Links between depressive symptoms and the observer perspective for autobiographical memories and imagined events: a high familial risk study

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ABSTRACT

Depression is associated with increased observer visual perspective for positive autobiographical memories. However, it is unclear if this relationship (1) is present in individuals at high familial risk of depression; (2) is a general bias extending to future imagined events; and (3) is independent of general cognition and other cognitive biases. We examined the association of observer perspective, valence (positive, negative, neutral) and temporality (memories, future imagined events) with depressive symptoms in 29 young adults at high familial risk for depression. Increased observer perspective for memories was associated with dimensional depressive symptoms controlling for IQ and autobiographical specificity. There was weak evidence that increased observer perspective for future events was associated with a diagnostic measure of depressive symptoms, but limited evidence that perspective by valence interactions were associated with depressive symptoms. Results indicate depressive symptoms are associated with an observer perspective bias in autobiographical thinking regardless of temporality or valence.

Introduction

Major Depressive Disorder (MDD) is an impairing psychiatric condition that is the leading cause of disability worldwide (Friedrich, 2017; World Health Organization, 2017), with a peak period for onset in young adulthood (Rohde et al., 2013; Weissman et al., 2006). Young people with a parent with MDD have 3–4 fold increased risk of developing depression themselves (Rice et al., 2002; Weissman et al., 2006), as well as being at risk of more persistent, chronic depression (Lieb et al., 2002; Musliner et al., 2016). Cognitive processes are integral to the development, maintenance and recurrence of MDD (Gotlib & Joormann, 2010), with robust evidence being seen for disruptions and biases in autobiographical memory (Dalgleish & Werner-Seidler, 2014; Hertel & Brozovich, 2010; Kircanski et al., 2012; LeMoult & Gotlib, 2018). Autobiographical memory is memory for past, personal experiences and can be recalled voluntarily or involuntarily.

Key autobiographical memory biases in depression include a *negativity bias*, whereby negative memories are recalled more quickly and frequently than positive memories (Lloyd & Lishman, 1975; Matt et al., 1992); *diminished positive memories*, i.e. reduced recall of and reduced positive affect gained from positive memories (Gotlib & Joormann, 2010; Joormann et al., 2007); *overgeneral memory*, the tendency to recall extended and repeated past events rather than specific instances (Warne et al., 2020; Williams et al., 2007); and an *observer perspective bias*, which involves recalling more memories from a third-person "observer" view and fewer memories from a first-person "field" perspective (Kuyken & Howell, 2006; Kuyken & Moulds, 2009). Whilst a great number of studies have examined how depression is associated with memory valence biases and overgeneral memory, relatively fewer studies have looked at the role of visual perspective in depression. As the visual perspective

from which a person recalls a memory is malleable (Akhtar et al., 2017; Gu & Tse, 2016; Robinson & Swanson, 1993; St. Jacques, 2019; Vella & Moulds, 2014; Williams & Moulds, 2008), further research into visual perspective as a potential risk factor for depression is warranted.

Changing the perspective in which you see yourself in a memory may be useful for regulating emotion. Using an observer perspective (looking at yourself in a memory), compared to a field perspective (viewing a memory through your own eyes, as if you were in the event), has been found to reduce the vividness and affect associated with recalling an event (McIsaac & Eich, 2002; Sekiguchi & Nonaka, 2014; Vella & Moulds, 2014). Dampening negative feelings and distancing oneself from unpleasant or stressful events by using an observer perspective may therefore be an effective emotion regulation strategy. Early evidence suggested that, when recalling a negative event, instructing individuals to use an observer ("distanced") perspective resulted in reduced negative emotion and reduced depressive thought accessibility compared with use of a field ("immersed") perspective (Kross et al., 2012; Kross & Ayduk, 2009; Wisco & Nolen-Hoeksema, 2011). There is some evidence that this effect is moderated by depression, in that using an observer perspective can reduce negative emotion for individuals with higher levels of depressive symptoms, but not individuals with low levels of depressive symptoms (Kross & Ayduk, 2009). Experimental studies have highlighted that using an observer perspective when recalling negative memories can lead to increases in reconstruing (i.e. thinking differently, experiencing closure, having more understanding of the event) and reductions in recounting (i.e. recalling the specific chain of events) which, in turn, leads to a reduction in negative emotion (Ayduk & Kross, 2010; Kross & Ayduk, 2008, 2009). However, use of an observer perspective may not be effective over the long-term as it could prevent effective processing of affect from memories (Holmes & Mathews, 2010; Kuyken & Moulds, 2009), and is longitudinally associated with higher levels of depressive symptoms following treatment with antidepressants and mindfulness-based cognitive therapy (Kuyken & Moulds, 2009). Furthermore, there is evidence that the observer perspective can increase emotional intensity for self-conscious emotions such as guilt and shame (Hung & Mukhopadhyay, 2012; Libby et al., 2011).

