Autobiographical memory specificity in a community youth sample: relations of specific and overgeneral memories with rumination, executive control, and depression.

Nicholas Allan

Victoria University of Wellington

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Abstract

Depression is associated with a tendency to recall a greater number of overgeneral memories (OGM) and fewer specific memories. The CaRFAX model (Williams, 2006) poses three mechanisms maintain OGM, but little work has investigated how these mechanisms uniquely relate to OGM beyond the variance they share with each other. There is also a substantial lack of research as to how the mechanisms of the CaRFAX model relate to OGM in typically developing youth, as much research has focused on adult and clinical samples. This study addressed these gaps in the literature by assessing a cross-sectional community youth sample (N = 658) to investigate two mechanisms of the CaRFAX model: executive control and rumination. A written version of the Autobiographical Memory Test (AMT) was used to measure both the number of OGMs and specific memories recalled. Depression was measured with the Child Depression Inventory-2, rumination was measured with a self-report Repetitive Thinking Questionnaire, and executive control was measured with a verbal fluency task and a self-report measure of effortful control; the Early Adolescent Temperament Questionnaire- Revised. Depression had a positive linear relationship with OGM and a negative linear relationship with specific memories. Both relationships were weak and became non-significant after accounting for age. A non-linear cubic positive relationship was found for OGM to negative cues predicting variance in depression. Over and above the shared variance between CaRFAX mechanisms, verbal fluency and effortful control evidenced no relationship with OGM but positively correlated with memory specificity. Conversely, rumination only related to a higher number of OGMs to negative cues. No interactions were found between rumination and executive control. Findings were interpreted with caution due to the small strength of relationships found. It is suggested that the relationships between depression, OGM/memory specificity, and CaRFAX mechanisms may only be clinically meaningful at high levels of psychopathology.

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Autobiographical memory specificity in a community youth sample: relations of specific and overgeneral memories with rumination, executive control, and depression.

Overview of the Current Study

It is characteristic of many sufferers of depression to display an overgeneral autobiographical memory style and have difficulty recalling specific autobiographical memories. When a depressed person is asked to recall a specific memory they instead tend to recall categories of events or events over a broad time period; which are considered to be overgeneral memories (OGM). A positive relationship between OGM and depression, and a negative relationship between memory specificity and depression, has been established in adult samples (see reviews, Sumner, Griffith, & Mineka, 2010; Williams et al., 2007), and there is growing evidence the same relationships exist in youth samples (See review, Hitchcock, Nixon, & Weber, 2014). In order to explain the development and maintenance of OGM Williams (2006) developed the CaRFAX model, which has mainly received attention in adult samples. The primary aim of the current study, therefore, was to investigate the relationship between OGM/memory specificity and depression symptoms in a youth community sample.

The CaRFAX model proposes that three key mechanisms develop and maintain the relationship between OGM and depression. Two of which are the focus of the current study: rumination and executive control. The CaRFAX model proposes that rumination maintains OGM by capturing an individual's attention with ruminative material, putting a load on cognitive processes, which makes the retrieval of a specific memory more difficult, so instead they recall an OGM (Williams, 2006, Williams et al., 2007). Relatedly, executive control encompasses executive resources which involve goal-orientated action, planning, and inhibiting irrelevant material (Sumner, Griffith, and Mineka 2011a). The CaRFAX model suggests that those with greater executive control will have a greater capacity to recall a

specific memory, and if executive control is compromised a person will be more likely to recall an OGM. These mechanisms, however, have received less attention in youth than adult samples. A further aim of this study, therefore, was to assess OGM/memory specificity and the relationships with rumination and executive control in a youth sample. Moreover, although the CaRFAX model (Williams, 2006; Williams et al., 2007) proposes that both rumination and executive control play a significant role in maintaining OGM, little work has focused on these processes together in children and adolescents. Few studies have examined if the variance in OGM explained by one CaRFAX mechanism might be accounted for by a different mechanism. This was also an aim of the current study.

Finally, this study investigated the relationship between a measure of temperament; effortful control, and its relationship with OGM. Effortful control incorporates executive control processes which enable an individual to suppress a dominant response to express a subdominant response (Rothbart, Ellis, Rosario Rueda, & Posner, 2003). There is a large overlap between effortful control and executive control (Bridgett, Oddi, Laake, Murdock, and Bachmann, 2013; Zhou, Chen, and Main, 2012), so in this study it will be considered a measure of executive control. There is research which indicates suffers of depression typically have lower scores on measures of effortful control (Moriya & Tanno, 2008; Verstraeten, Vasey, Raes, and Bijttebier, 2009; Vijayakumar et al., 2014). Furthermore, those with low effortful control may find it more difficult to disengage from negative ruminative thinking (Zetsche, D'Avanzato, & Joormann, 2012), which suggests effortful control might also interact with rumination to predict OGM and memory specificity. Therefore this study also assessed the relationship effortful control has with OGM and specific memory recall in a youth sample, and how it might interact with rumination to explain variance in OGM/memory specificity.

In summary this study had three overarching aims. The first aim was to investigate the relationship between depression and OGM/memory specificity. Secondly, the study aimed to explore the unique relationships rumination and executive control shared with OGM/memory specificity when the two are pitted against each other. Finally, the third aim of the study was to investigate interaction effects between rumination and executive control in predicting variance in OGM/memory specificity. These aims were investigated in a youth community sample given the predominant focus on adults and clinical samples in the literature.

Depression in Youth

It has been estimated that, globally, by 2030 depression will be one of the three leading disabling diseases alongside heart disease and HIV/AIDS (Mathers & Loncar, 2006). If a person experiences a depressive episode in adolescence or childhood, the risk of having major depressive disorder in adulthood is increased by almost fourfold (Rohde, Lewinsohn, Klein, Seeley, & Gau, 2013). Depression is debilitating to those suffering from it and places an individual at increased risk for suicide, with suicide risk being at its greatest in adolescence when comparing depression across the lifespan (Gould, Greenberg, Velting, & Shaffer, 2003; Rohde et al., 2013). The quality of life in sufferers of depression is also compromised. Adolescents with depression tend to have poorer relationships and more conflict with parents (Brière, Archambault, & Janosz, 2013), poor peer relationships and peer victimisation (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008), report lower happiness and well-being, do poorer academically, exercise less, and engage in more substance use (Field, Diego, & Sanders, 2001). Furthermore, those with depression in adolescence have greater risk of depression persisting or remitting in adulthood (Dunn & Goodyer, 2006; Rohde et al., 2013), which as a consequence negatively impacts that person's adult functioning (see review Kessler, 2012; Rao, Ryan, Birmaher, Dahl, Williamson, Kaufman, Rao, and Nelson, 1995). By furthering understanding of youth depression,

intervention could be implemented earlier in the life span to prevent the associated issues that can persist into later adulthood. Furthermore, research in youth depression may give greater insight as to how depression develops in some individuals and how it is then maintained.

Autobiographical Memory in Depression: Overgeneral Memory

Recollection and interpretation of autobiographical memories can differ in those that suffer from depression compared to people who have never been depressed. Memories are often more negative in content (see review, Dalgleish & Werner-Sidler, 2014) and often depressed individuals will generalise memories of events rather than refer to a specific autobiographical memory when asked to do so. This latter phenomenon being "overgeneral memory" (OGM).

OGM is usually measured by the Autobiographical Memory Test (AMT) (Williams and Broadbent, 1986) where participants are asked to recall a specific event lasting less than a day to cue words (e.g. happy, guilty). Typically 10 or 12 cue words of positive and negative valence are provided. Despite being asked to recall a specific memory, compared to a person with low OGM a person with high OGM will recall either categories of events (e.g. "Happy reminds me of my best friend's birthday parties"), which are often referred to as categoric memories; or memories over extended time periods (e.g. "My trip to Australia last year to see relatives"), referred to as extended memories (Williams et al., 2007). Both categoric and extended memories can be classified as OGMs.

It is established in the literature that depressed individuals and subclinical "dysphoric" individuals recall more OGMs compared to non-depressed individuals, (see review, Williams et al., 2007). OGM also shows predictive utility in the course of depression; higher OGM and lower memory specificity on the AMT has shown to predict later increases in depressive symptomology in clinical and non-clinical samples (see meta-analysis, Sumner et al., 2010).

To date, all studies examining the relationships between depression and memory specificity/OGM have explored linear relationships. Non-linear relationships between depression and memory specificity/OGM have not received attention. Yet non-linear relationships have been uncovered in other areas of psychology and can provide a better trend fit than linear trends (e.g. Kravariti et al., 2012). For example, there is evidence to suggest the relationship between depression and anxiety is curvilinear. Stanley and Jose (2015) found at low levels of anxiety, depression and anxiety were positively associated, but at moderate to high levels they become unrelated or slightly negatively associated. There is research demonstrating that depression and anxiety are positively associated (e.g. Jansson-Fröjmark and Lindblom, 2008) yet curvilinear trends may better describe relationships such as these. Therefore, curvilinear relationships between depression and memory specificity/OGM deserve attention.

While the relationship between OGM/memory specificity and depression has received considerable attention in adults, focus in youth has only occurred relatively recently (Hitchcock et al., 2014). An increased understanding of autobiographical memory specificity and depression in youth samples is important, as adolescence is a period of development where depression notably increases (Hankin, Abramson, Silva, McGee, & Angell, 1998).

Autobiographical memory requires a set of complex skills such as a sense of self over time, linking the past self to the present self, and subjective consciousness which develops across childhood and adolescence (Fivush, 2011). Because autobiographical memory is a developmental processes, it would be problematic to assume the adult literature directly translates to youth.

OGM and Depression in Youth

Although the OGM/memory specificity and depression relationship has predominantly received focus in adults, there is evidence to suggest the relationship between

OGM/memory specificity and depression also occurs in younger samples. Adolescents from the ages 12-18 years experiencing depression are shown to recall a higher proportion and number of OGMs compared to adolescents without depression (Kuyken & Dalgleish, 2011; Park, Goodyer, & Teasdale, 2002; Rawal & Rice, 2012) and clinically depressed children ages 9-13 years recall fewer specific memories compared to non-depressed children (Vrielynck, Deplus, & Philippot, 2007).

Also, in adolescents OGM may predict later depressive symptomology. Stange, Hamlat, Hamilton, Abramson, and Alloy (2013) showed that among Caucasian 12-13 year olds, self-reported emotional abuse interacted with OGM to predict depression, whereby emotional abuse predicted later increases in depressive symptoms only in participants with high levels of OGM but not low levels.

Overall the literature shows that OGM is associated with and may predict depressive symptomology in both adults and adolescent youth. There is limited research with community youth relative to clinical or at risk youth and adults, however. One of the aims of this study was to examine if there is an association between OGM and depressive symptomology in a community sample of adolescents.

The CaRFAX Model

The "CaRFAX" model is the leading theoretical framework which attempts to explain how OGM develops and is maintained in adults (Williams, 2006; Williams et al., 2007), and youth (Hitchcock et al., 2014). The CaRFAX model proposes that three core mechanisms are key to the development and maintenance of OGM: Capture and Rumination (CaR), Functoinal Avoidance (FA), and eXecutive function (X). The current study focused on two of these mechanisms: "capture and rumination" and "executive control". These two mechanisms will be described in the subsequent sections.

The CaRFAX model is derived from Conway & Pleydell-Pearce's (2000) model of autobiographical memory. Conway & Pleydell-Pearce (2000) propose there are two key patterns of activation that generate specific autobiographical memories: generative retrieval and direct retrieval. In generative retrieval a memory cue (e.g. proud) activates an autobiographical knowledge base, and then executive control processes can terminate the memory search, start a new search, or elaborate on the current search cycle. In generative retrieval a cue is elaborated on and evaluated in terms of its relevance to the retrieval goals at hand in order to move from more general representations of autobiographical memory to a specific memory. In this way, generative retrieval is viewed as a hierarchical memory search, where memories change from general to specific when going up this hierarchy. If there are disruptions in this hierarchical search, there will be difficulty retrieving a specific autobiographical memory and autobiographical recall will remain at a more general level in the hierarchy, resulting in an OGM (Conway, 2005; Williams 2006). Direct retrieval differs from generative retrieval as specific autobiographical memory recollection is spontaneous. In response to a cue, patterns of activation in the autobiographical knowledge base immediately activates a specific memory, without an individual having to move up the hierarchy from general to specific. This is because event-specific knowledge is closely associated with the memory cue and goals of memory retrieval (Conway & Pleydell-Pearce, 2000).

Capture and Rumination

According to the CaRFAX model (Williams, 2006; Williams et al., 2007) when an individual initiates a memory search, the cue may elicit information relevant to the self. If this elicited information is negative in nature and related to strong self-beliefs, the self-belief can capture attention and then may result in rumination. This "captures" the generative retrieval process in the general level of the hierarchical memory search and prevents the memory search progressing to the more specific level. This process can happen for both

positive and negative words as a positive cue can still elicit negative information, e.g. to the cue happy, a negative self-belief may be activated such as "I am always unhappy" (Williams, 2006). It is proposed that via the capture and rumination mechanism, the person would ruminate on that self-focused information, which prevents them from progressing to a more specific memory. When this self-relevant information is elicited it is also intrinsically linked to other intermediate self-relevant information unrelated to the working goal, which again prevents the person recalling event specific information (Williams, 2006; Williams et al., 2007).

Rumination is divided conceptually into two separate factors: reflective rumination and brooding rumination. Reflective rumination which is defined as "purposeful turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms" (Treynor, Gonzalez, & Nolen-Hoeksema, 2003, p. 256), is viewed as an adaptive subtype of rumination as it is related to adaptive coping strategies such as problem solving and cognitive restructuring, and has not shown to predict increases in depressive symptoms in adolescence (Burwell & Shirk, 2007). Brooding rumination is defined as "passive comparison of one's current situation with some unachieved standard" (Treynor et al., 2003, p. 256), is generally maladaptive, as it predicts greater depression longitudinally in early adolescence (Burwell & Shirk, 2007; Treynor et al., 2003).

There is evidence that brooding rumination, but not reflective rumination, is associated with lower memory specificity in adults (e.g. Romero, Vazquez, Sanchez, 2014), and that brooding rumination mediates the relationship between reduced memory specificity and higher depression scores in young adults (Debeer, Hermans, & Raes, 2009).

The associations between rumination and OGM are less established in youth. Rumination sharply increases as cognitive capacities develop in adolescence (Jose and Brown, 2008). In a sample of adolescents aged 12-13 years, Hamlat et al., (2015) found that

in female but not male participants, OGM predicted depression in female participants with high levels of rumination but not in female participants with low rumination.

