoms at T1 significantly predicting OGM at T2.

Concurrent correlational relationship between OGM and depression. A significant association between OGM and depression has previously been found in adults (Williams et al., 2007) and young people (Hitchcock et al., 2013). Based on this, it was predicted that a significant concurrent relationship between these variables would be present at T2. This hypothesis was supported, with OGM and depression significantly correlated such that higher depression scores were associated with higher rates of reported overgeneral memories. This significant association was not present at T1. This indicates that the sample increasing in age, or some associated factor influenced this.

As there is evidence of an association between OGM and depression in even younger individuals (Orbach, Lamb, Sternberg, Williams, & Dawud-Noursi, 2001; Raes et al., 2010), this finding may be due to other factors. Given that rates of depression and OGM were lower here than in a comparable sample of 9- to 13-year old youth assessed with the CDI and a similar version of the AMT (Raes et al., 2010), it may have simply that rates of depression and OGM were too low to detect this relationship at T1. This is supported by the significant increase in OGM and depression over time across the sample at T2. Importantly, even though overall rates of both depression and OGM remained relatively low at T2, the relationship between OGM and depression that has been widely replicated among both adults (Williams et al., 2007) and young people (Hitchcock et al., 2013) also emerged here. This contributes to existing evidence that

OGM is a relevant factor to examine in relation to depression. It also demonstrates, for this first time, that this extends to the New Zealand youth in the community.

Gender difference in association between OGM and Depression. There was also some tentative evidence found for a gender difference in the relationship between OGM and depression that represents a novel finding in this area. For males, as found generally and as discussed above, there was a significant positive linear relationship between these variables such that as depression increased, so too did OGM. For females, however, there was a significant quadratic relationship between these variables. Initially, as for males, OGM increased along with depression symptoms. At higher levels of depression, however, this relationship reversed so that females with the highest depression scores were associated with lower levels of OGM than those with moderate depression scores. Quadratic relationships have not been examined in any previous research and care must be taken in interpreting this result due to its post-hoc nature and the low overall rates of those with high depression scores. Nevertheless, this offers the intriguing possibility that the relationship with OGM and depression may differ between males and females and may not be a linear one.

There are several possibilities as to why a quadratic relationship may have emerged for females. It may be that a third variable accounted for more of the variation at higher levels of depression for females. Given the increase in rumination for females compared to males found elsewhere (Jose & Brown, 2007) and in the current sample, rumination is one possible candidate that may have accounted for more variance at higher levels of depression. This is somewhat supported by rumination being significantly correlated with depression such that more depressed youth were more likely to report higher levels of rumination. However, as rumination was not found to be a significant mediator between OGM and depression, this may not have been the

case. Unfortunately, the small number of females in the high range of depression scores limited the ability to analyse this pattern further.

While the majority of researchers have found higher levels of depression associated with higher rates of OGM, consistent with males in this sample, Yanes, Morse, Hsiao, Simms, and Roberts (2012) found that, as with females in this sample, higher levels of depression were associated with increased specific memories. This was found amongst a group of adult HIV patients. Yanes et al. suggested that the severe and chronic stress faced by these individuals may have decreased any possible benefits of increased memory specifity (for instance increased problem solving ability; Kao, Dritschel, & Astell, 2006; Raes et al., 2005) and increased distress due to recalling more specific memories that were likely of high salience due to the all-encompassing nature of their difficulties. Rumination also significantly mediated the relationship between memory specifity and depression in this sample. While it is unlikely that the current sample was experiencing comparable levels of stress, this provides some evidence that it is possible for more depressed individuals to display less OGM, although it remains uncertain what mechanisms may lie behind this.

As only females reported depression symptoms above a moderate to high range, and there were no males with comparably high scores in the sample, it also cannot be ruled out that the same quadratic relationship may emerge for males. The lack of any male participants in this higher range precluded testing of this and requires further research. As quadratic relationships have not been previously been tested in this area, investigating their presence in other samples is required to establish whether this is a valid and reliable difference.

Predictive relationship of depression to OGM. As there is evidence from existing youth longitudinal studies that OGM can predict depression, (Hipwell et al., 2011; Rawal & Rice,

2012b), it was also predicted that OGM at T1 would predict depression at T2. This was not supported in the current sample. Instead, and in the opposite direction to this prediction, depressive symptoms at T1 predicted OGM at T2. As past research that has found a direct predictive relationship used high-risk populations of youth (Hipwell et al., 2011; Rawal & Rice, 2012b), this may explain the different pattern of results. It is possible that 'high-risk' participants have either already experienced some depressive symptoms, or associated factors that have contributed to the development of OGM. OGM may then act as a maintaining or exacerbating factor with some predictive power. In contrast, in the current sample of young people from the community OGM does not appear to predict depression but the reverse. This sample was examined largely prior to the emergence of depressive symptoms and without screening for at-risk individuals. Rather than providing support for OGM as an early vulnerability factor, this provides greater support for the alternative hypothesis that OGM may be a secondary and possible maintaining factor of depression.

The one existing community-based youth longitudinal study also found that OGM alone did not significantly predict depression in 12-13 year olds but that OGM in interaction with emotional abuse did (Stange et el., 2013). Based on this, an alternative explanation may be that the predictive relationship found with high-risk samples is a consequence of these samples also experiencing higher rates of abusive or problematic relationships. However, this is uncertain as it was not controlled for in these samples (Hipwell et al., 2011; Rawal & Rice, 2012b).