Research into spontaneous visual perspective (rather than researcher-instructed) suggests that depression is associated with increased use of the observer perspective and decreased use of the field perspective for past events. This relationship has been seen in adults and adolescents with MDD (Kuyken & Howell, 2006; Kuyken & Moulds, 2009; Lemogne et al., 2006), participants with remitted MDD (Bergouignan et al., 2008), unaffected individuals with the serotonin-transporter-linked promoter region (5-HTTLPR) "risk" polymorphism and life stress exposure (Lemogne et al., 2009a), and with depressive symptoms in non-clinical adolescent and adult samples (Hawkins-Elder & Salmon, 2020; Nelis et al., 2013). The majority of studies directly comparing visual perspective by event valence have found that increased observer/reduced field perspective for positive events, but not negative events, is associated with depressive symptoms (Bergouignan et al., 2008; Hawkins-Elder & Salmon, 2020; Kuyken & Moulds, 2009; Lemogne et al., 2006; Nelis et al., 2013). If the function of the observer perspective is to distance oneself from the memory-related emotions, this suggests that individuals with depression may (consciously or unconsciously) be reducing positive emotions gained from recalling positive memories but still deriving normal levels of negative emotions from negative events. As the observer perspective may be used more often when recalling events that conflict with sense of self (Libby & Eibach, 2002), it has been suggested that depressed individuals may use the observer perspective for positive events that differ from their current negative sense of self or low mood (Nelis et al., 2013). Therefore, the observer bias in depression may be an example of a strategy used to reduce discrepancy in the self (Conway & Pleydell-Pearce, 2000). Alternatively, the observer perspective may be used to focus on the self in events and integrate events into a coherent self-concept (Libby & Eibach, 2011), rather than distancing oneself from events that are incongruent with current sense of self.

One way to further unpick the role of visual perspective in depression involves assessing future imagined autobiographical events. Imagined future events are similar to autobiographical memories in that they involve episodic thinking and are important for decision making and emotion regulation (Schacter et al., 2008, 2017). However, imagining a future event requires more effort on construction (extracting details and combining

into a novel event) than episodic remembering (Addis et al., 2009), and there is some evidence that future thinking relies on distinct neural underpinnings to autobiographical memory (Addis et al., 2007; Schacter & Addis, 2009). Furthermore, imagined future events are phenomenologically different as they are less vivid, less relevant to identity and life story, and more positive than autobiographical memories (Berntsen & Bohn, 2010; McDermott et al., 2016). Individuals with depression and high depressive symptoms have reductions in future autobiographical *specificity* in comparison to non-depressed participants (Gamble et al., 2019; Hallford et al., 2018), but very few studies have investigated the relationship between visual perspective for imagined autobiographical events and depression. Such research is important as it can clarify whether the observer bias is a general cognitive bias for all episodic thinking or whether it relates to past memories alone. Preliminary evidence suggests that depressed and dysphoric adults may imagine fewer future positive events from a field perspective and more future events of combined positive–negative valence from an observer perspective than non-depressed and non-dysphoric adults (Hallford, 2019; Hallford et al., 2020a). However, to our knowledge, no study has directly compared valence when looking at the relationship between visual perspective for future events and depression.

Investigating the role of valence can help further understanding of the relationship between visual perspective and depression. Although previous research has examined positive and negative valence, few studies have investigated visual perspective for neutral events. Investigating visual perspective for neutral events is important as it can provide useful insights into the function of an increased observer perspective in depression, especially when comparing with positive and negative valence. Emerging research has found no significant relationships between depressive symptoms and visual perspective for two neutral cues when controlling for memory age (McFadden & Siedlecki, 2020), but independent replication is required. Furthermore, the majority of previous studies focus on valence of the cue word used to elicit a memory under the assumption that cue valence matches the valence of the memory content. However, this is not always the case and similarity between cue and memory valence can vary with depressive symptoms and depression

(McFadden & Siedlecki, 2020; Young et al., 2012), so it is important to consider memory/event content valence (Lemogne et al., 2013).

Research is also required to investigate whether an observer perspective bias is a distinct cognitive bias in depression or whether it can be explained by a general cognitive deficit, or by other memory biases such as overgeneral memory. Despite the tendency for the observer perspective to be more common in memories that are more temporally distant (Akhtar et al., 2017; Berntsen & Rubin, 2006; Verhaeghen et al., 2018), few studies have statistically controlled for temporal distance or "memory age" in analyses (McFadden and Siedlecki (2020) being a notable exception). Furthermore, it is unclear whether the observer perspective-depression relationship would remain when accounting for the broader cognitive deficits seen in depression (Ahern & Semkovska, 2017; Gotlib & Joormann, 2010; Zammit et al., 2004), or other cognitive biases such as overgeneral memory/reduced autobiographical memory specificity. Specific memories and field perspective memories are phenomenologically similar, both being vivid and having high emotional intensity (Siedlecki, 2015; Sutin & Robins, 2010; Williams et al., 2007). Moreover, some studies have found a positive correlation between memory specificity and recalling memories from a field perspective (Lemogne et al., 2009b; Piolino et al., 2006). Their combined relationship with depression needs further exploration to understand whether observer perspective and reduced autobiographical specificity are independently associated with depression, or whether they are variants of the same underlying risk. Consequently, investigating the relationship between visual perspective and depression, taking into consideration general cognition and autobiographical specificity is warranted.

Depression-related research in young adults is particularly important as young adulthood is the peak period for new onset of MDD (Rohde et al., 2013; Weissman et al., 2006), and depression that begins early is associated with particularly poor outcomes and a chronic, long-term course of symptoms (Dunn & Goodyer, 2006; Patton et al., 2014; Rutter et al., 2006). One of the most common and potent risk factors for developing depression is having a parent with history of recurrent MDD (Rice et al., 2002; Weissman et al., 2006), with around 40% of depressed parents' offspring developing MDD by young adulthood (Weissman et al., 2016, 2006).

Genetic, environmental and social factors contribute to this risk (Rice et al., 2002; Thapar et al., 2012). Young adults with a parent with MDD, are therefore an especially informative group with increased risk for depression and depression-related genetic and environmental risk factors. To our knowledge, no study has investigated visual perspective and depression in this informative group.