OGM has also been experimentally induced in adolescents to observe its causal effect on rumination. Raes, Hermans, Williams, Geypen, and Eelen, (2006c) measured trait rumination in participants aged 15-18 years and experimentally induced an OGM style or specific retrieval style with a procedure which asks participants to write "types" of events to cue words. They then assessed ruminative responses participants made on a scrambled sentences task, where participants could assemble words into sentences in a ruminative or non-ruminative way. For example a participant would get a scrambled sentence such as 'do, "something, understand, to, trying" which could be unscrambled as "trying to understand something", which would be considered ruminative, or "trying to do something" which would be considered non-ruminative. It was found that those with high trait rumination given an induction of an overgeneral retrieval style gave more ruminative responses compared to high ruminators that had an induction of a specific retrieval style. This effect was not found in low ruminators. This overall implies that in adolescents who ruminate, an OGM style can cause a state of rumination, meaning that OGM might maintain a ruminative thinking style.

Experimental work has also induced rumination to see whether it has a causal influence on OGM. Park, Goodyer, and Teasdale (2004) induced rumination in adolescents with a self-focused task and found that induced rumination resulted in a greater depressed mood and retrieval of more OGMs to negative cues in both clinically depressed adolescents and matched community controls. This effect was only seen in response to negative cue words, which suggests the valence of cue words might play an integral role in rumination's influence on OGM in youth. Similarly, in a university undergraduate sample Romero et al., (2014) coded *memory* valence rather than cue valence, where memories were coded as positive or negative depending on the content. They found that memory valence determined

the relationship between rumination and memory specificity, whereby rumination was associated with a lower proportion of positive specific memories in dysphoric individuals, but rumination was not associated with proportion of negative memories. From these two studies it is important to highlight that memory/cue valence had a different relationship with rumination. The current study, therefore, investigated if cue valence would affect the relationship between rumination and OGM/memory specificity.

Taken together, these findings from adolescent samples suggest that rumination may predict OGM and that rumination and OGM may have a bi-directional relationship. There is still a substantial lack of research to support the capture and rumination mechanism of the CaRFAX model in youth, however. Indeed, there is still only a small amount of research to even suggest rumination and OGM are related in adolescents. There is also some evidence to suggest that cue and memory valence might determine the relationship between rumination with memory specificity and OGM, where rumination can result in greater OGM retrieval to negative cues (Park et al., 2004), and that rumination is associated with fewer positive specific memories (Romero et al., 2014).

Executive Control

Executive control encompasses cognitive processes that direct goal-orientated action, which involves planning, monitoring, and inhibiting information that is incongruent with a working goal (e.g. Chevalier, Huber, Wiebe, and Espy, 2013). One careful consideration is that the term “executive control” is an umbrella term for many cognitive control processes, some of which may be more or less relevant to the development and maintenance of OGM. It is therefore crucial to identify and understand which processes are most important in OGM.

The CaRFAX model highlights executive control as a key mechanism of one’s ability to retrieve specific autobiographical memories in generative retrieval. In generative retrieval, when one attempts to recall a specific autobiographical memory, executive control modulates

the autobiographical memory search. In this way executive control processes helps generate the retrieval search process and monitor the appropriateness of information for the goals at hand, inhibiting irrelevant information, and activating relevant patterns of activation (Conway Pleydell-Pearce, 2000). If executive control is compromised, the retrieval search from general to specific memory detail is more difficult, which reduces the likelihood of retrieving a specific memory and results in an OGM (Williams, 2006; Williams et al., 2007).

Various executive processes in adults have been associated with greater memory specificity or fewer OGMs. These facets of executive control include a number of measures of working memory (Holland, Ridout, Walford, & Geraghty, 2012; Raes et al., 2006a), verbal comprehension, perceptual reasoning (Park et al., 2002), and verbal fluency (Sumner et al., 2011a).

Executive deficits are also common in depression in adults. Compared to non-depressed individuals, depressed individuals are more impaired on tasks which require inhibition and activation, shifting attention, working memory processes, planning, verbal fluency, even after controlling for IQ and education (see meta-analyses, Snyder, 2013; Wagner, Alloy, and Abramson, 2015).

Because both OGM and depression are each associated with executive control deficits, one could argue that the relationship between executive control and OGM is due to the relationship these two variables have with depression. There is evidence that the relationship between OGM and executive control is not merely a function of the relationship between depression and executive control, however. Dalgleish et al. (2007) showed that a negative relationship between executive control and OGM remained significant even after depressive symptoms were controlled for. This shows there is unique explained variance for both depression and executive control in OGM, with some overlapping variance. Dalgleish et al. (2007) also showed that the depression OGM relationship was mediated by executive

control, indicating that the relationship between depression and OGM is partially explained by varying executive control capacities.

Much of this research has focused on adult samples, however, and these findings may not generalise to youth. This is because particularly in youth, executive functions related to goal directed activity, such as specific memory retrieval are not stable across time. Typically goal-oriented executive capacities develop and improve as a child ages (Chevalier, 2015), therefore age may be an important influential variable in relationship between executive control and OGM. There is evidence to support this from Hitchcock et al. (2014) who studied a sample of 7-17 year old children who had been hospitalised due to an accidental injury. They found that the relationship between working memory and OGM was moderated by age. For youth who were more than one standard deviation above the mean age, working memory was negatively related to OGM. However, for children more than one standard deviation below the average age, working memory was positively associated with recalling more OGMs. Hitchcock et al. (2014) suggested that these findings may be because younger children have not yet developed the control skills to block out irrelevant cue information, even though they have greater working memory capacity. Therefore, greater working memory at this stage in development may lead to more processes that interrupt the specific memory search.

Verbal Fluency

Research with youth has also examined verbal fluency as a measure of executive control. Verbal fluency involves executive control processes which update and monitor information in working memory (Valentino, Bridgett, Hayden, and Nuttall 2012). Findings with respect to the relationship between OGM and verbal fluency are mixed. Kuyken, Howell, and Dalgleish (2006) found no significant relationship between memory specificity and verbal fluency in a youth sample ages 12-18 years. In contrast, in a sample ages 7-17

years, Valentino et al., (2012) separated verbal fluency into letter fluency and category fluency. It was found letter fluency was not associated with OGM, but category fluency predicted fewer OGMs after controlling for child abuse and depressive symptoms. The authors suggested low category fluency may be related to more OGM due to low organisation of semantic knowledge, which would make it difficult to retrieve a specific memory that relied on semantic category cues.

In a verbal fluency task one must keep track of responses they have given and thus inhibit repetitions, inhibit irrelevant information that does not meet criteria for appropriate letter or category responses, and use goal directed cognitions towards an appropriate response. The current study used verbal fluency as a performance based measure of executive control. This ability to supress irrelevant information and engaging in goal orientated action overlaps with how the temperamental construct labelled "effortful control" is operationalised.

Effortful Control

Effortful control is defined as "…the ability to suppress a dominant response in order to perform a subdominant response." (Rothbart et al., 2003, p. 1114). Often terms "executive function", "executive control", and "effortful control" are used interchangeably in the literature, which depend on the area of psychological research studied. These constructs have much overlap: each involves processes of self-regulation such as inhibition, executive attention, and goal-orientated action; measures of executive function and effortful control are highly correlated; they are underpinned by overlapping genetic and neurobiological substrates; they share similar developmental trajectories; and share similar outcomes such as academic achievement and emotional regulation (Bridgett et al., 2013; Zhou et al., 2012). It is also important to be aware that processes that are considered as "effortful control" also draw upon more general executive functions such as working memory. In the current study effortful control was considered as an executive control process of the CaRFAX model

(Williams, 2006; Williams et al., 2007), and it was expected in the current study that lower effortful control would be related to greater OGM retrieval.

Aspects of effortful control have been shown to have a potential role in the OGM-depression relationship in youth samples. In a community sample of children ages 9-13 years Raes, Verstraeten, Bijttebier, Vasey, and Dalgleish (2010) showed that inhibitory control, a subscale of effortful control which refers to one's ability to inhibit inappropriate approach behaviour, partially mediated the relationship between depression and OGM. Furthermore, in a younger community sample of children age 4-6 years, Nuttall, Valentino, Comas, McNeill, and Stey (2014) found a positive relationship between memory specificity and performance on a "day/night task" which is a behavioural measure of inhibition. These researchers also showed that memory specificity and inhibition increased with age. However, inhibition did not mediate the relationship between memory specificity and age.

Paired with evidence indicating inhibitory control is positively related to memory specificity (Nuttall et al., 2014) and mediates the OGM depression relationship (Raes et al., 2010), it also makes theoretical sense that effortful control may be a process that effects one's ability to recall a specific memory and that effortful control may potentially interact with rumination. The capture and rumination mechanism poses that an individual "gets stuck" in the general level of the autobiographical hierarchy, because they cannot disengage from self-relevant ruminative information. It has been suggested that a person may have difficulty inhibiting categoric self-descriptions (e.g. "I'm never invited to parties because I'm boring") which are associated with depression, which consequently disrupts their search for a specific memory (Raes et al., 2010). Indeed, it has been shown that low effortful control in preschool predicts greater rumination in adolescence (Hilt, Armstrong, and Essex, 2012). It therefore seems likely that an individual with greater effortful control capacity will have a greater ability to disengage from self-relevant ruminative and irrelevant information, when it is not

related to the goal directed memory search. This suggests rumination and executive control may interact in predicting memory specificity/OGM, which was also originally posed in the CaRFAX model (Williams et al., 2007). We therefore proposed that rumination and effortful control would interact in the current study, where rumination would correlate with higher levels of OGM only in individuals with low effortful control.

The operationalisation of OGM

As noted earlier, OGM is typically assessed by means of the Autobiographical Memory Test (AMT) (Williams and Broadbent, 1986). The way in which OGM is operationalised varies across studies, however. Some studies operationalise OGM as the combined extended and categoric responses a participant makes (e.g. Rawal and Rice, 2012), while others will only include categoric responses (e.g. Park et al., 2002), and other studies include extended, categoric, and semantic associates as OGM (e.g. Hamlat et al., 2015). Semantic associates are general word associations to a cue word rather than an actual autobiographical memory.

Rather than OGM, some studies adopt memory specificity as the independent or dependent variable (e.g. Nuttall et al., 2014); which refers to the number of specific memories recalled. This is important, because although OGM and memory specificity may seem like opposites of the same continuum, therefore yielding similar patterns of findings, this conclusion cannot necessarily be drawn. This is because individuals can give responses that are not specific or overgeneral by failing to retrieve an autobiographical memory, instead providing omissions, which is failing to give a response, or semantic associates, which are words associated with the cue word which are not in the form of a memory. Therefore a person can have both low specific memory responses and low OGM responses if there are a lot of failures to retrieve an autobiographical memory. The CaRFAX model fails to signify

this, and instead implies if an individual fails to recall a specific memory they will recall an OGM.

For example, consider a person given ten cue words that recalls two specific memory responses, five OGM responses, and three omissions. If the variable analysed was the number of specific memories a person retrieved the person would score two out of ten. If this was conceptualised as the number of OGM responses, the person would score five out of ten.

Because both memory specificity and OGM are used quite interchangeably within the literature, but actually signify different variables, the current study will include both number of specific responses and number of OGM responses in analyses.

The Current Study

The overarching aim of the current study was to investigate the associations between OGM, depression, rumination, and executive control (assessed with a verbal fluency task, and self-report effortful control questionnaire) in a cross-sectional sample of 658 adolescents ranging in ages 11.5 years to 18 years. Rumination and executive control were investigated together, to test how they relate to memory specificity/OGM uniquely over and above the variance they share in OGM/memory specificity, as it is expected each mechanism of the CaRFAX model has a unique relationship with OGM (Williams, 2006; Williams et al., 2007). The current study also tested if rumination and executive control would interact to predict OGM/memory specificity.

The first aim was to test the patterns of relationships found between depression and memory specificity/OGM in adult community samples were similar in a youth community sample. From this the following was hypothesised:

Hypothesis 1: Depression will be negatively correlated with memory specificity and positively correlated with OGM.

In addition to this, the current study sought to explore non-linear relationships between depression and memory specificity/OGM, as to knowledge they have not been investigated. In particular, a non-linear trend was expected where at low levels of depression memory specificity/OGM would not be related to depression, and depression would be positively correlated to memory specificity/OGM at high levels of depression.

The next aim of the current study was to test the unique contributions of rumination and executive control beyond the variance they share in accounting for variance in memory specificity/OGM. In light of this the following was hypothesised:

Hypothesis 2: Executive control (measured by verbal fluency and effortful control) and rumination each explain unique variance in predicting memory specificity/ OGM, over and above the variance rumination and executive control share in memory specificity/OGM. When considered together, executive control will be positively correlated with memory specificity and negatively associated with OGM, and rumination will be negatively associated with memory specificity and positively associated with OGM.

As aforementioned, there is evidence to suggest rumination relates differently to memory specificity and OGM depending on memory cue valence (Park et al., 2004; Romero, Vazquez, and Sanchez, 2014). With this considered the following was hypothesised:

Hypothesis 3: To negative cues only, rumination would be associated with a greater number of OGMs recalled and a lower number of specific memories. There would be no association to positive cues.

The CaRFAX model suggests the mechanisms may interact to predict OGM (Williams et al., 2007). However, it is not clear in the model how these mechanism may interact. In light of this the following was hypothesised:

Hypothesis 4: It was hypothesised executive control would moderate the relationship between rumination and memory specificity/ OGM, such that rumination would only be

related to greater OGM and lower memory specificity in participants with low executive control.

Method

Design

The current study adopted a cross-sectional design to examine relationships amongst OGM, memory specificity, depressive symptoms, effortful control, verbal fluency, and rumination.

Participants

The final sample consisted of 658 participants recruited from schools across Nelson, Marlborough, Wellington, Manawatu, and Auckland. Across gender the average age of participants was 183.39 months (*SD*= 14.16). There were 297 male participants with a mean age of 185.71 months (*SD*= 13.72) and 358 female participants with a mean age of 181.39 months (*SD*= 14.23). Two participants did not disclose their gender. Ethnicity of participants were New Zealand European (52.2%), Maori (7.3%), Pacific People (4.0%), Asian (10.0%), Middle East/Latin America/Africa (4.4%), New Zealander/Kiwi (14.2%), or another ethnicity (7.9%).

School decile is a measure to indicate the extent to which a school's students live in low socio-economic communities. A school receives a rating from 1-10 determined by the ministry of education which is used to calculate funding schools receive (Ministry of Education, 2015). Participants in our sample came from schools ranging from decile 2 to decile 10, with a mean decile rating of 7.28 (*SD*= 1.39). The school with the highest number of participants was Pakuranga College (36.2%) with the lowest proportion of participants coming from St. Anne's School (1.1%).

Ethics approval was given by the School of Psychology Ethics Committee under delegated authority of Victoria University of Wellington. 269 of the participants were recruited as part of a follow-up of a longitudinal study. Principals of the schools had been contacted at a previous time point in the longitudinal study to consent to their school's involvement. A follow-up letter was then sent which asked for permission to follow up the participants from the previous time point who had obtained parental consent. The parents of participants who had previously consented in participation of the previous time point of the longitudinal study were contacted with a follow-up information letter (Appendix A). They were informed their child was already enrolled to participate in the study, but they had the opportunity to opt out if they no longer wished to participate.