Nevertheless, the current finding in a community-based sample that depression predicts OGM and not vice versa challenges the notion that OGM is a significant early predictor of depressive symptoms. For the general population, it appears it may not be until after depressive symptoms increase that OGM emerges as a related factor. OGM may then later act to predict

future symptoms. Further longitudinal work will be required to confirm whether this is the case.

Tentative evidence of predictive value of OGM to negative cues for males. Previous findings in this area have also differed by cue valence and this remains an area of uncertainty (Williams et al., 2007), thus post-hoc testing was carried out to investigate whether valence differences emerged in the current sample. While across the sample OGM did not significantly predict later depressive symptoms, there was some support for the initial hypothesis that OGM would predict depression when the sample was examined by gender and cue valence. For males only, overgeneral memories to negative cues, and not positive, weakly predicted depression at T2. Previous longitudinal research with young people has also found mixed results with regard to cue valence. Rawal and Rice (2012a) found OGM to negative cues only predicted depression in a sample of males and females while Hipwell et al. (2011), found OGM to positive cues only predicted depression in a sample of females only.

Part of the difficulty in disentangling and comparing these results is that while both positive and negative cue words were used, the exact words used across studies differed. The words we used were piloted particularly for use with young people for our study. Further, there is evidence that for both healthy and depressed individuals, cue and memory valence do not always match, with mismatches particularly prevalent in those with depression, likely due to mood congruency effects (Young, Erickson, & Drevets, 2012). Based on this, an individual may respond to a positive cue like word ‘happy’ with a memory that may be coded as negatively valenced, for instance “being at school never makes me happy.”

Factor analyses of the AMT have also found that a one-factor model fits the measure best, and therefore results should not split by valence (Griffith et al., 2009; Heron et al., 2012). Given this recommendation, the inconsistency of previous findings, the range of cue words used in

studies and the potential mismatch between cue and memory valence, further research disentangling valence effects is required before any firm conclusions can be drawn in this area. It is also unclear as to why the predictive effect of OGM negative cues would emerge for males only. It is possible that this reflects a genuine difference between genders. There is some evidence for example that males are more prone to avoidant coping strategies, (Tamres, Janicki, & Helgeson, 2002). Whether this is the case and whether this reflects a reliable difference requires further investigation.

Lack of relation between OGM and rumination. Contrary to the prediction that rumination would relate to OGM and mediate the relationship between OGM and depression, no significant relationship was found between rumination and OGM. Previous work has found that rumination significantly relates to OGM among young people across adolescence (Park et al., 2004; Raes et al., 2006). This is consistent with the CaR-FA-X model, where it is hypothesized that ruminative processing increases the likelihood of being 'captured' at higher more general levels of memory representation (Williams et al., 2007). However, no significant relationship was found between OGM and rumination in our sample at either T1 or T2.

The lack of a significant relationship between OGM and rumination may reflect both the age and community nature of our sample. Raes et al. (2006) found a bidirectional relationship between OGM and rumination in an older sample of adolescents (15- to 18-years), and as rumination increases over adolescence (Jose & Brown, 2007) this may explain why this was not found in our sample. Further, Park et al. (2004) examined a wider range of adolescents (12 to 17-year olds) but found rumination only increased OGM for adolescents meeting criteria for Major Depressive Disorder and not for non-depressed community controls. As our sample was community-based and exhibited low overall rates of depression, this may be why no significant

relationship with rumination emerged. It is possible that it is only when significant depressive symptoms are present that rumination increases to a level that at which it begins to noticeably interfere with memory processes and increase OGM. This is consistent with the view that negative self-concept is more salient in those with depression and more likely to lead to 'capture' at general levels of memory than in those without depression (Williams et al., 2007). Finally, rumination may also act through other variables to influence OGM. Rawal and Rice (2012b) found it was only the interaction between rumination and executive functioning that predicted OGM in an at-risk sample. Here, rumination in the context of low, but not high, executive functioning predicted reduced specificity. This gives further support for the interactions between key mechanisms related to OGM as described by the CaR-FA-X model (Williams et al., 2007).

Relation of findings to existing theory

The CaR-FA-X Model. As outlined above, care must be taken in interpreting the finding that for males, OGM to negative cues predicted depression. In combination with the finding that depression predicted OGM across the sample, however, this pattern of results provides some tentative support for current of theory of OGM. The CaR-FA-X Model (Williams et al., 2007) hypothesizes three mechanisms that individually, and in interaction, contribute to an increased tendency towards OGM: Capture and Rumination, Functional Avoidance and Executive Functioning. Specifically, the current results give some support for the functional avoidance mechanism. Initially OGM may emerge to negative emotional content, thus serving as potentially protective from aversive emotions in the short-term (Williams et al., 2007). As depressive symptoms develop, however, this strategy may generalize across memory recall due to its reinforcing effects. This is supported by OGM then being significantly related to both positive and negative cue words at T2. OGM may subsequently emerge as a maintaining factor

in of itself, for instance, through preventing healthy processing and problem solving (Kao, Dritschel, & Astell, 2006; Raes et al., 2005; Williams et al., 2007).