The current study

The aim of this study was to investigate whether increased use of the observer perspective was associated with increased depressive symptoms in young adults at high familial risk of depression. Specifically, we asked the questions:

(1) Is increased use of the observer perspective for *autobiographical memories* associated with depressive symptoms? Is this relationship stronger for positive events (valence rated by participants) than negative and neutral events?
(2) Does this observer perspective-depression relationship extend to *future imagined events*? Is this relationship stronger for positive events than negative and neutral events?
(3) Are associations between the observer perspective and depression present when adjusting for (a) IQ and temporal distance from event; and (b) autobiographical memory specificity or future event specificity?

It was hypothesised that increased use of the observer perspective for past and future events would be associated with depressive symptoms and thus act as a marker of a general cognitive bias. Consistent with the previous literature, we anticipated that strongest effects between observer perspective and depressive symptoms would be seen for positive memories, and also positive future events. Furthermore, it was expected that associations would remain after adjusting for IQ, temporal distance, and autobiographical specificity.

Methods

Participants

The sample consisted of 29 young adults (23 females, 6 males) aged 18–25 years at elevated familial risk for depression because they had at least one parent with Major Depressive Disorder. Demographic information

on the sample is presented in Table 1. These individuals were a subsample of young people who previously took part in the Early Prediction of Adolescent Depression (EPAD) study over three waves in adolescence (Mars et al., 2012; Rawal & Rice, 2012). Individuals who had consented to be contacted about future studies and whose last known home address was local to the university ($n = 141$) were sent information about the study and a reply slip by post (see Supplementary Figure 1). Researchers followed up those who returned a reply slip ($n = 31$) and a random selection of non-responders ($n = 43$) over the phone and via text. Part of the current study involved an MRI (Magnetic Resonance Imaging) scan so individuals not safe to be scanned (e.g. had an electrically operated device or metal in/on their body) were not eligible to participate. The current study focuses on the cognitive and depression data only ($n = 29$; $n = 19$ from reply slip responders and $n = 10$ from reply slip non-responders).

Procedure

Participants were invited to a testing session at the university and were posted or emailed a questionnaire booklet that included the Mood and Feelings Questionnaire to assess depressive symptoms (see below). During the face-to-face testing session, cognitive tasks on autobiographical memory and future thinking were administered prior to an MRI session (MRI data are not included here). Autobiographical memory was always tested first, followed by future thinking, as piloting indicated better participant understanding of the tasks with this order; however word lists for the autobiographical memory and future thinking tasks were counterbalanced. Following the MRI session, participants were asked to report whether they had received any current or previous depression diagnosis and completed a semi-structured psychiatric interview (Young Adult Psychiatric Assessment) on depressive symptoms. Participants were remunerated for their time and travel expenses. Ethical approval was gained from Cardiff University School of Medicine Research Ethics Committee and Cardiff University School of Psychology Research Ethics Committee.

Measures

Autobiographical memory
Participants completed the Autobiographical Memory Test (AMT) (Rawal & Rice, 2012; Williams

et al., 2007; Williams & Broadbent, 1986). Participants were asked to recall a specific memory that lasted less than a day and occurred at a particular time and place, for 18 cue words (6 positive, 6 negative and 6 neutral words). Words were taken from one of two word lists (see Supplementary Table 1) that were matched on familiarity, emotionality, imageability and frequency (Rawal & Rice, 2012). One word list was used for autobiographical memory, and the other word list was used for the future thinking task (see below) and this was counterbalanced. Participants initially completed three practice trials and received feedback with further prompting to be specific for any nonspecific responses. During the main trials, each of the 18 cue words was read aloud and participants were given 30 s in which to respond. If a specific memory was not retrieved participants were verbally prompted (e.g. "Can you think of a specific time?") and if no memory was retrieved an omission was recorded.

Participant-rated memory characteristics. Following each response on the AMT, participants were asked to rate the memory for valence, temporal distance and visual perspective (see Supplementary Table 1 for full details). Valence was measured on a scale of −3 "very negative" to +3 "very positive" with 0 "neutral". Temporal distance (i.e. memory age or remoteness) was measured on discrete life period of "childhood (11 and under)", "adolescence (12–18 years)", "adult (18 and over)", "within the past 6 months" and "within the past 2 weeks". For visual perspective, participants were asked to choose the rating that best fit the statement "When I recall the event I primarily see what happened from a perspective as seen through … " on a scale of "my own eyes" (1) to "an observer's eyes" (7) (Berntsen & Bohn, 2010).

Memory specificity coding. Memories were transcribed and responses were coded for specificity according to standard AMT coding systems (Williams et al., 2007; Williams & Broadbent, 1986) by two independent coders. Responses were coded as either: specific (memories specific to time and place, e.g. "the day we got our dog from the rescue shelter"), extended (spanning longer than one day, e.g. "when we went on holiday with our dog"), categoric (repeated events of a similar nature, e.g. "when walking my dog") or semantic associates (related to cue word but not a memory,

e.g. "my dog"). There was high inter-rater reliability (average κ = .89; percentage agreement = 96.36%). Any discrepancies were resolved through discussion.

Derived memory variables. The primary variables of interest were perspective and participant-rated valence. Perspective was used on the original scale of 1 (field perspective) to 7 (observer perspective) for main regression analyses. For descriptive analysis, the proportion of field perspective, mixed perspective and observer perspective were calculated. These were calculated as the percentage of events (specific, categoric and extended responses only) with responses of 1–3 for field perspective, responses of 4 for mixed perspective, responses of 5–7 for observer perspective. Valence was recoded to combine all negative responses (−3, −2, −1) as negative valence, neutral responses (0) as neutral valence, and positive responses (+1, +2, +3) as positive valence.