The other 389 participants were recruited via approaching schools across Nelson, Marlborough, Wellington, Manawatu, and Auckland. Schools were initially contacted via phone or email, and they were sent an information letter on the study if they expressed interest (Appendix B). Forms were sent to parents via the schools outlining the study, inviting caregivers to give consent for the child's participation (Appendix C).

During data collection all participants were given an assent sheet, which also highlighted the purpose of the study, what participation would involve, and information on privacy and confidentiality (Appendix D). The participants then had the opportunity to sign to assent at the end of the information sheet, which was obtained. Immediately after data collection participants were given a debrief sheet which thanked participants, reminded them of confidentiality, and the general purpose of the study (Appendix E).

Measures

The Autobiographical Memory Test (AMT). A minimal instructions version of The Autobiographical Memory Test was used in written format to measure OGM, as this version is more sensitive to detecting OGM in community samples (Deeber, Hermans, and Raes,

2009). Compared to the traditional AMT the minimal instructions AMT places less emphasis on instructions that memories need to be specific, and has less prompting. Good consistency has been shown between written and oral versions of the AMT (Raes, Hermans, Williams, and Eelen, 2006b), with evidence to suggest there are no differences in OGM responses between written and oral versions (Glynn, Salmon, and Jose, 2015).

In the minimal instructions AMT participants received the following instructions in a response booklet. The instructions were also read out loud by a researcher:

"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 what 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 not so important 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 it, and write 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"

Participants were also additionally told by a researcher: *"You don't have to worry about spelling. Please also ignore the numbers under the lines on each page; we will tell you what they are for after we finish the memory task."* The numbers on each page were for participants to rate which vantage point they viewed the memory from; either from their own eyes or an external point of view. This was not analysed in this study, however.

Participants completed the AMT in a response booklet (Appendix F) which contained instructions and the 10 cue words which were all read out loud by a researcher. The ten cue words appeared in the following order alternating between positive and negative valence, they were all on their own individual page with space for the participant to write a response: *happy, guilty, proud, scared, excited, angry, lucky, lonely, relaxed, sad.* There was instruction for the participants not to turn the page to the next cue word until they were instructed to do so by the researcher. Participants had 60 seconds per cue word to write a memory in the booklet provided.

Coding of memories: Because, in contrast to the spoken version, the written form of the AMT does not permit ambiguous memories to be clarified by the administrator, each memory was initially coded as one of 11 categories: *specific*; if the memory was a singular instance that lasted less than 24 hours, *extended*; if the memory was a singular instance but was over a period of more than 24 hours, *categoric*; if the response was a category of repeated instances, *specific or extended*; if the memory could be coded as either a specific or extended memory with the information given, *specific or categoric;* if the memory could be coded as either a specific or categoric memory with the information given, *extended and categoric;* if the memory contained both extended and categoric information, *semantic associate*; if a response was not a memory but something associated with the cue word, *future event*; if the response was about an event going to happen in the future, *incomplete memory;* if a memory was started but incomplete so couldn't be coded, *omission*; if no response was made or only had a statement like "I was happy when", and *repeated memory;* if the participant had used that memory for a previous cue.

The coding scheme used can be found in appendix G and appendix H.

Multiple post-graduate researchers were trained for reliability coding across the sample. Because this sample was spread across multiple studies, separate Cohen's kappas

were calculated for separate portions of the sample. Between five separate post-graduate researchers 23.4% of memories were independently coded for inter-rater reliability checks resulting in Cohen's kappas ranging between .71 to .85.

Children's Depression Inventory-2 (CDI-2)

The short form version of The Children's Depression Inventory-2 (Kovacs, 2011) was used as the measure of depressive symptomology. It consists of 12 items, each of which consists of three statements (e.g. "I hate myself, I do not like myself, I like myself"). For each item the participants were asked to select the statement that best described their feelings in the past two weeks. The CDI-2 short form has demonstrated good clinical validity (Allgaier, Frühe, Pietsch, Saravo, & Baethmann, Schulte-Körne, 2012), test re-test reliability (Kovacs, 2011) and the CDI-2 has high internal consistency in both clinical and community samples (Masip, Amador-Campos, Gómez-Benito, & del Barrio Gándara, 2010).

Early Adolescent Temperament Questionnaire- Revised Short Form (EATQ-R). The Early Adolescent Temperament Questionnaire- Revised (EATQ-R) (Ellis and Rothbart, 2001) measured effortful control consisting of 16 items e.g. "It's hard for me not to open presents before I'm supposed to". Items were on a 5-point Likert scale ranging from "almost always untrue" (1) to "almost always true" (5). Participants were instructed to circle the statement that was most true for them. The EATQ-R has shown to have good psychometric properties with good internal consistency, test-retest reliability, and validity (Muris & Meesters, 2008).

Verbal Fluency. Verbal Fluency tasks letter fluency and category fluency were administered in written form. Practically, this was the most appropriate way to assess verbal fluency as students could not be tested orally one on one as they were assessed the entire questionnaire in a classroom setting. Written letter verbal fluency has a high correlation with oral letter verbal fluency (Cohen and Stanczak, 2000). Verbal fluency is considered a

measure of executive control which involves updating information, shifting, and inhibiting dominant responses (Jurado and Rosselli, 2007; Shao, Janse, Visser, and Meyer, 2014). Both tasks require the participants to cognitively search for appropriate items and write them down, and inhibit inappropriate responses under time pressure. For letter fluency participants were instructed to write down as many words as they could that began with the letter they were about to be told. They were instructed not to give words that were the names of people, places, or the same words with different endings, and were given examples. Participants were then told that their letter was "S" and to start. After 60 seconds had elapsed participants were instructed to stop. Category fluency requires generation of items of a certain category. Participants were asked to write down as many different things that would fit into the category they were about to be told. They were provided with an example of a category (different to the one they were given) with items that would fit into that category. They were then told their category was animals and were instructed to start. A researcher instructed participants when to start and when to stop. After 60 seconds had elapsed participants were told to stop.

Repetitive Thinking Questionnaire (RTQ). A short form of the Repetitive Thinking Questionnaire (McEvoy, Mahoney, & Moulds, 2010) was used to measure rumination. Some of the items were adapted by making small wording changes to make the questionnaire more appropriate for young people. This measure of rumination was used to avoid using a measure with diagnosis-specific content, as many rumination measures are laden with depression-centred content (McEvoy et al., 2010). The short-form of the RTQ consists of ten items which show excellent internal consistency and the short-form RTQ strongly correlates with the full RTQ scale (McEvoy et al., 2010). Participants were asked to rate each item with respect to an experience when they are distressed or upset, on a 5-point Likert scale from "not true at all" (1) to "very true" (5). E.g. "Once I start thinking about the situation, I can't stop".

The RTQ has shown good convergent, and divergent validity in an adult clinical sample with depressive and anxiety disorders (Mahoney, McEvoy, & Moulds, 2012), and in a community sample of young adults (McEvoy et al., 2010).

Other measures were also administered but are not discussed in the current study. e.g., measures of life events, avoidance, anxiety; and participants were also asked to rate the extent to which they had experienced the emotions associated with each cue word in the past week.

Procedure

At each wave of data collection the study was carried out by a researcher with a minimum of a postgraduate qualification in psychology. During school hours at the participant's school, a researcher explained to participants in small groups consent and confidentiality, participants were given a form detailing consent and confidentiality, and then signed to consent. The participants were then all given their own response booklet for the AMT task. After the AMT was completed participants completed the other measures aforementioned in a separate questionnaire booklet. The full questionnaire booklet can be found in appendix I. The researcher read out loud every item on every measure, but the participants were told if they wanted to they could work at their own pace until they reached the page of the booklet with the verbal fluency task. At the point of the verbal fluency task all participants were verbally instructed by the researcher. Participants then went on to complete the other measures in the order listed, guided by the researcher. As the nature of the questions are quite negatively valenced, participants finished the experiment by writing down something they were looking forward to. Participants were then thanked for the participation and received a de-brief form for themselves to keep.

Results

Data Preparation

All raw data values were entered into SPSS (Statistical Package for the Social Sciences, Version 21). First, the reverse-worded items in the CDI-II and EATQ-R were coded appropriately. Next, a missing data analysis was run in order to determine if raw scores were missing completely at random. The result was non-significant, indicating that all scores missing were missing completely at random (Little's MCAR test: chi-square= 3025.64, *df*= 2945, $p = 0.147$). Of the variables analysed Expectation Maximisation (EM) was used to impute the 0.4% of missing raw scores.

Coding Raw Scores

A number of variables used in analyses were calculated from the responses given in the AMT. The two coded AMT variables were: 'memory specificity', which was calculated by totalling each participant's number of '*specific'* responses; and 'OGM', which was calculated to be the sum of '*extended'*, '*categoric'*, '*specific or extended*', '*specific or categoric*', and '*extended and categoric*' responses. In this way it was decided that ambiguous responses that could be interpreted as either specific or overgeneral were combined with extended and categoric responses into the final OGM variable. Similar analyses were run with ambiguous responses coded in the final memory specificity variable instead, and regardless of how OGM and memory specificity were operationalised, similar patterns of findings were found.

Memory specificity and OGM were also separated by cue valence for some analyses. This was achieved by summing the number of responses that were specific or overgeneral to positive and negative words.

'Semantic associates', '*future events'*, '*incomplete memories'*, '*omissions'*, and '*repeated memories'* were all summed to create a "retrieval failure" variable.

Depression was calculated based on the participant's total scores for the CDI-II (as in Kovacs, 2011), and rumination was calculated by the participant's total score on the RTQ (as

in McEvoy et al., 2010). To calculate participant's overall effortful control score the raw scores were summed and then averaged to give a final score (Ellis, 2002). Letter fluency was calculated by the total number of correct responses a participant made for that task. Category fluency was also calculated as the total number of correct responses a participant made on the category fluency task. The overall fluency score was then calculated as the sum of the letter fluency and category fluency scores.

Descriptive Statistics

Descriptive statistics for OGM, memory specificity, depression, rumination, verbal fluency, effortful control, and age are presented in table 1. Using independent samples t-tests in SPSS (Statistical Package for the Social Sciences, Version 21), there was no difference between males and females for number of specific responses retrieved ($t(653) = -.97$, $p = .332$), or for number of OGM responses ($t(653) = -1.48$, $p = .140$). The average depressive score was comparable to studies using other community adolescent samples (e.g. Hamlat et al., 2015), with females on average scoring higher than males ($t(653) = -4.18$, $p < .001$). Participants scored in the average range for rumination, which was similar to the average score in the sample used in developing the scale (McEvoy et al., 2010) with females having slightly higher scores compared to males $t(653) = -3.57$, $p < .001$).

Age ranged from 140.40 months (11 years 8.40 months) to 215.50 months (17 years 11.50 months). The average age was 183.89 months (15 years 3.89 months) with a standard deviation of 14.16, indicating 68.27% of participants were aged between 169.73 months (14 years 1.73 months) to 198.05 months (16 years 6.05 months). Males on average were slightly older than females ($t(653) = 3.93$, $p < .001$), with a similar age spread ($SD = 13.72$, $SD = 14.23$, respectively). Females also scored slightly higher than males on the verbal fluency task ($t(653) = -2.91$, $p = .004$). There was no difference between males and females in effortful control scores ($t(653) = 1.00$, $p = .920$).

Table 1.

Descriptive statistics for variables analysed by whole sample and gender

Variable	Whole Sample (*N*= 658) M (*SD*)	Males (*N*= 297) M (SD)	Females (*N*= 358) M (SD)
Memory Specificity (Total)	6.17 (2.27)	6.09 (2.30)	6.26 (2.23)
Memory Specificity (Positive)	3.40 (1.30)	3.41 (1.31)	3.41 (1.28)
Memory Specificity (Negative)	2.76 (1.35)	2.67 (1.35)	2.85 (1.34)
OGM (Total)	2.98 (1.91)	2.87 (1.90)	3.09 (1.92)
OGM (Positive)	1.19 (1.09)	1.13 (1.07)	1.25 (1.11)
OGM (Negative)	1.79 (1.22)	1.74 (1.20)	1.84 (1.24)
Depression	6.20 (4.23)	5.43 (3.66)	6.79 (4.53)
Rumination	30.85 (8.78)	29.50 (8.45)	31.94 (8.93)
Effortful Control	3.21 (.55)	3.24 (.56)	3.24 (.55)
Fluency (Total)	26.52 (6.61)	25.70 (6.58)	27.19 (6.53)
Age (months)	183.39 (14.16)	185.71 (13.72)	181.39 (14.23)

To uncover relationships between key variables, Pearson's correlation analyses were run using SPSS (Statistical Package for the Social Sciences, Version 21). Because a Pearson's correlation assumes scores across variables are normally distributed, descriptive statistics were calculated to determine skewness and kurtosis. George & Mallery (2010) suggest skewness and kurtosis to fall within -2 and 2. All the variables used in analysis fell within an acceptable range of both skewness and kurtosis for Pearson's correlations.

Table 2 displays the correlations between the major "non-memory" variables used in our analyses. There was a moderate to high positive correlation between depression and rumination. Effortful control had a negative, moderate, significant correlation with depression and rumination. Verbal fluency was not significantly associated with depression or

rumination. Effortful control and verbal fluency were positively and weakly correlated. Age also weakly and positively correlated with depression and rumination, but did not correlate with verbal fluency and was weakly but negatively correlated with effortful control. A Pearson's correlation was also run which showed memory specificity and OGM were strongly negatively correlated as expected ($r(657) = -.81$, $p < .001$).

Table 2

Correlations between depression, rumination, verbal fluency, effortful control, and age

	Correlation Coefficients				
Variable	Depression	Rumination	Verbal Fluency	Effortful Control	Age
Depression	1				
Rumination	.54***	1			
Verbal Fluency	-.05	.02	1		
Effortful Control	-.49***	-.35***	.12**	1	
Age	.18***	.12**	-.06	-.11**	1

Note: *** $p < .001$, ** $p < .01$,* $p < .05$, † $p < .10$, no asterisk = non-significance. $N = 658$.

All correlations between the AMT memory responses with the CaRFAX model variables are displayed in Table 3. Rumination shared a significant positive correlation with OGM but did not significantly correlate with memory specificity. When separating memories by cue valence rumination was only significantly associated with memories to negative cues; negatively with memory specificity to negative cues, and positively associated with OGM to negative cues. Effortful control significantly correlated with both memory specificity positively and OGM negatively. Verbal fluency significantly correlated with memory specificity positively but did not significantly correlate with OGM. Failures to retrieve memories were significantly associated with verbal fluency and effortful control in a negative direction. In the expected direction depression showed a weak but significant negative

correlation with specific memory retrieval, and depression had a weak significant correlation with OGM. While depression correlated weakly and negatively with specific memories to positive and negative cues, it only significantly correlated with OGM to negative cues in a positive direction and not to positive cues. Age significantly correlated with all memory variables except for OGM to positive cues and with many "non-memory" variables (table 2) so age was included as a covariate in all subsequent analyses.