The other mechanism examined, rumination did not significantly relate to OGM. As discussed, this may have reflected the nature of the sample. Furthermore, it is possible that avoidance may be a more relevant mechanism for this relatively young sample, as it has been suggested that younger children may use more avoidant strategies due to having less mature emotion regulation strategies (Sumner, 2012). Evidence for whether or not this is the case is lacking. Rumination may also exert more of an influence as it increases over adolescence (Jose & Brown, 2007). Given that executive functions such as planning and inhibition are still developing in this age group, it is also possible that executive functioning deficits exert a stronger influence on OGM than may be found in adults(Hitchcock et al., 2013). As executive functioning was not analysed in the present study this is purely speculative and requires further investigation. This also highlights the need to examine the CaR-FA-X model further as to how its proposed mechanisms may change over development.

A developmental psychopathology framework. The current results, in combination with past findings, also emphasise the need to examine OGM within a broader model of developmental psychopathology (Valentino, 2011). Based on a developmental psychopathology perspective, it is likely that a complex and dynamic set of interactions across multiple levels contribute to this phenomenon. Given the finding in the current study that depression predicts OGM, there may be difficulty in disentangling what factors may uniquely relate to OGM, particularly as many of the hypothesized relevant factors (e.g. parent and child attachment) are also likely to be associated with an increased risk of depression. Nevertheless, investigating what makes an individual more vulnerable to an overgeneral style of memory recall is important given

that individuals displaying a greater tendency towards OGM may be at higher risk of depression.

There is recent evidence, for instance, that the quality of parent-child talk affects memory specifity (Valentino et al., 2013). Here, higher quality conversations were associated with greater reported specific memories. This, and the variety of other factors implicated in the development of autobiographical memory are likely to create an increased propensity towards OGM. An individual may then have a general increased tendency towards OGM, which, in combination with stressors, may make it more likely for this to be reinforced and become an associated feature of psychopathology. While research into which developmental factors may influence OGM is still in its infancy, using a broad model as proposed by Valentino (2011) is essential in moving towards a more comprehensive understanding.

The current results also contribute to a greater understanding of the normative change in OGM into adolescence, crucial in understanding normative and pathological trajectories at the heart of a developmental perspective (Valentino, 2011). Currently there is conflicting evidence regarding the impact of age (Drummond et al., 2006; Johnson et al., 2005) and gender on OGM (Heron et al., 2012; Stange et al., 2013). In the current sample, OGM was found to significantly increase over time with no gender differences. As this was a community-based sample, this contributes to the picture of normative developmental trajectories, with the suggestion that OGM may increase over early adolescence.

An alternative conceptualisation of OGM building on a cognitive theory of depression. In combination with existing models of OGM, the relationship between OGM and depression can also be integrated into existing cognitive theories of depression. Cognitive theories of depression describe the formation of negative beliefs about oneself and the world (Beck, 2008). These are then activated and strengthened in particular circumstances, fuelling and maintaining

symptoms (Beck, 2008; Feliciano et al., 2012). OGM can also be viewed as a form of cognitive bias and may act in a similar manner to these as well as be partly a consequence of them. The cognitive biases associated with depression (of which, 'overgenerality' of thought is already established; Beck, 2008), along with mechanisms both perpetuating depression and implicated in the CaR-FA-X model (such as rumination), may act to either create or increase OGM which then, alongside these factors, becomes part of the constellation of negative feedback loops that make up depressive symptomatology.

It is possible that for some individuals, the consequences of depression alone, such as negative, extreme thinking styles, increased rumination and reduced executive functioning may be enough to trigger OGM (as described in Williams et al., (2007) CaR-FA-X model). For others, depressive symptoms may reinforce a preexisting tendency to overgenerality through factors such as family interactions (as described by Valentino's (2011) developmental psychopathology model). As hypothesized and partially supported by evidence (Moore & Zoellner, 2007), an early traumatic event may also have reinforced OGM as a protective mechanism against aversive emotions for some individuals, making it more likely to be displayed with the onset of low mood. In its emergence or reinforcement, OGM, as with other cognitive biases, may then act and interact to maintain symptoms of depression. The more severe and lasting the symptoms, the more OGM may be reinforced. OGM would then become a marker of the severity of an episode which is in of itself is strongly predictive of future symptoms (Feliciano et al., 2012). From this perspective, examining how OGM may contribute to depression as one of multiple interacting factors (e.g., alongside other cognitive biases and deficits) rather than in isolation may prove to ultimately be a more fruitful avenue of inquiry.

Limitations, strengths, and future research

There were both particular strengths as well as certain limitations to the current study that should be kept in mind when interpreting these results. Operationalizing abstract constructs such as depression is by nature an inexact science, and there is also inconsistency across the research both in measures used and methodology. With depression measures, a significant proportion of researchers have used categorical measures of depression rather than dimensional measures of symptoms such as the CDI. Some studies have found that the relation between OGM and depression only emerges when comparing those with a clinical diagnosis of depression to those without (see Williams et al., 2007 for discussion). The use of a dimensional measure of depression, however, is also a strength as by including all levels of depression symptomatology it can be viewed as a more sensitive measure of this relationship. This is also more appropriate in a community sample where using clinical diagnoses as cut-offs are liable to create floor effects. Furthermore, the replication of the association between depression and OGM using the CDI in the current sample provides validation that effects are measurable using this, even when overall scores are low.

While the AMT is the most widely used measure of OGM, there is wide variety in its content, methodology and scoring (for review see Griffith et al. 2012). There is some evidence as to how certain changes influence results, for instance less direction to be specific increases rates of OGM (Debeer et al., 2009; Raes et al., 2007). While further research is needed to establish the impact of specific variations, overall the AMT has been found to have good psychometric properties in comparable samples (Griffith et al., 2009; Heron et al., 2012), further validated by the wide replication of the correlation between OGM and depression that is also supported in the current sample.