Secondary variables that were included as covariates were temporal distance and autobiographical memory specificity. Temporal distance was measured as the event remoteness reported by participant (scale 1–5), with higher scores indicating more distant, or older, memories being recalled. Autobiographical memory specificity was measured for each item as a binary coding of whether the response was specific (1) or not specific (0).

Future thinking

An adapted version of the AMT was used to assess autobiographical future thinking. Participants were asked to think of specific events that may happen to them in the future for 18 cue words (the alternative word list to the word list used for the AMT, see Supplementary Table 1). Participants were told that future events should last less than a day, be specific to time and place, and be realistic events that could actually occur. Three practice trials were administered where participants received feedback and prompting to be specific for any nonspecific responses. In the main trials, participants were given 30 s to respond to each of the cue words and received verbal prompting if they did not respond with a specific future event.

Participant-rated future event characteristics. As with the AMT, following each response on the future thinking task participants were asked to rate the events for valence, temporal distance and

visual perspective (see Supplementary Table 1). Valence was measured on the same scale as the AMT (−3 "very negative" to +3 "very positive", with 0 "neutral"). Temporal distance in the future was recorded in categories of "within 2 weeks", "2 weeks to 6 months", "6 months to 1 year", "1 year to 5 years", and "over 5 years in the future". As with the AMT, visual perspective was measured as responses to the statement "When I think about the event I primarily see what happened from a perspective as seen through … " on a scale of "my own eyes" (1) to "an observer's eyes" (7).

Future event specificity coding. Responses were transcribed and coded for specificity by two independent raters as above using the AMT coding system (Williams et al., 2007; Williams & Broadbent, 1986). Inter-rater reliability was excellent (average κ = .94; percentage agreement = 96.55%) and discrepancies were resolved through discussion.

Derived future event variables. As with the AMT derived variables, perspective was used on the response scale of 1 (field perspective) to 7 (observer perspective) for regression models and descriptive analyses included proportion of field (rated 1–3), mixed (rated 4), and observer (rated 5–7) perspectives for future events. Valence was recoded as negative (−3, −2, −1), neutral (0), and positive (+1, +2, +3) valence.

Temporal distance and autobiographical future event specificity were included as variables in adjusted analyses. Temporal distance was measured as the event remoteness reported by participant (scale 1–5), with higher scores indicating more distant future events being imagined. Binary variables were used for each item on the future thinking task to indicate whether the response was specific (1) or not specific (0).

Depression
Depressive symptoms. Two measures were used to assess depressive symptoms in participants: the Mood and Feelings Questionnaire (Angold & Costello, 1987) and the Young Adult Psychiatric Assessment (Angold & Costello, 2000). We chose to include two different measures of depressive symptoms as the measures provide distinct but complementary information about depressive symptoms that can be used to unpick the nature of the relationship between visual perspective and depression. The Mood and Feelings Questionnaire

is a dimensional measure that is sensitive to the broad spectrum of possible symptoms, while the Young Adult Psychiatric Assessment provides a more stringent index of DSM-5 (American Psychiatric Association [APA], 2013) symptoms that are associated with functional impairment.

The 34-item Mood and Feelings Questionnaire (MFQ) was used to assess symptoms of depression as a dimensional measure of current mood. Participants reported on 34 statements of depression on a scale of "not true" (0), "sometimes" (1), and "true" (2) over the previous 3 months. Responses were summed for a total score (possible range 0–68) and were prorated to allow for up to 15% missingness in item responses (Goodman, 2001). The MFQ has been used successfully in young adult samples (Khandaker et al., 2014; López-López et al., 2020).

The Young Adult Psychiatric Assessment (YAPA) was used to assess depressive symptoms more closely aligned with diagnostic criteria. The YAPA is a semi-structured interview assessing DSM-5 (APA, 2013) psychiatric symptoms and impairment over the previous 3 months. To meet symptom criteria, individuals needed to have experienced the DSM-5 depressive symptom so that it was uncontrollable and interfered with at least two activities. MDD symptoms were summed to form a more stringent measure of DSM-5 depressive symptom count (possible range 0–9).

Self-reported depression diagnosis. During the face-to-face testing session, participants were asked to report any diagnosis of depression with the question: "Have you received a diagnosis or has a medical professional ever told you that you have depression?". Follow up questions on who provided the diagnosis and when they were diagnosed were asked to confirm self-reported diagnosis. This measure was used solely for descriptive information on the sample to indicate potential lifetime presence of treated depression.

Research diagnosis of MDD. Participants reporting depressive symptoms consistent with DSM-5 Major Depressive Disorder criteria (APA, 2013) or with subthreshold symptoms on the YAPA interview were reviewed at clinical meetings by a psychiatrist. Participants that met MDD criteria following review were considered to have a diagnosis of current MDD.

Covariates

A number of covariates were included in analyses given their associations with visual perspective and depressive symptoms. These were participant age (Mars et al., 2012; Rathbone et al., 2015; Siedlecki et al., 2015); gender (Hawkins-Elder & Salmon, 2020; Thapar et al., 2012); IQ (Zammit et al., 2004); and temporal distance/event remoteness (Akhtar et al., 2017; Berntsen & Rubin, 2006; Falco et al., 2015; McFadden & Siedlecki, 2020). Age and gender were reported in the questionnaire booklet along with MFQ depressive symptoms. IQ was assessed previously in adolescence at Wave 1 of the EPAD study (at mean age: 11.69 years, SD: 1.81, range: 9–16 years) using the Wechsler Intelligence Scale for Children IV (WISC-IV) (Wechsler, 2003) as this was the only measure of IQ available. Memory and future event temporal distance were derived from participant report as the mean event (specific, categorial, extended) remoteness ranging from 1 to 5, with higher scores indicating more distant, or more, remote events. Event specificity was also included as a covariate to test whether results were driven by the association between reduced autobiographical specificity and depression.