Table 3

Correlations between memory responses with CaRFAX variables and age

	Correlation Coefficients						
Variable	Specific	Specific positive	Specific negative	OGM	OGM positive	OGM negative	Retrieval Failure
Depression	-.10*	-.08*	-.09*	.08*	.03	.10*	.05
Rumination	-.06	-.03	-.08*	.10*	.03	.13**	-.03
Effortful Control	.13**	.11**	.12**	-.09*	-.07†	-.08*	-.10*
Fluency	.15***	.12**	.13**	-.07†	-.04	-.06	-.16***
Age	-.19***	-.13**	-.20***	.12**	.07†	.13**	.15***

Note: *** $p < .001$, ** $p < .01$,* $p < .05$, † $p < .10$, no asterisk = non-significance. $N = 658$.

Hypothesis 1: Linear and non-linear relationships between Depression and Memory Specificity/OGM

The first hypothesis was that depression would show a positive linear relationship with OGM and a negative relationship with memory specificity. Contrary to this hypothesis, partial correlations, controlling for age, showed that depression no longer correlated with memory specificity ($r(656) = -.06$, $p = .111$) or OGM ($r(655) = .06$, $p = .133$).

Possible quadratic and cubic relationships between depression with OGM and specificity were also investigated. To explore a quadratic relationship between OGM and

depression a "quadratic OGM" variable was created by squaring the OGM variable in the dataset. A regression analysis was then run, first entering OGM and then quadratic OGM. The quadratic OGM variable added significant explained variance to the model (β = -.23, p = .044) which indicated there was a small significant quadratic relationship between depression and OGM. The same analysis was also carried out with memory specificity and quadratic memory specificity but this yielded no significant quadratic relationship with depression (β = -.09, p = .551). The quadratic relationship between OGM and depression was graphed with ModQuad (Jose, 2013). As shown in Figure 1, at low levels of OGM, the relationship between OGM and depression was positive, at moderate levels of OGM there was no relationship, and at high levels of OGM the relationship between OGM and depression was negative. This pattern suggests that the most highly depressed participants were ones who generated medium levels of OGMs, whereas the least depressed participants generated either very few or very high levels of OGM. When age and gender were entered into the regression model, quadratic OGM no longer significantly predicted depression, but was marginally significant (β = -.20, p = .074.).

A cubic relationship between OGM and depression was also investigated. First, an "OGM cubic" variable was created by cubing the OGM variable in the dataset. "OGM cubic" was then added to a regression model predicting depression with OGM in the first step, "quadratic OGM" in the second step, and "OGM cubic" in the third step. "OGM cubic" when added to the model explained no additional significant variance (β = -.55, p = .078).

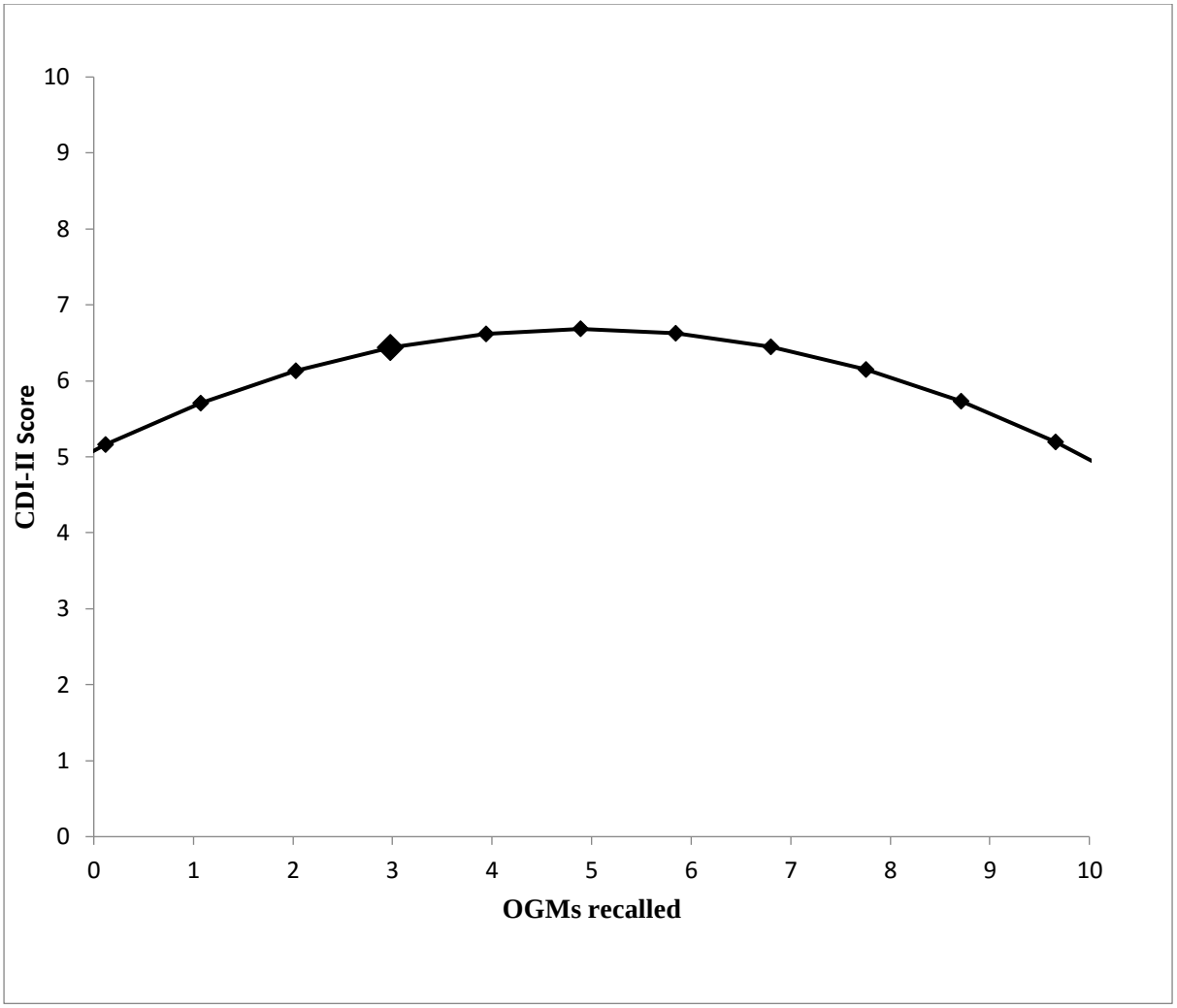

Figure 1. Quadratic relationship between OGM and depression.

Note: Large diamond represents the mean depression score.

As an exploratory analysis OGM was separated by valence and a cubic relationship between depression and OGM for negative and positive cue words was explored. This was achieved by creating a quadratic variable for OGM to negative memories by squaring OGM to negative memories, then a cubic variable for OGM to negative memories by cubing OGM to negative memories. Quadratic and cubic OGM to positive cues was created in the same way. These variables were then entered stepwise into a regression model, first OGM to positive cues, then OGM to positive cues quadratic, and then OGM to positive cues cubic. No significant cubic relationship was found for a cubic relationship for OGM responses to positive cue words ($R^2_{change} < .01$, $\beta = -.45$, $p = .089$). The same analysis was done to test a

cubic relationship between depression and OGM to negative cues. In the final step of the regression analysis OGM to negative cues cubic added small but significant variance to the overall model (R^2_{Change} = .01, β = -.84, p = .015). Cubic OGM to negative cues remained a significant predictor for depression after for age and gender were added to the regression model (β = -.81, p = .016), which also both significantly added explained variance in depression in the overall model (R^2_{Change} = .06; age, β = .20, p < .001; gender, β = .19, p < .001). To uncover the nature of this relationship it was graphed with ModQuad (Jose, 2013) (see figure 2). The pattern in figure 2 indicates that at low levels of OGM to negative cues, there was no relationship between OGM to negative cues and depression, at moderate to high levels of OGM to negative cues a positive relationship between OGM to negative cues and depression was noted, but at extremely high levels of OGM to negative cues there was a negative relationship between OGM to negative cues and depression.

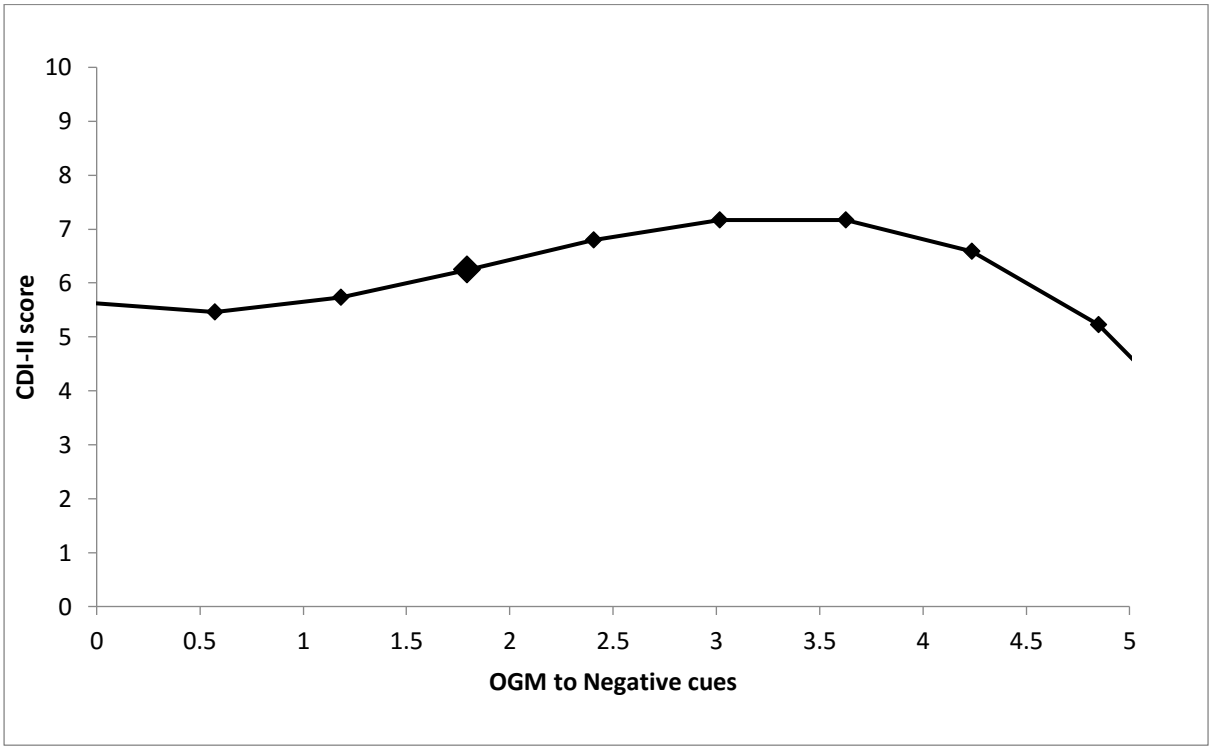

Figure 2. Cubic relationship between depression and OGM to negative cues.

Note: Large diamond represents mean depression score.

In summary, the prediction that depression would be linearly related to OGM positively and memory specificity negatively was supported as the correlations were in the expected direction. However, no significant relationship existed after controlling for age. A significant cubic relationship between depression and OGM to negative cues was found, even after controlling for age and gender. This trend was deemed the best fit for the OGM depression relationship.

Hypothesis 2: Unique relationships of CaRFAX mechanisms with memory specificity and OGM

The second hypothesis predicted that both rumination and the measures of executive control (verbal fluency, effortful control) would predict unique variance in memory specificity and OGM, beyond the variance they shared in predicting memory specificity and OGM.

To test this hypothesis the Structural Equation Modelling (SEM) program in AMOS (Version 21) was used. A model was created in which rumination, verbal fluency, and effortful control were proposed to predict memory specificity and OGM, which were proposed to predict depression. Age and gender were also added into the model as covariates. Because a number of relationships were non-significant in the model, model pruning was used which removed a non-significant relationship between verbal fluency and depression (β = -.03, p = .417). The goal was to test if each of rumination, verbal fluency, and effortful control predicted memory specificity/OGM while controlling for each other (e.g. rumination controlling for effortful control and verbal fluency). Therefore relationships between rumination, verbal fluency, and effortful control with memory specificity/OGM were not removed even if non-significant.

A final model was then obtained with the one path between verbal fluency and depression removed (figure 3).

Consistent with hypotheses 2, verbal fluency was a significant predictor of memory specificity (R^2 = .02, β = .13, p < .001). Effortful control was also a significant predictor of memory specificity (R^2 = .01, β = .01 p = .017). Contrary to the hypothesis, verbal fluency did not significantly predict unique variance in OGM (β = -.06, p = .111), nor did effortful control (β = -.05, p = .232).

Also contrary to hypothesis, rumination was not a significant predictor of memory specificity (β = -.01, p = .789) or OGM (β = .06, p = .160).

Depression was also not associated with either OGM (β = -.05, p = .366) or memory specificity (β = -.04, p = .391).