Currently the term OGM is also broadly applied across research whilst in actuality it is used to refer to a range of measured variables, from categoric overgeneral memories only, to all memories that are not specific, to less specific memories. There is evidence, however, that the same association emerges regardless of how OGM is operationalized with a recent review finding that fourteen out of seventeen studies examining OGM in youth supported a relationship with depression regardless of how OGM was defined (Hitchcock et al., 2013).

Across all measures written responses were required and although items were also read aloud with participants it also possible that they may not have been appropriate for some of the younger children. This is particularly so for the AMT, due to the time constraints on responses and likely reduced speeds of reading and writing amongst the younger age group. Nevertheless, the low overall rate of omissions (that is, missing responses) on this task provides some reassurance that most of the sample was able to complete it appropriately. There is also emerging evidence that oral versus written modes of responding to an AMT affect memory specificity and quality from children, which may be an important area for further inquiry (Glynn, 2013). While the use of self-report measures can also be biased, overall the three measures used have good psychometric properties (Hipwell et al., 2011; Masip et al., 2010; Raes et al., 2010), and the current results and significant findings that are generally in concordance with past research provides further evidence for the validity of the use of these measures.

As there is evidence that a variety of variables can influence the relationship between OGM and depression the current study was also limited in only focusing on a small set of these. Particularly in regards to testing the CaR-FA-X model, and given existing evidence for interactions between factors such as rumination and executive functioning (e.g. Raes et al. ,2010), future research should attempt to include these. Beyond these hypothesised central mechanisms,

there is also evidence that a host of other factors including ethnicity (Hipwell et al., 2011; Wang, 2004) and life stress (Gibbs & Rude, 2004; Sumner et al., 2011) have a significant impact on this relationship. Given the disparate findings with regard to gender in this sample, it is plausible that other factors may also influence the relationship between OGM and depression. As with the expression of any psychological disorder, it is also likely that there are complex interactions between multiple factors present and research must begin to move past testing simple relationships. Testing multiple factors would also further inform a developmental psychopathology model of OGM for which evidence as to the normative development of OGM is also required as this is currently almost entirely lacking (Valentino, 2011).

The role of trauma, which has been highlighted as significantly related to OGM in both adults (for review see Moore & Zoellner, 2007), and young people (for review see Hitchcock et al., 2013), and independent of the influence of depression (Valentino et al., 2009), was also not included in the current study. As we did not measure trauma or abuse in the sample, it is possible that the presence of this may have influenced results given evidence for different pathways to OGM via abuse compared to depression as well as evidence for an interaction between abuse and depression in predicting OGM in a community sample (Stange et al., 2013; Valentino, Bridgett, Hayden, & Nuttall, 2012). While outside the scope of the present research, and complicated by ethical issues, the significant links with trauma and abuse in this area highlight this as an important area to include in future research.

There were also multiple strengths to this study. Although the relationship between OGM and depression has been increasingly researched in the decades since it was initially reported, there is limited evidence with young people, and few longitudinal studies, which are critical to begin to answer etiological questions. Furthermore, the few existing studies that have examined

OGM in young people over time have tended to use at-risk samples of young people. For some time there has been an identified gap in the literature on research into OGM investigating community samples of young people over time and a major strength of the current research is contributing towards filling this. The inclusion of a range of schools and age groups, use of males and females, as well as the low drop-out rates of this study give further value to these results and increase confidence in their applicability outside this sample. This is essential in clarifying what the role of OGM in depression may be in the general population. Future research measuring the development of these variables from an early age and across multiple time points will be critical in further contributing to this.

Practical and theoretical implications

The findings of the present research have both theoretical and practical implications. Theoretically, while providing some tentative support for existing theory regarding the development of OGM and its association with depression, the finding that depression predicted OGM over time requires reconsideration of the hypothesis that OGM may be an early vulnerability factor that contributes to the development of depression. OGM appears to emerge following depression and may maintain symptoms, although as with other cognitive biases there are likely to be preexisting vulnerabilities that make the emergence of OGM more likely. The tentative findings with regards to differences between gender also draws attention to the importance of examining how the relationship between depression and OGM may vary over different populations and the need to test theory across these.

Practically, there is already evidence that among adults, OGM may be able to be targeted in the form of both mindfulness-based interventions (Heeren, Van Broeck, & Philippot, 2009; Williams, Teasdale, Segal, & Soulsby, 2000). It is unclear, however, whether mindfulness

reduces depressive symptoms that then reduces OGM, or whether mindfulness partly works through reducing OGM. Given that here, OGM did not predict depression it may be the latter, particularly among younger community samples. Based on this, targeting OGM before the development of depression may not have a significant preventative effect and any OGM focused interventions would perhaps have greatest value in targeting maintaining effects. As such, reducing OGM may both reduce the influence of interacting factors (such as rumination and avoidance) and directly reduce symptoms (such as through increasing problem solving ability). Whether or not OGM is an early predictive factor for depression in the general population, the consistent association replicated here affirms OGM as a factor worthy of attention in targeting depression (Hitchcock et al., 2013). The findings from the current sample, notable due to its community-based and longitudinal nature, provide a unique and important contribution to furthering this aim of understanding how OGM may relate to the development of depression in young people.