Statistical analysis

All analyses were performed in Stata version 15 (StataCorp, 2017). Descriptive statistics (means, standard deviations, percentages, ranges where appropriate) were performed for visual perspective, demographic, cognitive and depression variables (Tables 1 and 2).

A number of multivariate regression models were performed to assess the associations between perspective (for memories and future events) and valence predictors and depressive symptom outcomes. Analyses were performed in long data format with perspective and valence (and temporal distance and specificity in adjusted analyses) as within-subject variables. Regression models used robust clustering to account for items clustered within person. First, we examined main effects of perspective (for each item on a scale from 1 (field perspective) to 7 (observer perspective)) and valence (dummy-coded in analyses as neutral versus negative (reference) and positive versus negative (reference)) on depressive symptoms as measured by the MFQ (Table 3) and the YAPA (Table 4). Second, we assessed whether valence moderated the relationships between visual perspective and depressive symptoms by using Wald tests to test a combined interaction effect of valence. Where there was evidence of an interaction, we followed up by testing whether slopes for perspective differed by valence. A series of regression models were used to examine (a) the unadjusted association between each observer perspective measure, and then sequentially adding covariates: (b) age and gender; (c) IQ and temporal distance, and (d) autobiographical specificity.

We performed additional sensitivity checks to examine the effect of severity of depressive symptoms on differences in results seen when using MFQ and YAPA depressive symptoms. Non-linear main effects of perspective for future events (and observer perspective for memories, for completeness) on MFQ symptoms were assessed using quadratic terms in regression models sequentially adjusting for confounders (as above).

Results

Preliminary analysis

Descriptive demographic, cognitive and clinical information is presented in Table 1 and proportions of each visual perspective by temporality and valence is presented in Table 2. In the current sample, field perspectives for memories and future events were the norm, with the proportion of observer rated responses ranging from 13.11% (positive memories) to 25.22% (negative future events). On average, participants reported using an observer perspective more often for future events than past memories. Participants were also less specific for

Table 1. Descriptive information (demographic, cognitive and clinical) on the sample.

Variable	Mean or %	SD or n	Range
Gender (female)	79.31%	23	
Age	21.14	1.83	18–25
IQ	98.31	10.62	77–118
AMT mean perspective	2.26	1.89	1–7
FTT mean perspective	2.84	2.16	1–7
AMT mean temporal distance (possible range 1–5)	2.61	0.51	1.46–3.76
FTT mean temporal distance (possible range 1–5)	2.53	0.63	1.25–3.91
Proportion of specific AMT responses	73.95%	386	
Proportion of specific FTT responses	60.46%	315	
Self-reported depression diagnosis	31.03%	9	
Research diagnosis of MDD	10.34%	3	
Mood and Feelings Questionnaire depressive symptoms	15.93	11.5	3–44
Young Adult Psychiatric Assessment depressive symptoms	1.69	1.75	0–6

AMT = Autobiographical Memory Test; FTT = Future Thinking Task; MDD = Major Depressive Disorder.

Table 2. Proportion of field, mixed and observer perspective by temporality (memory, future imagined event) and valence.

		Proportion of visual perspective		
		Field	Mixed	Observer
Memories	Positive	80.34%	6.55%	13.11%
	Negative	78.11%	8.40%	13.49%
	Neutral	83.33%	1.39%	15.28%
Future imagined events	Positive	70.03%	9.56%	20.41%
	Negative	68.83%	5.95%	25.22%
	Neutral	73.61%	6.94%	19.44%

future events than past memories. Approximately one in ten participants had a research diagnosis of MDD and approximately three in ten participants reported a medical professional had given them a diagnosis of depression in their lifetime.

The relationship between visual perspective for autobiographical memory and depressive symptoms

Increased use of the observer perspective was positively associated with MFQ depressive symptoms in the unadjusted model and all sequentially adjusted models (Table 3). Importantly, the association

remained when adjusting for IQ, temporal distance and specific positive autobiographical memories, indicating that increased use of the observer perspective has an independent association with depressive symptoms. There was weak evidence for a main effect of valence in that positive memories were associated with fewer depressive symptoms (Table 3; fully adjusted Model 4 B (SE) = −1.708 (0.881), p = .063). There was no evidence that an interaction between perspective and valence affected depressive symptoms (unadjusted $F(2, 28) = 0.36$, $p = .699$; fully adjusted Model 4 $F(2, 28) = 0.03$, $p = .970$).

There was no main effect of visual perspective or valence for autobiographical memories on depressive symptoms measured on the more stringent YAPA interview (Table 4). There was no evidence of an interaction between perspective and valence (unadjusted $F(2, 28) = 1.38$, $p = .269$; fully adjusted Model 4 $F(2, 28) = 1.07$, $p = .356$).

The relationship between visual perspective for future events and depressive symptoms

Visual perspective for future events was not associated with MFQ depressive symptoms (Table 3).

Table 3. Main effects of event perspective and event valence on depressive symptoms as measured on the Mood and Feelings Questionnaire.