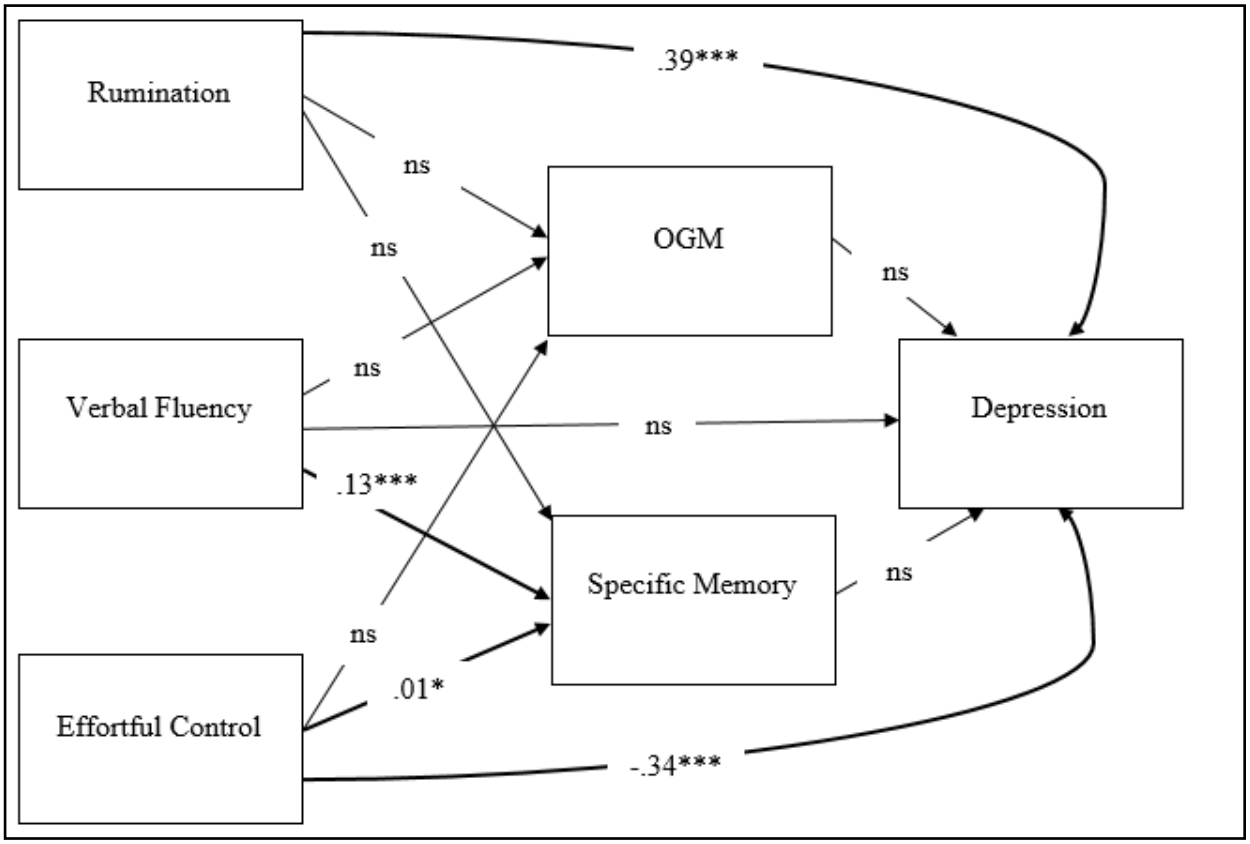

Figure 3. Relationships of rumination, verbal fluency, and effortful control with OGM/memory specificity.

Note: *** p < .001, ** p < .01,* p < .05, † p < .10, ns = non-significance. N = 658.

There were no indirect effects observed in rumination, verbal fluency, and effortful control in predicting depression through OGM or memory specificity, as the pathway between OGM and depression was not significant (β = -.05, p = .366) and the pathway between memory specificity and depression was not significant (β = -.04, p = .391).

Overall, in testing hypothesis 2, results indicated that both measures of executive control only predicted variance in memory specificity but not in OGM. Rumination did not predict variance in either memory specificity or OGM.

Hypothesis 3: Rumination and memory specificity/OGM by cue valence

Additionally, it was expected cue valence would affect the relationship between rumination and memory specificity/OGM. The third hypothesis therefore predicted that to negative cues rumination would be negatively associated with memory specificity and OGM, but this relationship would not apply to positive cues.

To test this hypothesis two separate SEM analyses were run in Amos. One model had specificity to positive and negative cues as the outcome variables, and the other had OGM to positive and negative cues as the outcome variable. In each model rumination, verbal fluency, and effortful control were entered as predictor variables, with gender and age as covariates. These models were left fully saturated as verbal fluency and effortful control were controlled for along with age and gender.

In support of hypothesis 3, rumination did not significantly predict variance in memory specificity to positive cues (β = .02, p = .624). However, contrary to hypothesis, rumination also did not relate to memory specificity to negative cues (β = -.04, p = .355) (figure 4).

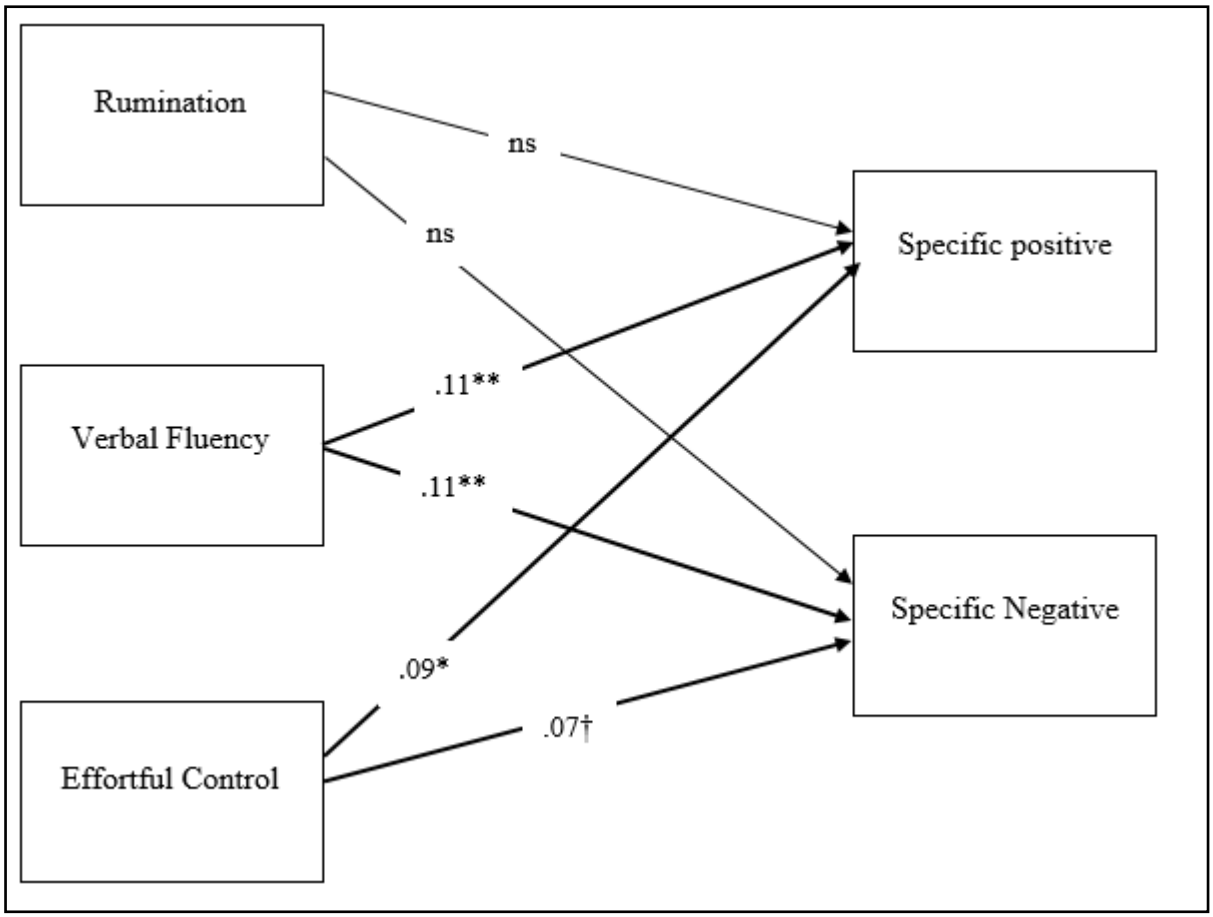

Figure 4. Relationships of rumination, verbal fluency, and effortful control with memory specificity cue valence.

Note: *** $p < .001$, ** $p < .01$,* $p < .05$, † $p < .10$, ns = non-significance. $N = 658$.

In support of the hypothesis, the next model showed rumination did not significantly predict variance in OGM to positive cues ($\beta = -.01$, $p = .826$), but did predict variance in OGM to negative cues ($R^2 = .01$, $\beta = .10$, $p = .017$) (figure 3).

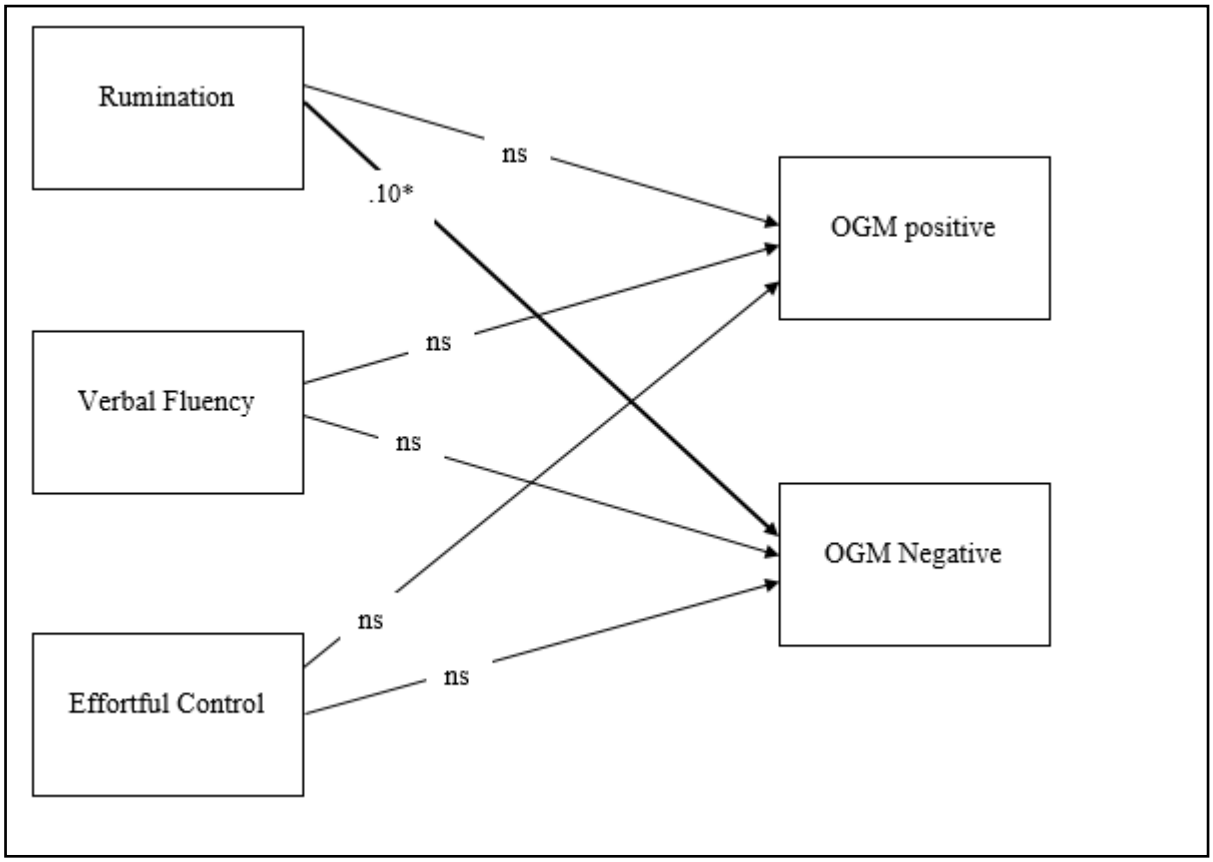

Figure 5. Relationships of rumination, verbal fluency, and effortful control with OGM cue valence.

Note: *** $p < .001$, ** $p < .01$,* $p < .05$, † $p < .10$, ns = non-significance. $N = 658$.

Overall, cue valence affected the relationship between rumination and OGM. Rumination was unrelated to memory specificity, regardless of cue valence, and was unrelated to OGMs to positive cues. However, rumination did predict significant variance in OGM to negative cues.

Hypothesis 4: Testing interactions between CaRFAX model mechanisms

The study also explored interactions among rumination with verbal fluency and effortful control in predicting memory specificity and OGM. The fourth hypothesis was that verbal fluency and effortful control would moderate the relationship between rumination and memory specificity/OGM. This was tested with a multiple regression predicting memory specificity with rumination, verbal fluency, and the interaction variable. The interaction term

was an insignificant predictor of memory specificity (β = .34, p = .111). The same regression analysis was also run with OGM as the dependent variable in which the interaction variable was also insignificant (interaction term: β = -.18, p = .399).

Effortful control was also tested as a moderator with a multiple regression predicting memory specificity with rumination, effortful control, and the interaction variable. The interaction term was an insignificant predictor of memory specificity (β = -.22, p = .296). The same regression analysis was also run with OGM as the dependent variable in which the interaction variable was also insignificant (interaction term; β = .24, p = .254).

In summary, analyses in hypothesis 4 showed no interaction between executive control and rumination in predicting memory specificity/OGM.

Discussion

The first overarching aim of the current study was to determine if depression was related both linearly and non-linearly to memory specificity/OGM in a community youth sample. The second aim of the study was to explore how two mechanisms of the CaRFAX model, rumination and executive control, related to unique variance in OGM/memory specificity beyond the variance they shared in memory specificity/OGM. The third aim was to see how rumination and executive control interact in predicting memory specificity/OGM.

Depression and memory specificity/OGM

OGM is associated with depression and predicts depression in adult clinical samples (see meta-analysis, Sumner et al., 2010) and adult community samples (Van Daele, Griffith, Van den Bergh, and Hermans, 2014) but research in youth is more limited.

The current study aimed to replicate literature which has found associations between depression with OGM and memory specificity in youth (Kuyken & Dalgleish, 2011; O'Carroll, Dalgleish, Drummond, Dritschel, and Astell, 2006; Park et al., 2002; Raes et al.,

2010; Rawal & Rice, 2012; Sumner et al., 2011b; Valentino et al., 2012; Vrielynck et al., 2007).

OGM is a better established memory phenomenon in depression in adults and clinically depressed samples, rather than in typically developing community youth samples which was the focus of the current study. This being said, there is some evidence to suggest that in community youth samples depression symptoms are related to increases in OGM (Kuyken & Dalgleish, 2011; Raes et al., 2010) and decreases in memory specificity (Bosmans, Dujardin, Raes, and Braet, 2013; O'Carroll et al., 2006).

The current study found a weak positive linear relationship between OGM and depression, and a weak negative relationship between memory specificity and depression. This indicates a weak trend where community samples of youth with higher depressive symptomology generally recall more OGMs and fewer specific memories. When accounting for age, rumination, and executive control, the relationships between depression and memory specificity/ OGM were non-significant. This suggests the depression and memory specificity/OGM relationship is likely due to other variables that might be associated with age. For example as a child gets older rumination increases (in the current study; Jose and Brown, 2008), and other variables not measured in the study, such as working memory, have also been associated with age (see review, Sander, Lindenberger, and Werkle-Bergner, 2012). These factors associated with age may also influence depression and memory specificity/ OGM which may in turn influence the relationship between depression and memory specificity/OGM.

In a series of follow-up analyses, the current study tested non-linear relationships between depression with OGM and memory specificity. Much research in psychology fails to explore non-linear relationships between variables. There is evidence, however, to suggest that in other areas of psychology non-linear relationships may provide a better trend fit

between variables than linear trends (e.g. Kravariti et al., 2012, Stanley and Jose, 2015). Non-linear relationships between OGM and depression have received little attention in adult and youth samples, and to our knowledge no studies to date have assessed non-linear relationships between depression and memory specificity/OGM in youth.