Conclusion

The present study found that while depressive symptoms and OGM were significantly related at follow-up in the sample, rather than OGM predicting depressive symptoms over time, depressive symptoms were found to predict OGM. There was also some tentative evidence for a difference in the relationship between OGM and depression by gender as well as by cue valence. While these findings offer some support for current theories of OGM, they also point to the need for caution in establishing the role of OGM in the development of depression. The replication of the correlational relationship between OGM and depression does provide further evidence that this is an important phenomenon to examine, and gives support to the notion of OGM as a potential maintaining factor of depression which is likely to be linked to other maintaining

factors. The lack of relationship between OGM and rumination, while contrary to predictions, is somewhat consistent with evidence rumination may only have an impact on OGM in those with significant depressive symptoms given the community nature of the sample and low rates of depression. This may have also been due to the exclusion of other potentially relevant variables. Taking this and other limitations into account, there were also significant strengths to the current research, particularly in the nature of the sample being a diverse, community-based sample of young people followed over time. This is critical in order to further illuminate whether, how, and why OGM relates to the development of depression so we may use this knowledge to enhance the wellbeing of young people into their, and by extension all, of our futures.

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Appendix

Appendix A: Autobiographical memory test (AMT) booklet with sample memory recording page

MEMORY BOOKLET

Hello. We come from Victoria University of Wellington and we are very interested in learning how people of your age think about themselves and their lives. We want to find this out so that we can understand better how to help kids feel good about themselves and their world as they get older. We are going to ask you a whole lot of questions today, and we hope that you will find these interesting as you fill them out.

Remember – nothing you say goes to anyone else (other than the researchers) unless we are very worried about your safety. Also, once we have your forms, with your names, we take your name off and use a number only.

Thank you very much for helping us.

We are interested in your memory for events that have happened in your life. For each of the following words we would like you to think of an event that happened to you which they word reminds you of. The event could have happened recently (e.g., yesterday, last week…) or a long time ago. It might be an important event, or a trivial event.

The memory you write down should be for a real event. So if we said "good" – it would not be OK to say "I always enjoy a good party" because this does not mention a specific event. But it would be OK to say "I had a good time at Jane's party" because that is a real event.

Please don't use the same event more than once.

After I read each word, you will have about a minute to think about, and write down your memory. We'll tell you when to start and when it's time to stop. You can use as many or as few lines as you want. You don't have to fill in all the lines.

Sample memory record page (identical for all ten cue words)
Happy

_____
_____
_____
_____
_____
_____
_____

Appendix B: Questionnaire booklet

Date _____

Code Number_____

QUESTION BOOKLET

Kids sometimes have different feelings and ideas. This form lists the feelings and ideas in groups of 3 sentences. From each group of three sentences, pick one sentence that describes you best for the past two weeks. After you pick a sentence from the first group, go on to the next group. There is no right or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this X next to your answer. Put the mark on the line next to the sentence you pick. Choose only ONE in each group of 3 sentences.

Item 1. ____ I am sad once in a while ____ I am sad many times ____ I am sad all the time	Item 2. ____ Nothing will ever work out for me ____ I am not sure if things will work out for me ____ Things will work out OK for me
Item 3. ____ I do most things OK ____ I do many things wrong ____ I do everything wrong	Item 4. ____ I have fun in many things ____ I have fun in some things ____ Nothing is fun at all
Item 5. ____ I am important to my family ____ I am not sure if I am important to my family ____ My family is better off without me	Item 6 ____ I hate myself ____ I do not like myself ____ I like myself
Item 7 ____ I feel grumpy all the time ____ I feel grumpy many times ____ I am almost never grumpy	Item 8 ____ I cannot make up my mind about things ____ It is hard to make up my mind about things ____ I make up my mind about things easily
Item 9. ____ I have to push myself all the time to do my schoolwork ____ I have to push myself many times to do my schoolwork ____ Doing schoolwork is not a big problem	Item 10. ____ I am tired once in a while ____ I am tired many days ____ I am tired all the time
Item 11. ____ Most days I do not feel like eating ____ Many days I do not feel like eating ____ I eat pretty well	Item 12. ____ I do not feel alone ____ I feel alone many times ____ I feel alone all the time

We are interested in what people think about themselves. Circle one answer for each sentence.

1. When something good happens, I feel thankful.	YES	NO
2. When I am happy, I show it on my face.	YES	NO
3. Often I feel sick in my stomach.	YES	NO
4. I am nervous.	YES	NO
5. I often worry about something bad happening to me.	YES	NO
6. I fear other kids will laugh at me in class.	YES	NO
7. I have too many headaches.	YES	NO
8. I think I am happier than most of my friends.	YES	NO
9. I worry that others do not like me.	YES	NO
10. I wake up scared sometimes.	YES	NO
11. I get nervous around people.	YES	NO
12. I feel someone will tell me I do things the wrong way.	YES	NO
13. I fear other people will laugh at me.	YES	NO
14. When I do something hard, I feel proud of myself.	YES	NO
15. I am a happy person.	YES	NO

We are interested in how you feel. This is not a test: there are no right or wrong answers. When people feel happy or sad, they do and think different things. What about you? What do you do and think when you feel happy or sad? For each question, please mark what you usually do, not what you think you should do.