Predictor	Model 1[a]		Model 2[b]		Model 3[c]		Model 4[d]	
	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Autobiographical Memory Test								
Perspective	**1.270 (0.443)**	**0.008**	**1.337 (0.435)**	**0.005**	**1.247 (0.466)**	**0.012**	**1.250 (0.451)**	**0.01**
Valence: neutral (vs negative reference)	0.853 (1.537)	0.593	0.109 (1.672)	0.949	0.204 (1.684)	0.904	0.202 (1.721)	0.907
Valence: positive (vs negative reference)	−1.358 (0.985)	0.179	−1.518 (0.902)	0.104	−1.459 (0.906)	0.118	−1.708 (0.881)	0.063
Future Thinking Task								
Perspective	0.605 (0.459)	0.198	0.683 (0.458)	0.147	0.764 (0.469)	0.115	0.769 (0.474)	0.116
Valence: neutral (vs negative reference)	−2.148 (1.812)	0.246	−1.907 (1.860)	0.314	−2.040 (1.824)	0.273	−2.015 (1.867)	0.290
Valence: positive (vs negative reference)	−1.965 (1.018)	0.064	−1.435 (1.137)	0.218	−1.412 (1.113)	0.215	−1.372 (1.154)	0.244

[a]Unadjusted; [b]Adjusted for age and gender; [c]Adjusted for age, gender, IQ and event temporal distance; [d]Adjusted for age, gender, IQ, event temporal distance and autobiographical memory specificity. Table presents main effect models only (without interaction terms in the models) given the lack of evidence for interaction effects. Associations significant at $p < 0.05$ indicated in bold.

Table 4. Main effects of event perspective and event valence on depressive symptoms as measured on the Young Adult Psychiatric Assessment.

Predictor	Model 1[a]		Model 2[b]		Model 3[c]		Model 4[d]	
	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Autobiographical Memory Test								
Perspective	0.008 (0.076)	0.921	0.024 (0.075)	0.750	0.003 (0.079)	0.963	0.004 (0.077)	0.957
Valence: neutral (vs negative reference)	0.030 (0.283)	0.917	−0.152 (0.243)	0.538	−0.130 (0.237)	0.588	−1.130 (0.240)	0.591
Valence: positive (vs negative reference)	−0.152 (0.248)	0.544	−0.197 (0.225)	0.389	−0.184 (0.221)	0.413	−0.225 (0.225)	0.325
Future Thinking Task								
Perspective	0.110 (0.065)	0.104	0.127 (0.063)	0.054	0.127 (0.064)	0.058	1.290 (0.064)	0.055
Valence: neutral (vs negative reference)	−0.271 (0.269)	0.321	−0.219 (0.243)	0.374	−0.173 (0.249)	0.493	−0.166 (0.256)	0.521
Valence: positive (vs negative reference)	−0.279 (0.154)	0.080	−0.164 (0.178)	0.366	−0.164 (0.179)	0.366	−0.154 (0.188)	0.420

[a]Unadjusted; [b]Adjusted for age and gender; [c]Adjusted for age, gender, IQ and event temporal distance; [d]Adjusted for age, gender, IQ, event temporal distance and autobiographical memory specificity. Table presents main effect models only (without interaction terms in the models) given the lack of evidence for interaction effects. Associations significant at $p < 0.05$ indicated in bold.

There was weak evidence for more positive future events being associated with fewer depressive symptoms in unadjusted analyses (B (SE) = −1.965 (1.018), p = .064) but this attenuated with addition of covariates (fully adjusted Model 4 B (SE) = −1.372 (1.154), p = .244). There was weak evidence of an interaction between perspective and valence in the unadjusted analysis (F(2,28) = 2.60, p = .092) in that there was a stronger relationship between perspective and depressive symptoms for positive valence (B (SE) = 1.015 (0.440), p = .029). However, the interaction effect attenuated in subsequent models adjusting sequentially for age and gender (Model 2 F(2, 28) = 2.08, p = .144), plus IQ and event temporal distance (Model 3 F(2, 28) = 1.96, p = .160), plus event specificity (fully adjusted Model 4 F(2, 28) = 1.97, p = .159).

There was weak evidence for an association between increased observer perspective for future events and increased YAPA depressive symptoms in all adjusted models, including when adjusting for IQ, temporal distance and autobiographical specificity (Table 4; fully adjusted model 4 B (SE) = 1.290 (0.064), p = .055). The weak evidence for positive memories to be associated with fewer depressive symptoms in unadjusted analyses (B (SE) = −0.279 (0.154), p = .080) did not hold following adjustment for confounders. There was no evidence of a potential interaction between perspective and valence (unadjusted F(2, 28) = 0.83, p = .448; Fully adjusted Model 4 F(2,28) = 0.67, p = .519).

Sensitivity analysis

To assess whether differences in results for MFQ and YAPA depressive symptoms were attributable to severity of depression, we tested whether there was a non-linear main effect of observer perspective for future events and memories on MFQ depressive symptoms using quadratic terms. There was no evidence of an association in unadjusted or sequentially adjusted models for observer perspective for future events (fully adjusted Model 4 B (SE) = 0.402 (0.348), p = .259). There was evidence of the quadratic term for observer perspective for memories being associated with MFQ depressive symptoms in the unadjusted model (Model 1 B (SE) = 0.572 (0.238), p = .023), and sequentially adjusted models (Model 2 B (SE) = 0.557 (0.259), p = .040; Model 3 B (SE) = 0.547 (0.253), p =.039; Fully adjusted model 4 B (SE) = 0.514 (0.246), p = .046).