A quadratic relationship was found between depression and OGM, and a cubic relationship was found between depression and OGM to negative cue words. The quadratic relationship between depression and OGM suggested a trend where the most highly depressed participants generated medium levels of OGMs, whereas the least depressed participants generated either very few or very high levels of OGM. However, like the linear relationship, this quadratic relationship became non-significant after controlling for age. This again suggests that factors associated with age are likely determining the relationships between depression and memory specificity/ OGM.

This gives reason to suggest non-linear trends may better explain the depression and memory specificity/OGM relationships observed in the literature. In the current sample at least, at low levels of OGM increases in OGM were not related to depression. Once a threshold of OGM to negative cues was reached depression and OGM were positively associated. This is in line with the notion that depression and OGM only relate when substantial depressive symptomology is present. Interestingly, at the highest levels of OGM the relationship with depression became negative, indicating as OGM to negative cues increased, depression decreased. It could be speculated that this is due to the initial adaptive function of OGM, which while not examined in this study, could be explained by the functional avoidance mechanism of the CaRFAX model. The functional avoidance mechanism poses that specific memories have more event specific information that is unpleasant and by recalling an OGM, that unpleasant affect is avoided in the short term (Williams et al., 2007).

However, the clinical utility of both the linear and non-linear relationships between depression and memory specificity/OGM must be considered. With the very large sample size of the current study, statistically significant relationships are likely due to large statistical power, and very weak relationships reach significance even though they only account for a small amount of variance, which do not necessarily denote clinical significance. The cubic relationship between depression and OGM to negative cues remained significant even after controlling for age and gender, which suggests there is unique variance explained in depression when examining OGM to negative cues in a non-linear cubic trend, beyond factors that are associated with age. However, the variance explained by this cubic relationship was very small; only 1%. Therefore this finding may have limited clinical and practical value.

Nonetheless, compared to literature which assesses linear relationships the direction of the linear relationship between depression and memory specificity/OGM in the current study was in the expected direction. It could be possible that the relationship between depression and memory specificity/OGM is meagre in community samples and becomes more relevant when clinical levels of psychopathology are met. Sumner et al. (2010) in a meta-analysis showed that a clinical diagnosis of depression was a moderator for depressive symptomology predicting later increases in OGM, where in samples with a clinical diagnosis of depression memory specificity/OGM was a stronger predictor for depression symptomology than in non-clinical samples. Indeed some studies using community samples fail to find correlations between depression and memory specificity (Debeer et al., 2009; Gibbs and Rude, 2004; Hamlat et al., 2015; Sumner et al., 2011b), and depression and OGM (Debeer et al., 2009; Gibbs and Rude, 2004; Hamlat et al., 2015; Stange et al., 2013), and other studies that do find an association only find small correlations similar to the sizes of correlations found in the current study (Hipwell et al., 2011). Studies in community samples

often find if OGM does predict depression it only does in interaction with other variables, such as under a high number of negative life events (Gibbs and Rude, 2004), stressful life events (Hamlet et al., 2015), and high levels of self-reported emotional abuse (Stange et al., 2013). Under conditions like these higher levels of psychopathology may be more likely to occur.

Most studies in the autobiographical memory specificity literature do not test quadratic and cubic relationships. This may be important for research to consider in future as the trend with the better fit may be "masked" within a linear trend, but actually better be represented by a non-linear trend. The current study at least suggests the relationship between OGM and depression is not as simple as OGM and depression increasing linearly; rather that increases in depression are different across different levels of OGM. Even though the cubic relationship between OGM to negative cues and depression is weak in the current study, it was a better fit than a linear relationship, and stronger non-linear trends may be uncovered at clinical levels of depression. Which is an area unexplored that deserves attention in clinical youth and adult samples.

The CaRFAX model: Testing rumination and executive control

Each mechanism of the CaRFAX model is proposed to be a significant contributor in the development and maintenance of OGM (Williams et al., 2007). Few studies have examined these mechanisms in conjunction predicting memory specificity/OGM, however. Hypothetically one mechanism of the CaRFAX model could be redundant if the variance one mechanism explains in OGM is accounted for by another mechanism. The current study aimed to test this by investigating the rumination and executive control mechanisms together to see whether each contributed unique variance above and beyond the shared variance they explained in memory specificity/OGM. Therefore the second hypothesis proposed that, when investigated together, rumination would be positively associated with OGM and negatively

associated with memory specificity, and that executive control (measured by verbal fluency and effortful control) would be positively associated with memory specificity and negatively associated with OGM.

In relation to this hypothesis it was shown that both measures of executive control, verbal fluency and effortful control, were positively associated with memory specificity. Executive control had no significant association with OGM after controlling for age, gender, and rumination, however. Rumination did not relate to either OGM or memory specificity after accounting for age, gender, and executive control. However, when examining memories by cue valence, higher rumination was associated with a higher number of OGMs recalled to negative cues. Although all of these findings were statistically significant, the strength of these findings were weak, explaining only 1-2% of variance in memory specificity and OGM.

Rumination

In the current study rumination was associated with an increased number of OGMs only to negative cue words. Similarly, Park et al., (2004) found that induced rumination compared to a distraction condition resulted in a greater retrieval of OGMs to only negative cues in clinically depressed adolescents and matched community controls. This differs from similar work with adults, which shows community samples and clinically depressed samples display increased OGM and to both positive and negative cue valence after rumination induction (Sutherland and Bryant, 2007; Watkins and Teasdale, 2001). The current study and results from Park et al. (2004) suggest that OGM to negative cues but not positive cues might be related to rumination in youth, which suggests a different finding to adults. There is a need therefore in future research for further longitudinal work assessing rumination predicting OGM to cue valence in youth.

Rumination may be related to OGM to negative cue words and not positive words because positive cue words may be more likely to elicit a positively valenced memory and

less likely to elicit unpleasant self-relevant material than a negative cue word would. As the CaRFAX model suggests (Williams, 2006; Williams et al., 2007), when these negative self-relevant memories are produced it "captures" the person in their hierarchical memory search, so instead an OGM is retrieved. The CaRFAX model poses it is still possible for a person to be "captured" by positive cues, as this can still elicit unpleasant self-relevant information. However, negative cues may be more likely to elicit unpleasant self-relevant information than positive cues, which is why the association was only found in negative cues. This tentative explanation is based on the assumption that negative cues produce more negative memories and this would need to be further tested. Also, this valence effect may only be seen in adolescents due to the social demands and stressors at this point in development. Adolescence is a period where social stressors become more apparent (Davey, Yücel, & Allen, 2008; Steinberg & Morris, 2001), and the negative cues such as "guilty" and "lonely" may be more likely to activate social stressors that will cause rumination compared to "happy" or "relaxed". In adults a broader range of stressors may be activated from cue words irrespective of valence.

The finding that rumination was positively associated with OGM to negative cues should be interpreted with caution, as the relationship was still relatively weak. Our study assessed trait rumination only, however, and rumination may be more strongly related to OGM to negative cues if a "state" of rumination is active in individuals with ruminative tendencies. Indeed, Raes et al. (2006c) showed inducing an OGM retrieval style only increased ruminative responses in individuals that already had high trait rumination. Also the strength of this relationship may differ in clinical samples of psychopathology. Youth who are high ruminators may have greater OGM recall at clinical levels - an effect strongest in relation to negative cues. So at low levels of psychopathology the strength of relationship to positive cues may be too weak to become statistically significant or meaningful. There is

evidence to suggest this, for example Sutherland and Bryant (2007) found that a rumination induction only increased OGM in high-depressed individuals but had no effect on low-depressed individuals.

Executive Control

The current study also found that higher executive control, measured by verbal fluency and effortful control, was associated with a higher number of specific memories recalled. After accounting for age, gender, and rumination, the measures of executive control still explained significant variance in memory specificity but had no association with OGM.

Other work assessing verbal fluency in youth samples has failed to find a relationship between memory specificity and verbal fluency (Kuyken et al., 2006). The current study did find a relationship between memory specificity and verbal fluency, however, which indicated youth with greater ability on the verbal fluency task also retrieved a greater number of specific memories. This relationship remained significant after accounting for rumination, age, and gender suggesting that verbal fluency contributed unique variance to the prediction of number of specific memories recalled.

OGM evidenced no relationship with verbal fluency, however. These findings differed from Valentino et al. (2012) who in an in-patient youth sample found that while there was no association between letter fluency and OGM, category fluency predicted lower OGM recall even after controlling for age, IQ, depression, and abuse.

The findings from this study may have differed from the other youth literature due to methodological differences. Verbal fluency in the current study was administered in a written format and in a group setting, where participants had to write their own responses rather than having an experimenter record responses for them in a one on one setting. Because a participant can write their responses they may not have had to rely on keeping track of their responses in working memory, because they could see their responses on the page. Also both

Kuyken et al. (2006) and Valentino et al. (2012) assessed samples with most participants having some form of psychopathology. This reinforces why it is important to distinguish these relationships of the CaRFAX mechanisms with memory specificity/OGM between community and clinical samples. It also highlights how it is important to consider memory specificity and OGM as different variables, as going by the results of the current study and the literature in youth, both relate differently to verbal fluency.

In relation to the measure of effortful control, the findings of the current study were similar to Nuttall et al. (2014), where a performance based measure of inhibitory control related to greater memory specificity in children ages 4-6 years. Raes et al. (2010) examined the "inhibitory control" subscale of the EATQ-R, which specifically refers to one's ability to inhibit inappropriate approach behaviour (Moriya & Tanno, 2008). Raes et al. (2010) found inhibitory control was correlated with OGM, and mediated the relationship between OGM and depression in children ages 9-13 years. The current study found an initial correlation between effortful control and memory specificity, but this disappeared after accounting for age, gender, and rumination. Raes et al. (2010) did not assess rumination, so the discrepancy in findings may be due to rumination playing a role in the relationship between inhibitory control and OGM.

Overall the findings suggest executive control is associated with greater specific memory recall, but not associated with OGM. This was indicated by both verbal fluency and effortful control being positively correlated with memory specificity, and verbal fluency and effortful control not correlating with OGM after accounting for rumination's relationship with OGM.

While OGM and memory specificity are similar constructs, they are not simply ends of the same continuum. Because of this distinction, executive control processes may only be involved in the ability to retrieve specific memories and do not hinder or improve one's

ability to retrieve an OGM; hence why no association was observed between executive control and OGM. Theoretically retrieving a specific memory requires employing executive control processes (Conway and Pleydell-Pearce, 2000). However, it is logically nonsensical to state that having lower executive control improves one's ability to recall an OGM. By default if one does not recall a specific memory they do not automatically recall an OGM. They could recall an OGM, omission, semantic associate, partial response, future event, or repeated memory.

OGM and memory specificity are different variables

The finding that OGM and memory specificity demonstrated different relationships with rumination and effortful control reinforces the notion that indeed they are not opposing variables on the same continuum and there are distinct differences. OGM and memory specificity did correlate in our sample and correlates in other studies that assess both (e.g. Hamlat et al., 2015). However, as stated previously, if one does not recall a specific memory, by default it does not mean that they will recall and OGM; a vital detail which is not clear in the CaRFAX model (Williams, 2006; Williams et al., 2007). This is important for the literature in memory specificity and OGM, as these terms are often used interchangeably with an underlying assumption that if one of memory specificity or OGM show a finding in one direction, the other will show the same finding in the opposing direction. For example Hamlat et al. (2015) found that stressful life events predicted depression in girls that had higher rumination and OGM recall; an effect that was not found in males. The same interaction was not found when OGM was replaced with memory specificity.

Interactions between executive control and rumination

In the last hypothesis an interaction was predicted between rumination and executive control in predicting memory specificity/OGM. No interactions, however, were found

between rumination and executive control in relating to OGM or memory specificity. This is consistent with other research which has also found no interactions between self-report rumination and executive control (measured by verbal fluency) predicting memory specificity in a university undergraduate sample (Sumner et al., 2014) and predicting OGM in children who had experienced trauma (Hitchcock et al., 2014)

Sumner et al. (2014), however, found an interaction between executive control (measured by verbal fluency) and self-reported rumination in a sample of young adults with and without a history of depression. The interaction showed that in participants with a history of depression lower verbal fluency was associated with reduced memory specificity in low ruminators. In individuals without a history of depression participants with lower verbal fluency had lower memory specificity in high ruminators. The interaction found in individuals with a history of depression was unexpected, and it was postulated by the authors that the finding may have been due to individuals not being currently depressed, or the individuals with a history may have been using techniques requiring effortful control to counter the negative thinking patterns they had previously experienced. They also proposed if the cognitive load was higher, effortful control processes might have been interfered with making ruminative thinking harder to combat. Furthermore, all participants were part of a 10-year longitudinal study for those at risk of emotional disorders, which suggests higher levels of psychopathology that in a typical community sample. This again reinforces the notion of mechanisms in clinical or "at risk" populations may be different and play a more significant role in maintaining OGM compared to typical community samples.

Limitations, strengths, future suggestions

Limitations

One challenge for this study and any studies that use community samples is the ecological validity of variables. Depression is based on a single questionnaire to capture

depressive symptomology, but a clinical diagnosis of depression is far more thorough than a single questionnaire which alone cannot capture the full symptomology and experience of depression (American Psychiatric Association, 2013). Practically, in research settings a thorough assessment is not always possible, but nonetheless is a validity challenge to be mindful of.

Verbal fluency is adopted in some studies as a measure of executive control in the OGM literature (e.g. Valentino et al., 2012), but few studies have used the version of the verbal fluency task this study adopted. The manner the verbal fluency task was administered in the current study has the advantage of testing groups of participants together rather than individually, which ensured a large sample size. The validity of administering verbal fluency in this way is questionable, however. Participants were asked to write their own responses to the verbal fluency task, which might impair the number of responses they could give. Writing speed would likely affect how many responses a participant could give in the task, and the task may not correlate highly with the traditional verbal fluency task where responses are written by the administrator. For example, a person scoring highly in the traditional verbal fluency task might perform poorly in the version this study used if they are a slow writer or have motor difficulty writing.

One limitation of this study is that it was cross-sectional meaning that the mechanisms tested in the CaRFAX model cannot predict memory specificity at a later date, or give any indication of causality. The patterns of findings found should encourage further longitudinal work to clarify the causal nature of these relationships (or lack of relationships) over time.

Strengths

A relative strength of this study was that non-linear relationships were explored between depression and memory specificity/OGM, which have been largely ignored in the

literature. Indeed in the current study it was found a non-linear trend provided the best fit, whereby there was a cubic relationship between depression and OGM to negative cues.