	Almost never	**Some-times**	**Often**	**Almost always**
1. When I am happy, I like to go to the movies with my friends.	1	2	3	4
2. When I am sad, I try to ignore my feelings.	1	2	3	4
3. When I am sad, I try to ignore or get away from my problems.	1	2	3	4
4. When I am sad, I go away by myself and think about why I feel this way.	1	2	3	4
5. When I am sad, I talk about it with someone who can help me feel better.	1	2	3	4
6. When I am sad, I watch TV or play video games so I don't think about how sad I am.	1	2	3	4
7. When I am sad, I think I'm ruining everything.	1	2	3	4
8. When I am sad, I remind myself that this feeling will go away.	1	2	3	4
9. When I am happy, I read a book or a magazine.	1	2	3	4
10. When I am sad, I try to pretend there isn't a problem.	1	2	3	4
11. When I am sad, I stay away from the person or situation that is causing the problem.	1	2	3	4
12. When I am sad, I do something I enjoy.	1	2	3	4
13. When I am sad, I think about how angry I am with myself.	1	2	3	4
14. When I am sad, I make up my mind that things are OK even if they're not.	1	2	3	4
15. When I am sad, I avoid thinking about how I feel.	1	2	3	4
	Almost never	**Some-times**	**Often**	**Almost always**
16. When I am sad, I am afraid to think about my feelings.	1	2	3	4
17. When I am sad, I ask a friend, parent or teacher to help me solve my problem.	1	2	3	4
18. When I am happy, I like to listen to my favourite music.	1	2	3	4
19. When I am sad, I think there must be something wrong with me or I wouldn't feel this way.	1	2	3	4

20. When I am sad, I go to my favourite place to get my mind off my feelings.	1	2	3	4
21. When I am sad, although things are bad, I choose to believe that things are good.	1	2	3	4
22. When I am sad, I avoid something that is making me upset.	1	2	3	4
23. When I am sad, I think about all of my failures, faults, and mistakes.	1	2	3	4
24. When I am sad, I decide that things are fine, even though I know they're not.	1	2	3	4
25. When I am sad, I think of a way to make my problem better.	1	2	3	4
26. When I am sad, I think why can't I handle things better?	1	2	3	4
27. When I am sad, I do something fun with a friend.	1	2	3	4
28. When I am happy, I think about how many things I like to do.	1	2	3	4

Directions

Below you will find a series of statements that people might use to describe themselves. The statements refer to a wide number of activities and attitudes.

For each statement, please circle the answer that best describes how true each statement is **for you**. There are no right or wrong answers. People are very different in how they feel about these statements. Please circle the first answer that comes to you.

You will use the following scale to describe how true or false a statement is about you:

Circle number:	**If the statement is:**
1	Almost always untrue of you
2	Usually untrue of you
3	Sometimes true, sometimes untrue of you
4	Usually true of you
5	Almost always true of you

How true is each statement for you?		**Almost always untrue**	**Usually untrue**	**Sometimes true, sometimes untrue**	**Usually true**	**Almost always true**
1)	It is easy for me to really concentrate on homework problems.	1	2	3	4	5
2)	I have a hard time finishing things on time.	1	2	3	4	5
3)	It's hard for me not to open presents before I'm supposed to.	1	2	3	4	5
4)	When someone tells me to stop doing something, it is easy for me to stop.	1	2	3	4	5
5)	I do something fun for a while before starting my homework, even when I'm not supposed to.	1	2	3	4	5
6)	The more I try to stop myself from doing something I shouldn't, the more likely I am to do it.	1	2	3	4	5
7)	If I have a hard assignment to do, I get started right away.	1	2	3	4	5
8)	I find it hard to stop what I was doing and start something new when I go from one subject to another at school.	1	2	3	4	5
How true is each statement for you?		**Almost always untrue**	**Usually untrue**	**Sometimes true, sometimes**	**Usually true**	**Almost always true**

			untrue		
9) When trying to study, I have difficulty tuning out background noise and concentrating.	1	2	3	4	5
10) I finish my homework before the due date.	1	2	3	4	5
11) I am good at keeping track of several different things that are happening around me.	1	2	3	4	5
12) It's easy for me to keep a secret.	1	2	3	4	5
13) I put off working on projects until right before they're due.	1	2	3	4	5
14) I pay close attention when someone tells me how to do something.	1	2	3	4	5
15) I tend to get in the middle of one thing, then go off and do something else.	1	2	3	4	5
16) I can stick with my plans and goals.	1	2	3	4	5

Word Task

In a moment I'm going to give you a letter, and I want you to write down as many words as you can that begin with this letter. You can write any word but not names of people or places, such as **Will or Wellington**. You should write different words rather than the same word with a different ending (for example, if you write **walk**, you can't write **walking**). You do not need to worry about spelling, and I will tell you when to stop.

In a moment I'm going to give you a category. I want you to write down as many different kinds of things that fit into this category as you can. For example, if the category was types of vegetables, you could write down **potato, broccoli,** and so on. You do not need to worry about spelling , and I will tell you when to stop.

Final thing: think of something that you are looking forward to today or tomorrow, and write it down.

Thank you!

Appendix C: AMT coding scheme based on Heron et al. (2012)

Types of Memories

Specific (SPSS code = 1)

Memories which refer to a discrete event which would have happened on one particular day. The time and day do not need to be specified. Use your discretion to determine whether the occasion described would in reality have been or likely been confined to one particular day.