Discussion

The current study examined the relationship between visual perspective and depressive symptoms in a sample of young adults at high familial risk for depression. Specifically, we explored (1) whether increased use of the observer perspective for memories was associated with depressive symptoms and whether results differed by valence, (2) whether the relationship extended to imagined future events and whether results differed by valence, and (3) whether associations remained when adjusting analyses for cognitive factors such as IQ, temporal distance and autobiographical specificity. Findings were somewhat mixed. We found increased use of the observer perspective for past memories was associated with increases in MFQ depressive symptoms. This association remained when adjusting for IQ, temporal distance of event and autobiographical specificity. There was no evidence that memory perspective was associated with YAPA depressive symptoms, nor evidence for an interaction between memory perspective and valence for either measure of depressive symptoms. On the other hand, there was weak evidence for an association between increased observer perspective for future events and higher levels of YAPA depressive symptoms. There was weak evidence for an interaction between future event perspective and valence on the MFQ with a stronger perspective-depression association for positive (versus negative) events; however, this interaction attenuated with the addition of covariates. Current results suggest increased use of the observer perspective may be linked to depressive symptoms regardless of temporality (memories, future imagined events) and event valence (positive, negative, neutral)..

To our knowledge, this is the first study to examine visual perspective in a group at high familial risk of depression. Participants used the observer perspective for 13% of positive memories, 13% of negative memories, and 15% of neutral memories. Similar to previous research (Berntsen & Bohn, 2010; McDermott et al., 2016), we found higher levels of the observer perspective for future imagined events (20% of positive, 25% of negative, and 19% of neutral future events). Use of the observer perspective was lower in the current sample compared to previous samples of undergraduate students (Nelis et al. (2013)—non-dysphoric students: 29% positive, 30% negative memories;

dysphoric students: 37% positive, 28% negative memories; McDermott et al. (2016) – 71% memories, 78% episodic future thoughts), and a community sample of adolescents (Hawkins-Elder and Salmon (2020) – 38% memories). However, findings are similar to individuals with remitted depression who used observer perspective for 24% of negative memories and 18% of positive memories (Kuyken & Moulds, 2009). Inconsistency with previous literature could be attributable to differences in methods. For instance, the current study used the oral AMT, whereas other studies have used the minimal instructions written AMT (Hawkins-Elder & Salmon, 2020; Nelis et al., 2013) and other minimal instruction event cueing paradigms (McDermott et al., 2016). Furthermore, we focus on valence of the event itself rather than cue valence seen in previous studies.

The association between increased use of the observer perspective for memories and MFQ depressive symptoms is consistent with previous findings in non-clinical samples (Hawkins-Elder & Salmon, 2020; Nelis et al., 2013), and in individuals with MDD (Kuyken & Howell, 2006; Kuyken & Moulds, 2009; Lemogne et al., 2006). Importantly, the current study extends findings to depressive symptoms in young adults with a parent with MDD who are at higher (genetic and environmental) risk of developing depression and depression-related risk factors. This group are of particular of interest when identifying modifiable risk factors for targeted interventions; the current study indicates that an observer perspective bias warrants further investigation as a potential risk factor for depression.

There was weak evidence that increased observer perspective for future events was associated with YAPA depressive symptoms. These results suggest that the observer perspective bias may be a bias that is not specific to autobiographical memory but relevant to other types of autobiographical thinking. This echoes other cognitive biases that are present for memory and imagined future events such as reduced autobiographical specificity (Gamble et al., 2019; Hallford et al., 2020b; Sumner et al., 2010; Williams et al., 2007).

Interestingly, we found different measures of depressive symptoms were associated with different temporalities of visual perspective. The broader, more dimensional, measure of depressive symptoms (MFQ) was associated with observer perspective for past memories, whereas there was weak

evidence the stringent measure of diagnostic-level depressive symptoms (YAPA) was associated with observer perspective for future events. As previous research indicated that higher levels of depressive symptoms could moderate the relationship between the observer perspective and reduction in negative affect (Kross & Ayduk, 2009), we examined whether severity of depressive symptoms could affect the relationship between visual perspective and MFQ depressive symptoms. There was evidence that a non-linear (quadratic) relationship for memory perspective was associated with MFQ depressive symptoms, but no non-linear associations were evident for future thinking visual perspective. The MFQ and YAPA are inherently different instruments to measure depressive symptoms which is likely driving differences in results. The MFQ is a "pen and paper" self-report questionnaire for a broad range of low-level depressive symptoms whereas the YAPA is interviewer rated and the threshold for endorsing a symptom at DSM-5 level is high (i.e. a symptom cannot be endorsed unless it is uncontrollable and interferes with at least two activities). Therefore the YAPA depressive symptoms are likely to be capturing a different, more severe, selection of depressive symptoms than the broad low-level mood symptoms captured on the MFQ, which may explain why there was no relationship between perspective for past events and YAPA depressive symptoms. The method used to measure depressive symptoms has been seen to moderate the relationship between other cognitive biases and depression; for instance, there is a stronger relationship between clinician-rated depressive symptoms (typically selecting a more severe selection of depressive symptoms) and overgeneral memory than there is for self-reported depressive symptoms (Hallford et al., 2020b). Given the previous literature for an association between observer perspective and depressive symptoms has typically used self-reported dimensional questionnaire measures of depressive symptoms (Hallford, 2019; Hawkins-Elder & Salmon, 2020; McFadden & Siedlecki, 2020; Nelis et al., 2013), further research comparing the relationship for different methods of assessing depression (e.g. questionnaire checklist versus diagnostic assessment) would be elucidate reasons for the differences in the current study.