Another challenge for this study and the OGM literature more generally is how autobiographical memory specificity is operationalised. A strength of the current study was the manner this challenge was approached. A rigorous coding scheme was developed which gained reliability with multiple coders. Coding memory responses can often rely on the subjective judgement of the coder, as many memories are ambiguous and could be categorised as either specific or overgeneral, e.g. "When I was home alone". Therefore the current study developed a coding scheme of memory responses in a way that could be analysed in either a "conservative" or "liberal" way. A conservative approach with specific memories meant only non-ambiguous specific memories were included in the specific memory category and any ambiguous memory would be coded as an OGM. This was the stance this study adopted. Analyses were also run with liberal specific memories and conservative OGM, where ambiguous responses were included as specific memories, and patterns of results were similar. Often studies lack detail as to how they exactly operationalised OGM and the coding decisions they make, so it is a necessity for future research to be clearer on coding decisions made.

Conclusions

From this study a number of noteworthy results were found, which informed by the literature can offer interpretations for the interplay between depression, OGM/memory specificity, rumination, and executive control in typically developing youth. Based on the findings of the current study and the literature aforementioned there is the sense that the depression-OGM relationship, and the capture and rumination and executive control mechanisms of the CaRFAX model are different in community youth samples compared to samples with clinical levels of psychopathology. Depression was only weakly associated with

OGM/specificity. This is similar to other findings which show no relationship or weak relationships in community samples (Debeer et al., 2009; Gibbs and Rude, 2004; Hamlat et al., 2015; Stange et al., 2013; Sumner et al., 2011b). After accounting for age, depression and OGM/memory specificity were not significantly related. This suggests the somewhat weak relationship between depression and memory specificity/OGM may differ across age, which is likely due to other extraneous factors that change across age and development.

From the results of the current study and considering the available literature, OGM appears to be a memory phenomenon in clinical depression. In individuals where psychopathology is low and not at a diagnostic level, there are hints of the relationships observed at clinical levels, but they are relatively weak and have little explanatory value in the variance in OGM/memory specificity.

As suggested, the mechanisms of the CaRFAX model might only operate in maintaining OGM/memory specificity when significant psychopathology is present. Executive control (measured by verbal fluency and effortful control) was only related to memory specificity and not OGM, and rumination only related to OGM to negative cues. Nonetheless, these significant relationships only explained 1-2% of the variance. There are signs of the mechanisms showing the expected directions of relationships with OGM/memory specificity, but they may not play a significant role in OGM/memory specificity until marked psychopathology is present.

Furthermore this study stresses that OGM and memory specificity are two different constructs given the relationships they share with depression and mechanisms of the CaRFAX model are often different, as they were in the current study. Therefore, future work should consider both OGM and memory specificity, and be clearer on the decisions made coding memory responses and operationalising memory variables.

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Appendix

Appendix A: Study follow-up letter for parents/caregivers

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

Young People's Memory and their Wellbeing

May 2014

Dear Parents/Caregivers,

- During 2012 and 2013 we conducted a study looking at how young people recall emotional experiences. We invited your daughter or son to participate and we recently sent you a summary of our findings. In our initial letter, we also sought your permission to re-contact you regarding following up your son or daughter during 2013, and you provided us with your consent to do so. **We would now like to follow up our original participants.**

What is the purpose of this research and why is it important?

- Just to remind you, our research is aimed to help us understand how young people remember everyday emotional experiences, and how this process is related to their styles of thinking and their wellbeing. Being able to follow up young people enables us to get a clearer picture of whether young peoples' styles of thinking and remembering are stable over time, and whether they predict their level of sadness, worry, and wellbeing. Ultimately this information can be used to protect young people from emotional difficulties.

What is involved if your son or daughter participates in this follow up study

- We will ask exactly the same questions as last time. That is, your daughter or son will be seen in a group of students during school time. The study takes about 40 minutes, or one class session. His or her responses will be in writing and not known to other students present. She or he will first be asked to complete a remembering task followed by questionnaires.
- Your son or daughter will first be asked to complete a remembering task and to fill out several questionnaires. The remembering task involves writing about everyday memories in response to cue words (such as 'pleased' or 'sad'). The questionnaires will ask about your son's or daughter's style of thinking about everyday experiences, and his or her emotional responses to them. In particular, we will ask about repetitive thinking patterns ('I think to myself, why do I always react this way?'), depressive symptoms ('I feel sad'), and anxious symptoms ('I worry about how things will turn out'). We will also ask them about the different ways they cope with their feelings, and to answer some questions that

will tell us about their temperament. They will complete a word task and a numbers task that helps us understand how your son or daughter processes information. We will also ask whether they've experienced any problems recently, but will not ask them for any specific details about these.

- Your son or daughter can withdraw from the study at any point prior to the end of the study.

Who is conducting the research?

- This research is being supervised by Associate Professors Karen Salmon and Paul Jose, from the School of Psychology at Victoria University of Wellington, and is being coordinated by Senior Research Fellow Dr Kate Bryson. Charlotte Gutenbrunner is helping conduct the research as part of her PhD, and there are Masters and Honours students also involved in the study under guidance from Associate Professors Salmon and Jose.

What do you need to do?

- **If you and your daughter or son are happy to participate in this follow up study, then you need to do nothing at all. If you are not happy to participate, could you please remove the form at the bottom of the document attached to this letter and return it to school. Please return the form within a week of receiving this letter.**

Privacy and Confidentiality

- As for the data collected previously, consent forms and information from the study will be kept for future use, and stored securely in the laboratory of Dr Karen Salmon. The data will be coded by numbers and therefore, your son or daughter will never be identified individually.
- If your son or daughter yields a pattern of concerning scores on our measures, we will relate this information to the school's principal or guidance counsellor for referral or other action to help him or her.

What happens to the information that you provide?

- We may publish the results of the study in a scientific journal, present them at a conference, and report them in thesis that will be submitted for assessment. For both publication and theses, no individual will be identified in the results and all data will remain confidential.

The results of the study will be available in November of this year. A summary of the results will be sent out to you upon completion, if you wish.

If you have any concerns about your daughter's or son's level of sadness or worry, then you may contact one of the following options:

- Your family GP
- Your local Child, Adolescent, and Family Service
- Lead researcher Associate Professor Karen Salmon (04 463 9528), who will provide further information regarding possible sources of help.

If you have any further questions regarding this study, you are most welcome to contact Dr Kate Bryson on (04) 463 5671, or kate.bryson@vuw.ac.nz, or Associate Professor Karen Salmon on (04) 463 9528 or karen.salmon@vuw.ac.nz.

Thank you for considering again participating in this study.

Yours sincerely,

Karen Salmon, PhD., Dip.Clin.Psych
Associate Professor in Psychology

Paul Jose, PhD
Associate Professor in Psychology

Withdrawal of Parental Consent

I have read all the information above and have asked any questions relating to this study, and

I **withdraw** consent to the participation of my child in this research.

Parents name: .....

Child's name: .....

Child's date of birth: .....

Mailing address: .....

Email address: .....

Phone number: .....

Signature: .....

Date: .....

Please return this form to your child's teacher.

Appendix B: Study information letter for schools

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

How young people recall emotional experiences

November 2014

We are conducting a study that looks at how young people recall emotional experiences. We would like to invite your school to participate, as we are keen to involve young people between 12 and 18 years of age. We have received ethical approval [application number 0000020997] from the Victoria University's School of Psychology Human Ethics Committee, under delegated authority to the Victoria University of Wellington's Ethics Committee. The study is funded by the Royal Society of New Zealand's Marsden Fund.

What is the purpose of this research and why is it important?
Our research aims to help us understand how young people remember everyday emotional experiences, and how this process is related to their styles of thinking and their wellbeing. This study is important because research with adults shows that the way we remember everyday emotional events is related to our level of sadness, worry, and wellbeing. Very little research has asked whether the same is also true for younger people, and that is what our present study is investigating.

One further way in which our research is unique is that we plan to follow up our participants over time (this year, and again in 2015). This plan means that we can track how young people's style of remembering their everyday experiences relates to their pattern of worry and their feelings of sadness (or lack of sadness). Studies that are conducted over time can shed light on how different styles of thinking and remembering are associated with better or poorer psychological wellbeing. Ultimately, this information can be used to devise interventions to protect young people from emotional difficulties.

Who is conducting the research?

- This research is being conducted by Associate Professors Karen Salmon and Paul Jose, from the School of Psychology at Victoria University of Wellington. The research is being overseen by Senior Research Fellow, Dr Kate Bryson, and will form part of Charlotte Gutenbrunner's PhD. Other students will be assisting with this study as part of their Masters and Honours research.
- Drs Salmon and Jose are both very experienced researchers who have conducted similar studies over the past 15 years.

What is involved if your school participates in this study?

- Students will be seen in class groups during school time. The study will take one class session to complete. Student's responses will be in writing and will be confidential. This means that his or her answers will not be known to other students or staff at the school, and will be kept private by the researchers on our team.

- Students will first be asked to complete a remembering task and to fill out several questionnaires. The remembering task involves writing about everyday memories in response to cue words (such as 'pleased' or 'sad'). The questionnaires will ask about student's style of thinking about everyday experiences, and his or her emotional responses to them. In particular, we will ask about repetitive thinking patterns ('I think to myself, why I always react this way?'), depressive symptoms ('I feel sad'), and anxious symptoms ('I worry about how things will turn out'). We will also ask them about the different ways they cope with their feelings, and to answer some questions that will tell us about their temperament. They will complete a word task and a numbers task that helps us understand how young people process information. We will also ask whether they have experienced any problems recently, but will not ask them for any specific details about these.
- Students can withdraw from the study at any point prior to the end of the study.
- This is a longitudinal study, which means that we would like to do follow-up sessions at your school once a year for the next two years. We will contact you each year to arrange to visit again.

Privacy and Confidentiality

- Consent forms and de-identified data from the study will be kept securely for future use.
- Students will be allocated a number, so their answers cannot be linked to their name, and their answers will never be identified individually.
- Coded data (that is, data without names) may be shared with other competent professionals upon request.
- The coded data (that is, without names …) will be securely stored in the laboratory of Associate Professor Karen Salmon.
- If a student yields a pattern of concerning scores on our measures, we will relate this information to your principal or guidance counsellor for referral or other action to help him or her. In practice, this is a rare event.
- The written memories collected from your students will be linked to the questionnaire data by number only to protect confidentiality. After all data have been collected and coded, any documentation containing names and addresses will be destroyed.

What happens to the information that students provide?

- We intend to publish the results of the study in a scientific journal and present findings at conferences. For all reports, no individual will be identified in the results and all data will remain confidential.
- The data will yield findings that will form part of student theses at honours, masters, and PhD levels, and these will be submitted for assessment.

The results of the study will be available at the end of each year of data collection. A summary of the results will be sent out to you upon completion, and we would like to offer to return to your school to feedback our findings to your staff in person.

If you have any further questions regarding this study, you are most welcome to contact either Dr Kate Bryson by calling (04) 463 5671, or emailing kate.bryson@vuw.ac.nz, or Associate Professor Karen Salmon, by calling (04) 463 9528 or emailing karen.salmon@vuw.ac.nz.

Thank you for considering participating in this study.

Yours sincerely,

Kate Bryson, PhD
Senior Research Fellow in Psychology

Karen Salmon, PhD., Dip.Clin.Psych
Associate Professor in Psychology

Paul Jose, PhD
Associate Professor in Psychology

Appendix C: Study information letter for parents/caregivers

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

How young people recall emotional experiences

May 2014

Dear Parents/Caregivers,

We are conducting a study that looks at how young people recall emotional experiences. We would like to invite your daughter or son to participate, as we are keen to involve young people between 10 and 17 years of age. We have the support of your son or daughter's school, and have received ethical approval [application number 0000020997] from the Victoria University's School of Psychology Human Ethics Committee, under delegated authority to the Victoria University of Wellington's Ethics Committee. The study is funded by the Royal Society of New Zealand's Marsden Fund.

What is the purpose of this research and why is it important?
Our research aims to help us understand how young people remember everyday emotional experiences, and how this process is related to their styles of thinking and their wellbeing. This study is important because research with adults shows that the way we remember everyday emotional events is related to our level of sadness, worry, and wellbeing. Very little research has asked whether the same is also true for younger people, and that is what our present study is investigating.

One further way in which our research is unique is that we plan to follow up our participants over time (this year, and again in 2015). This plan means that we can track how young people's style of remembering their everyday experiences relates to their pattern of worry and their feelings of sadness (or lack of sadness). Studies that are conducted over time can shed light on how different styles of thinking and remembering are associated with better or poorer psychological wellbeing. Ultimately, this information can be used to devise interventions to protect young people from emotional difficulties.

Who is conducting the research?

- This research is being conducted by Associate Professors Karen Salmon and Paul Jose, from the School of Psychology at Victoria University of Wellington. The research is being overseen by Senior Research Fellow, Dr Kate Bryson, and will form part of Charlotte Gutenbrunner's PhD. Other students will be assisting with this study as part of their Masters and Honours research.
- Drs Salmon and Jose are both very experienced researchers who have conducted similar studies over the past 15 years.

What is involved if you and your child participate in this study?

- Your daughter or son will be seen in a group of students during school time. The study will take one class session to complete. His or her responses will be in writing and will be confidential. This means that his or her answers will not be known to other students or staff at the school, and will be kept private by the researchers on our team.
- Your son or daughter will first be asked to complete a remembering task and to fill out several questionnaires. The remembering task involves writing about everyday memories in response to cue words (such as 'pleased' or 'sad'). The questionnaires will ask about your son's or daughter's style of thinking about everyday experiences, and his or her emotional responses to them. In particular, we will ask about repetitive thinking patterns ('I think to myself, why do I always react this way?'), depressive symptoms ('I feel sad'), and anxious symptoms ('I worry about how things will turn out'). We will also ask them about the different ways they cope with their feelings, and to answer some questions that will tell us about their temperament. They will complete a word task and a numbers task that helps us understand how your son or daughter processes information. We will also ask whether they have experienced any problems recently, but will not ask them for any specific details about these.
- Your son or daughter can withdraw from the study at any point prior to the end of the study.
- This is a longitudinal study, which means that we would like to do follow-up sessions with your son or daughter once a year for the next two years. We will send you another letter each time to let you know that we are returning to your child's school and would like to continue the research with your son or daughter. You will be given the option to withdraw your son or daughter from the study at that time, if you wish, and the young person can also withdraw themselves from the study by declining to give their assent.
- We will be running a related study in 2015 that involves both parent and child participation. We would also like your permission to contact you in the future about possibly participating in that study.

Privacy and Confidentiality

- Consent forms and de-identified data from the study will be kept securely for future use.
- Your son or daughter will be allocated a number, so their answers cannot be linked to their name, and their answers will never be identified individually.
- Coded data (that is, data without your son's or daughter's name) may be shared with other competent professionals upon request.
- The coded data (that is, without names …) of your child will be securely stored in the laboratory of Associate Professor Karen Salmon.
- If your son or daughter yields a pattern of concerning scores on our measures, we will relate this information to the school's principal or guidance counsellor for referral or other action to help him or her. In practice, this is a rare event.
- The written memories collected from your son or daughter will be linked to the questionnaire data by number only to protect confidentiality. After all data have been collected and coded, any documentation containing names and addresses will be destroyed.