Examples – the following give examples of responses which are likely to refer to events occurring on a particular day, at a particular time and place

Extended (SPSS code = 2)

Memories which refer to events which occurred over more extended periods of time. This could include longer events like holidays but could also include extended periods of time boundaried in other ways e.g. "when my cousins were living with us". Sometimes it might not be obvious whether the person is referring to a specific day or the period of time around an event (e.g. "when my granny died", "when my parents divorced")

Categoric (SPSS code = 3)

These are memories which refer to categories of event, repeated events (events which have occurred at least twice). The definition of 'event' is quite loose and sometimes it is difficult to decide (e.g. in example below 'when I don't have arguments with my brothers", is this referring to particular times, or the absence of an event). Sometimes people will describe a number of highly distinct unique events (e.g. "when my 3 children were born") and it is probably that they are recalling three specific events. In these cases we need to make a judgement about how these will be coded (are we more interested in what is actually in people's minds – e.g. can they recollect specific episodic detail – of their style of responding – e.g. whether or not they talk in generalities).

Note phrases that indicate repetitive nature.

Associate (SPSS code = 4)

These are usually nouns given as associations to the cue word. Occasionally the word may suggest that the person is really referring to a repeated event (e.g. verbs like 'running') in these cases a categoric code may be more appropriate.

Error (SPSS code = 5)

Statement such as ''I can't remember'' or statements that were incomprehensible or future-oriented, e.g. ''next week I will go to see my granny'.

Omission (SPSS code = 6)

blank spaces, no memory recorded

Other rules

When two memories are listed, coders **only assess the first memory.**

If you are uncertain between two categories give benefit of the doubt and score as a more specific memory.

Extended memories must refer to an event that occurs over **2 days or more**.

E.g. Last weekend I went to an adventure camp.

Incomplete responses should still be coded as a memory if they contain a phrase referring to a **time**, and contain an **object/subject**.

E.g. The time when my mum was joking around when I…

To code as a semantic associate, there must be a noun in the response. Otherwise, we code as an error.

E.g. Every day (error)
Once (error)
In bed (semantic)

If a memory is repeated, code as an error.

If unsure:

1. Look for linguistic cues for plurals/singulars
2. Use semantic knowledge. E.g. Is this event likely to have occurred more than once
3. When in doubt, give the benefit of the doubt. If ambiguous, assume specific.

Things to consider after reviewing pilot coding:

If there is no indicator of how long an event went we need a rule to decide. It looks like Charlotte was more conservative when judging an event as "specific".

Need to emphasize using only the first 'memory' when multiple memories are provided.

The following are disagreements between specific and extended events:

106 (3) When Rebecca and I were the first year fours to be in level 8 spelling.
109 (10) When I moved house.
113 (9) Last week when I was at home doing nothing.
114 (3) Last year when my netball bullets team won the whole season.
116 (3) I'm proud of my bird assignment which we had to do in room 15. It was hard but fun at the same time.
107 (7) When I went to rainbows end with my family.
108 (9) I felt relaxed when I was swimming in the sea in the gold coast last month.
110 (1) In the last weekend of the Easter holidays I went to an adventure camp.
110 (5) When it was nearly my tenth birthday.

The following are disagreements between specific and "error":

114 (2) The time when my mum was joking around when I was little and she said go down to the shop so I went down and a man had [memory ends]
116 (9) I was relaxed after a while because I heard my Dad's best friend died and it took me a while to [memory ends]
107 (2) When I took chocolate from the cupboard and [memory ends]
107 (6) When I was three and I thought I got a pony when I [memory ends]

The following are disagreements between "associate" and "error":

112 (1) Every day.
112 (2) Once.
112 (7) Not at all.
112 (8) In bed.
115 (2) Having my radio taken, losing my phone.
115 (8) Being by myself, when I was born.
115 (9) Being by myself, no one yelling, having time at the swimming pool.
115 (5) My mum's having a baby soon and it's a boy, having the ability to do this with you.

The following are disagreements between "categorics" and "associates":

115 (6) Seeing someone get bullied. Seeing someone cry. Getting yelled at.
112 (5) Birthdays, Christmas, rock climbing, Australia.
112 (6) Sometimes at my little brother.
118 (7) When I never lose.

Appendix D: Testing script

For collecting from class

Hi, I'm _____, and I'm here with some other people from the university. Your parents have said you can help us out with some research we are doing on how kids remember and think about things. Is that OK? Alright, if you could please follow me, we just have to collect some other students. We'll tell you more about what you'll be doing when we have everyone together as a group.

Event Script

(once students are seated in test room)

Hi Everyone, my name is _____, you may have already met (other researcher's names) when we came and collected you. We're from Victoria University, and we're here today because we are interested in finding out how students remember some events in their lives and think about things.

The first thing we're going to ask you to do is read through some info about the study. Your parent has said its fine for you to take part. If you think that's ok then can you sign too? Remember, everything you write here is private. We have given you two copies so that you can keep this info as well.

[collect information/assent sheets off students as they finish. Make sure that they keep one copy]

OK, thanks everyone for signing that for us. Now we're going to start. There are two parts to our session today. First we'll do the remembering part and after that we'll answer some questions about what we think and feel.

First things first, we're going to give you a booklet. Please don't look through it – all I want you to do is read the first page. Then I want you to turn to the second page and just write down your name, your school, your date of birth and your culture or ethnicity. Remember – even though this might feel like a test with us being all serious, it's NOT! There are no right answers or wrong answers; we just want to know your view.

OK, is your name on your booklet now? Great! We're going to start the first part of our session in a moment, but I want you to remember that if there is anything you want to know at any time while you're here, just say! We want you to feel happy and comfortable being here. Also, if you feel uncomfortable at any time during this session and no longer want to stay just let us know and you can go back to class.