We found no evidence of interaction between perspective and valence with the exception of weak evidence of an interaction for perspective for

future thoughts and valence on MFQ depressive symptoms. Unadjusted analyses found this was driven by a stronger relationship between increased use of the observer perspective and depressive symptoms for positive future events, compared to negative future events. This finding was consistent with previous associations in the literature between increased observer/ reduced field perspective for positive memories and depressive symptoms in non-clinical samples (Hawkins-Elder & Salmon, 2020; Nelis et al., 2013), and in individuals with MDD (Kuyken & Howell, 2006; Kuyken & Moulds, 2009; Lemogne et al., 2006). It has been argued that this relationship may be due to individuals high in depressive symptoms distancing themselves from positive events that are incongruent with their current negative mood or sense of self (Libby & Eibach, 2002; Nelis et al., 2013), but previous research has also highlighted for self-conscious emotions, such as shame and pride, use of the observer perspective may enhance emotional intensity (Hung & Mukhopadhyay, 2012; Libby et al., 2011). Therefore the observer perspective may function to downregulate or upregulate emotional intensity of positive future imagined events. Nevertheless, the future event perspective by valence interaction attenuated in subsequent adjusted models, indicating that the interaction may have been partly driven by covariates (gender, age, IQ temporal distance of future event, and future event specificity).

The association between observer perspective for memories and MFQ depressive symptoms remained when statistically controlling for IQ, temporal distance of event and autobiographical specificity. This is important as it indicates that the association between visual perspective and depression is not driven by a reduction in general cognition (in this instance, IQ) or reduced autobiographical specificity. Instead, these results suggest that the observer perspective bias may be a distinct factor associated with depression. Additional research exploring whether the observer perspective bias could be a distinct risk factor that precedes the onset of depression would be beneficial to identify whether visual perspective would be a useful target in potential treatments for depression.

Taking into account both the main effects of perspective and the limited evidence for interactions with valence, our results may be more consistent with the idea that increased use of the observer perspective reflects increased self-focused attention (regardless of valence) in individuals with high levels of depressive symptoms. The observer perspective considers the conceptual "me" rather than the experiential "I" (Libby et al., 2011) and previous research has found that individuals may use the observer perspective to focus on integrating the event into a coherent self-concept, rather than distancing oneself from events that are incongruent with current sense of self (Libby & Eibach, 2011). Therefore, looking at oneself in memories and future imagined events and integrating these into a self-concept may be one aspect of self-focused attention that has been reported in individuals with depression (Mor & Winquist, 2002). In the case of events containing self-conscious emotions (e.g. embarrassment, pride, guilt, shame), this may also serve to amplify the emotional intensity of the event (Hung & Mukhopadhyay, 2012; Libby et al., 2011). However, we are cautious with interpreting function of perspective from current findings since we only examined whether there is a relationship between visual perspective and depressive symptoms and not why this relationship exists. Further research manipulating visual perspective in individuals with depression is required to unpick the function of the observer perspective in this clinical population.

It is not clear whether increased use of the observer perspective could lead to the development of depressive symptoms, whether higher levels of depression lead to increased use of the observer perspective, or whether there is a bidirectional relationship. A complex relationship between visual perspective and depression is likely but direction and causality cannot be disentangled in the existing study as it is cross-sectional. To address questions of directionality, longitudinal studies that assess both visual perspective and depression are required, particularly in young people as this can help us understand if visual perspective precedes the onset of depression and depressive symptoms. Preliminary evidence suggests that depressive symptoms may be associated with subsequent observer perspective for positive cues in adolescents (Hawkins-Elder & Salmon, 2020) but further longitudinal work is required to identify direction of effect in young adults and those at high risk of developing depression. Given the multifactorial nature of depression (Thapar et al., 2012), studies that unpick the role of additional risk factors (such as overgeneral memory) in the relationship between visual perspective and depression are vital.

Strengths and limitations

To our knowledge, this is the first study to look in depth at the relationships between depressive symptoms and the observer perspective, using event temporality (past and future) and *self-reported* valence (positive, negative and neutral) to help improve understanding. Importantly, the current study extends findings for self-reported valence of events, and although there has been similar cue and content valence findings in previous work in this sample during adolescence (Warne et al., 2019), there is evidence to suggest depression may moderate the similarity between cue and memory content valence in adults (McFadden & Siedlecki, 2020; Young et al., 2012). We also examined this question in a novel sample of young adults at high familial risk for depression who are at risk for both depression and depression-related risk factors. This sample is important to examine as they can be easily identified and targeted for selective intervention and prevention approaches, and the chance of intervention effectiveness can be greater in high-risk individuals than in individuals in the general population (Horowitz & Garber, 2006; Stice et al., 2009).

However, this study should be viewed in light of the limitations. First, the use of a cross-sectional design precludes exploration of whether the observer perspective for memories and future events is a risk factor that precedes depressive symptoms or the onset of depression. Second, we conducted analysis in a small, predominantly female, sample so we are cautious interpreting associations as they require replication in larger, more representative samples. Furthermore, given perspective may function differently across Eastern and Western cultures (Cohen & Gunz, 2002), this research using a sample from the UK may not generalise to non-WEIRD (Western, Educated, Industrialised, Rich and Democratic) cultures (Henrich et al., 2010). Finally, we did not employ control for multiple comparisons given the relatedness of observer perspective measures and to avoid missing potential true effects and reducing power (Gelman et al., 2012; Rothman, 1990, 2014). Consequently, results should be interpreted with caution.

Conclusions

We found that increased use of the observer perspective for memories was associated with increased depressive symptoms in a group of young adults at elevated familial risk of depression. This relationship was independent of general cognition and autobiographical specificity. There was also weak evidence that increased use of the observer perspective for future imagined events may be associated with depressive symptoms, indicating this bias may extend to episodic thinking, regardless of temporality. There was limited evidence for an interaction with event valence. Further work investigating whether the observer perspective for past memories and future imagined events could be a distinct risk factor that precedes onset of depression or whether it is a marker of current mood/depressive state is important.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author (NW). The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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