What happens to the information that you provide?

- We intend to publish the results of the study in a scientific journal and present findings at conferences. For all reports, no individual will be identified in the results and all data will remain confidential.
- The data will yield findings that will form part of student theses at honours, masters, and PhD levels, and these will be submitted for assessment.

The results of the study will be available at the end of each year of data collection. A summary of the results will be sent out to you upon completion, if you wish.

If you have any concerns about your daughter's or son's level of sadness or worry, then you may contact one of the following options:

- Your family GP
- Your local Child, Adolescent, and Family Service
- Lead researcher Associate Professor Karen Salmon (04 463 9528), who will provide further information regarding possible sources of help.

If you have any further questions regarding this study, you are most welcome to contact either Dr Kate Bryson by calling (04) 463 5671, or emailing kate.bryson@vuw.ac.nz, or Associate Professor Karen Salmon, by calling (04) 463 9528 or emailing karen.salmon@vuw.ac.nz.

If you agree for your daughter or son to participate in this study, please return this consent form to your child's teacher.

Thank you for considering participating in this study.

Yours sincerely,

Karen Salmon, PhD., Dip.Clin.Psych
Associate Professor in Psychology

Paul Jose, PhD
Associate Professor in Psychology

Statement of Parental Consent

I have read all the information provided, and, where relevant, I have asked any questions relating to this study, which have been answered satisfactorily.

I consent to the participation of my child in this research. I understand that my child can withdraw from this study at any point prior to the end of the study.

Parents name: .....

Child's name: .....

Child's date of birth: .....

Mailing address: .....

Email address: .....

Phone number: .....

Signature: .....

Date: .....

I would like the report describing the results of the study sent to me by:

- ☐ Post
- ☐ E-mail

I give permission for the researchers to contact us again in the future for a follow-up assessment. ☐ Yes ☐ No

I give permission for the researchers to contact me again in the future regarding participation in a separate parent-child study. ☐ Yes ☐ No

Appendix D: Study information 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 and their Wellbeing

Karen Salmon
Associate Professor

Karen.Salmon@vuw.ac.nz

Paul Jose
Associate Professor
Paul.Jose@vuw.ac.nz

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 at Victoria University of Wellington. Associate Professors Salmon and Jose are supervising this project, and Senior Research Fellow Dr Kate Bryson is coordinating it. There are also student researchers working on the project for their Honours, Masters and PhD studies.
  This research has been approved by the School of Psychology Human Ethics Committee [application number 0000020997], 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. We will also ask you to fill out several questionnaires on how you have been feeling, how you think and what has been happening in your life recently. You will do these tasks in a group but your information will be written down and private.
- We will come to your school, and the study will take no more than one class session.
- During the research, you are free to stop and withdraw at any point.
- We would like to follow-up with you once a year for the next two years. We will contact your parents again at that time, and will come back to your school about the same time each year to repeat these sessions.

Privacy and Confidentiality
- You will never be named or identified in any talk or article that we publish in an academic journal. We will store your information by number and not by your name.
- The information you give us (without names) may be shared with other researchers.
- The information you give us (without names) may be used in other, related studies.
- A copy of your responses (without names) will be held confidentially by Associate Professor Salmon.

- If several of 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 information 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, Masters, or PhD research project.

If you have any further questions regarding this study, please contact Dr Kate Bryson by phone (04 463 5671) or email kate.bryson@vuw.ac.nz.

We have asked you questions about your feelings of happiness and sadness or worry. If you have any concerns about your feelings, then there are some possible sources of help:

- You could speak to your school guidance counsellor
- You could contact Youthline online at www.youthline.co.nz or free call on 0800 37 66 33, free txt 234, or email talk@youthline.co.nz
- You could check out the Lowdown website at 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.

Thank you for reading this information. The researcher with you today will be happy to answer any questions you might have.

The VUW Developmental and Clinical Child Research Team

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 E: Debrief form for participants

Young People's Memory and their Wellbeing

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 is 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 young people 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 young people think and remember things. This letter will not tell your parents or teachers how you did – remember your answers will be combined with other young people answers to create a big group that we will explore.

If you have any further questions regarding this study, please contact Dr Kate Bryson by phone (04 463 5671) or email kate.bryson@vuw.ac.nz.

And if you have any concerns about your sadness or worry, then there are some possible sources of help:

- You could speak to your school guidance counsellor
- You could contact Youthline online at www.youthline.co.nz or free call on 0800 37 66 33, free txt 234, or email talk@youthline.co.nz
- You could check out the Lowdown website at www.thelowdown.co.nz
- You could talk to your family GP
- Or you could phone one of the researchers, Associate Professor Karen Salmon on (04) 463 9528, who will provide further information for you.

Thanks for your time and effort!

Appendix G: Autobiographical memory test coding scheme

AMT Coding Scheme – Revised

General Notes:
Children sometimes respond with mixed tenses. In this case use your judgement on how to code the memory while making as few inferences as possible.

Examples:
I feel happy when I play with my dog yesterday (specific)
I felt excited when I go to my friend's house (categoric)

Specific (SPSS code 1)
An event that occurred on a particular occasion and lasted less than one day. It can often be located in a time or place, but this information does not need to have been provided by participants.

Examples:
On my 13th birthday
During my sleepover last week.
When I came second in a hurdles race
When I was told my Grandad had died
When I found out we were going to Australia
When I was on the plane on the way to Australia

Extended (SPSS code 2)
An event that lasted longer than 1 day. Note: the memory must be referring to an event. Includes holidays, deaths, parental divorce or separation, child or others moving towns, being bullied, school holidays, school years and other extended periods with time boundaries e.g. "when my cousins were living with us". Trips – use your judgement, is it a place they are likely to travel to and from in less than 1 day?

Examples:
When I was on holiday in Fiji
When I was being bullied
When my parents split up

Categoric (SPSS code 3)
Summaries of a class of events or repeated events. Use your judgement – is it likely that this event would be one that happened repeatedly for a child in this age range?

Examples:
Playing rugby
When I get home from school
When I get into a fight with my sister

Specific OR Extended (SPSS code 4)
Memories of a specific event which could have lasted less than 24 hours or could have lasted more than 24 hours and it is not possible to tell from the response. Also include memories that are ambiguous with regards to whether participant referred to specific point in time that may represent

the beginning of a subsequently mentioned extended period e.g. "I was sad when Amy left to go to Germany for 6 weeks."

Examples:
When I went camping last weekend
When I went to Palmerston North
When my family were visiting

Specific OR Categoric (SPSS code 5)
Memories of an event that lasted less than 24 hours and may have occurred once or may have occurred more than once and it is not possible to tell from the response

Examples:
Reading my book
Going to the park
In the hot pools at Hamner Springs

Extended AND Categoric (SPSS code 6)
A response that contains a categoric memory within an extended time period. This extended period may be while overseas, when living in a different city, when in a different school year, during the school holidays

Examples:
On holiday I read a book by the pool
In year 7 when I played soccer
When I lived in Christchurch and I hung out with my friends

Semantic Associate (SPSS code 7)
A response that is derived from general semantic knowledge rather than a personal memory. Child has not provided a memory of an event. Include responses when something didn't happen e.g. "that I didn't get to say goodbye to my cat" (But does not include "that I didn't get injured when I almost got hit by a car" – this is a specific event). Also includes when participants say they always feel a certain way or feel it every day. May be present tense, but <u>not referring to a specific event that happened to child in the past.</u>

Examples:
I feel lucky to have a family that love me
I always feel lonely
I feel lucky to live in New Zealand
I felt angry that I didn't get to properly say goodbye to my Granddad
My dog

Future Oriented (SPSS code 8)
Responses that refer to an event that has not yet happened. This event could be specific (i.e. confined to one day) or extended (i.e. will last longer than a day) but it must be <u>an event that the child is going to experience in the future</u>.

Examples:
I'm excited about going to Granddad's on the weekend
I'm scared to do the maths test tomorrow

Incomplete Responses (SPSS code 9)
Partial or incomplete responses that give enough detail to suggest the child had thought of a memory but not enough detail to code. It may seem as though the child ran out of time to complete the response. Note: if the response does not contain any detail about the memory code as **Omission** (code 10) e.g. “I was happy when”

Examples:
I get angry when my brother
I am proud when I do
I was lonely when I went to

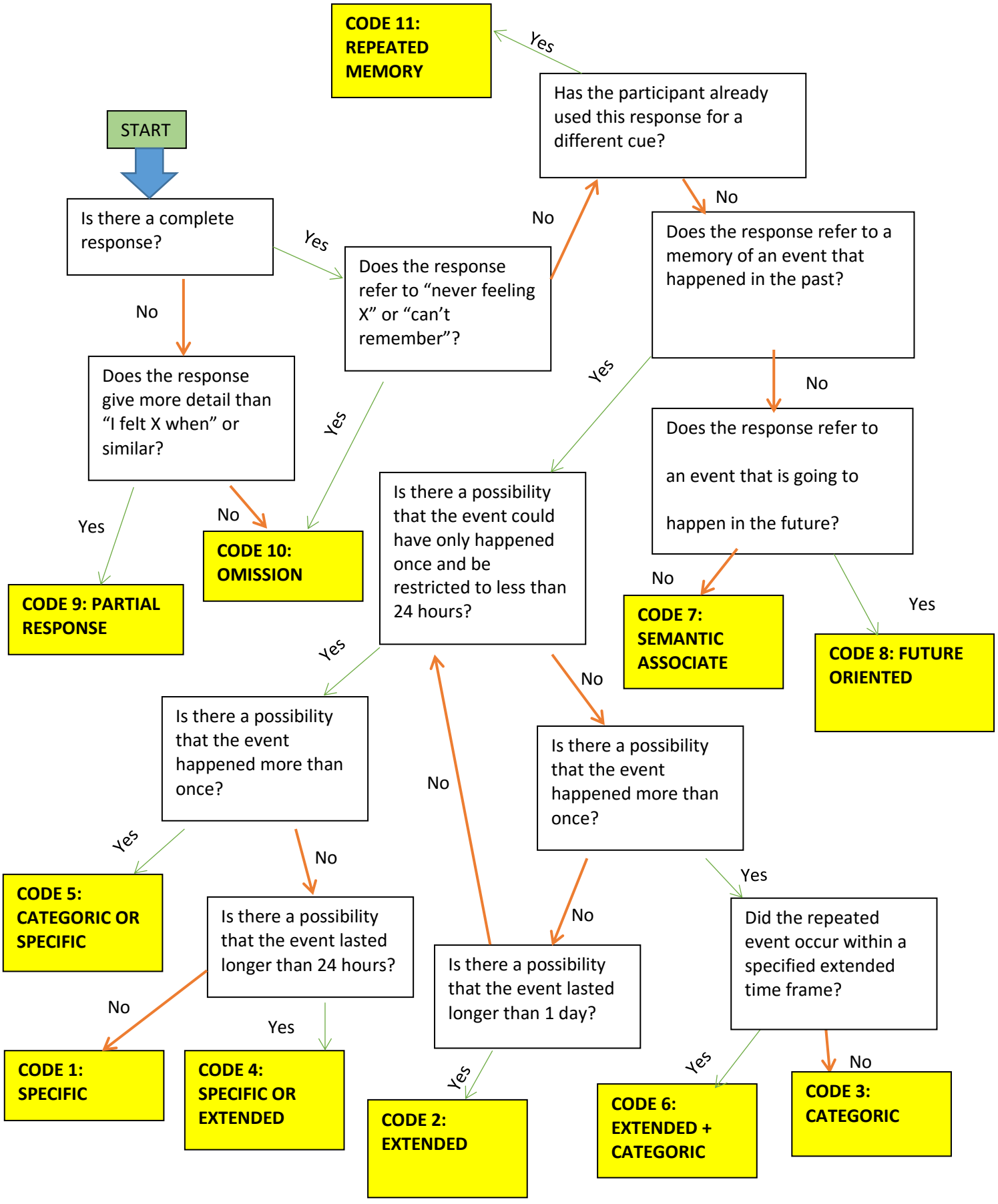
Omissions (SPSS code 10)
Participant does not provide a response or cannot retrieve a memory for the cue. Includes responses that have been started but no memory content has been included e.g. “I feel happy when”. Also includes responses that a child has “never” felt that way

Examples:
“I never feel angry”
“I felt happy when”
“N/A”

Repeated Memory (SPSS code 11)

Participant has already provided this response to a different cue

AMT CODING FLOW CHART



Appendix H: 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
29. When I feel sad, I try not to think about my sadness	1	2	3	4
30. When I feel sad, I stay away from anything that reminds me about the problem	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 untrue**	**Usually true**	**Almost always true**
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.

In this questionnaire we are interested in understanding how you respond to distressing situations. Please recall how you tend to respond when you feel distressed or upset.

How true (1-5) are each of these statements with respect to your experience **when you are distressed or upset**?

1	**2**	**3**	**4**	**5**
Not true at all		Somewhat true		Very true

1. I have thoughts or images about all my shortcomings, failings, faults, mistakes.	1	2	3	4	5
2. I have thoughts or images about events that come into my head even when I do not wish to think about them again	1	2	3	4	5
3. I have thoughts or images that "*I won't be able to do my school work because I feel so badly.*"	1	2	3	4	5
4. I have thoughts or images that are difficult to forget.	1	2	3	4	5
5. Once I start thinking about the situation, I can't stop.	1	2	3	4	5
6. I notice that I think about the situation.	1	2	3	4	5
7. I have thoughts or images of the situation that I try to resist thinking about.	1	2	3	4	5
8. I think about the situation all the time.	1	2	3	4	5
9. I know I shouldn't think about the situation, but can't help it	1	2	3	4	5
10. I have thoughts or images about the situation and wish it would go better.	1	2	3	4	5

Thinking back over the last 12 months, how many problems have you had in each of the following areas of your life?

	None	**A few**	**Some**	**A fair number**	**A lot**
School/Kura	1	2	3	4	5
Friends	1	2	3	4	5
Family/Whanau	1	2	3	4	5
My body	1	2	3	4	5

How much in the last week have you felt these feelings?

	Not at all	**A little bit**	**Some of the time**	**A lot of the time**	**Almost all the time**
Guilty	0	1	2	3	4
Proud	0	1	2	3	4
Scared	0	1	2	3	4
Excited	0	1	2	3	4
Angry	0	1	2	3	4
Lucky	0	1	2	3	4
Lonely	0	1	2	3	4
Relaxed	0	1	2	3	4
Sad	0	1	2	3	4
Happy	0	1	2	3	4

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

Thank you!