Even though this isn't a test, it is important that you listen carefully to what we say and concentrate on your own work. To help everyone else listen and concentrate, it's important that you don't speak to each other and don't discuss your answers.

OK, if you could all turn to the second page I'm going to start reading the instructions for what we are going to do. Are you ready? OK!

[Read through instructions for the memory task. Stop frequently to make sure students understand the task. Emphasize that they should wait for you to say each word and that they shouldn't read ahead. Tell students that spelling doesn't matter. Remember to provide very clear "go" and "stop" signals].

Great! We've finished the remembering part! What I'd like for you to do now is wait for one of us to come and collect your memory booklet and give you a new booklet. Please don't open the booklet – just leave it on the front page while I tell you about what we're going to do next.

[Researchers should collect memory booklets one at a time, and replace it with a question booklet that you have filled in with the appropriate code number]

In this booklet we're going to answer some questions about what we think and feel. I'm going to read through the instructions and questions with you. Just like before, we'd like everyone to be quiet so that we can focus on answering their own questions. If you get lost or want to know something just ask one of the researchers to help you.

[Read through questions and response options. For questionnaires with scales/many response options read through all the options for the first item (at least) to show children how to respond. Make fun comments about progress. "phew – that one took a bit of thinking." "yes! only one to go" "this one is fun" "this one asks some hard questions but we'll take it slow." Remind children periodically that this is not a test. No right or wrong answer]

[Verbal fluency items: remember to allocate 60 seconds per item. Letter cue = "S"; Category cue = "animals"]

Phew!! We've finished the question part. Thanks so much for all your effort! We're just going to come and collect your booklet off you now.

[collect booklets. If student is NOT in pilot study, give them a copy of the informal debriefing]

Debriefing:
Thanks so much for coming in today! We really hope that you enjoyed yourself. Now I'm going to tell you what happens next. When we finish at [School name] today we take all of these booklets back to the university. The first thing we do it take your name off the booklet so that your answers do not have your name attached to them. Instead, your answers become part of a big group of answers that we use to explore how kids think in general and how their thinking links in with what they remember.

When we finish this study we will send a letter to your school and to you and your parents. This letter will tell you about what we have learned about how kids think and remember things. This letter will not tell your parents or teachers how you did – remember your answers will be combined with other kids answers to create a big group that we will explore.

Do you have any questions about what you did today or what will happen in the future?
Thanks for helping us out! [researcher's name] will take you back to class now.

Appendix E: Information and assent form for participants

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

Information Sheet: for the student
Young People's Memory for Experiences in their Lives

Karen Salmon
Associate Professor
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Paul Jose
Associate Professor
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Why are we doing this study?
- This research will allow us to understand how students remember specific events in their life.

Who is conducting the research?
- We are a team of researchers in the School of Psychology. Drs. Salmon and Jose are supervising this project, and two honours students will be conducting the actual research and will be helped by an experienced research assistant. This research has been approved by the School of Psychology Human Ethics Committee, under delegated authority to the Victoria University of Wellington's Ethics Committee.

What is involved if you agree to participate?
- If you agree to participate in this study, you will be asked to remember events from your life and to list some names. We will also ask you to fill out several questionnaires asking about how you have been feeling and how you think. You will do these tasks in a group but your information will be written down and private.
- We expect that the total time for the study will be no more than 40 minutes.
- During the research, you are free to stop and withdraw at any point.

Privacy and Confidentiality
- You will never be named or identified in any talk or publication. We will store your information by number and not by your name.
- Your data (without names) may be shared with other researchers.
- Your data (without names) may be used in other, related studies.
- A copy of the data (without names) will remain in the custody of Dr. Salmon.

- If your scores on our questionnaires suggest that you are very sad or worried, we will inform your principal or school counselor so that you can receive some help with this.

What happens to the information that you provide?

- The data you provide may be used for one or more of the following purposes:
  - The findings may be put forward for publication in a scientific journal, or presented at a scientific conference.
  - The findings may form part of an honours research project.

If you have any further questions regarding this study, please contact any one of us above. And if you have any concerns about your sadness or worry, then there are some possible sources of help. You could contact Youthline (www.youthline.co.nz); to talk or get further information or look on the Lowdown website (www.thelowdown.co.nz); you could talk to your family GP; or you could phone one of the researchers, Associate Professor Karen Salmon (04 463 9528), who will provide further information for you.

Statement of assent

I have read the information about this research and any questions I wanted to ask have been answered to my satisfaction.

I agree to participate in this research. I understand that I can withdraw my consent at any time, prior to the end of my participation.

Name: _____

Signature: _____

Date: _____

Copy to:

[a] participant,
[b] researcher (initial both copies below)

Appendix F: Debriefing information for participants

How children remember experiences in their lives

Thanks so much for coming in today! We really hope that you enjoyed yourself. Now I'm going to tell you what happens next. When we finish at your school today we take all of these booklets back to the university. The first thing we do it take your name off the booklet so that your answers do not have your name attached to them. Instead, your answers become part of a big group of answers that we use to explore how kids think in general and how their thinking links in with what they remember.

When we finish this study we will send a letter to your school and to you and your parents. This letter will tell you about what we have learned about how kids think and remember things. This letter will not tell your parents or teachers how you did – remember your answers will be combined with other kids answers to create a big group that we will explore.

Thanks for your time and effort!