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Autobiographical memories of vomiting in people with a specific phobia of vomiting (emetophobia)

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ABSTRACT

Background: Vomiting is an almost universal phenomenon, but little is known about the aetiology of a specific phobia of vomiting (SPOV). The associations with vomiting during childhood and autobiographical memories may have relevance for our understanding of the development of SPOV and its treatment.

Method: Two groups: (a) a group with SPOV ($n = 94$) and (b) a control group ($n = 90$) completed a self-report questionnaire assessing their lifetime memories of both their own vomiting and others vomiting.

Results: People with SPOV recalled the memories of their own and others vomiting experiences from an earlier age and rated them as significantly more distressing than the control group. There was no difference between the groups in the number of memories of their own vomiting recalled before the age at which vomiting became a problem. However, the SPOV group recalled more memories of others vomiting before the onset of the problem. After the age at which the phobia became a problem they recalled less memories of their own vomiting and more memories of others vomiting than the control group. They recalled significantly more memories of vomiting associated with inter-personal events, health or emotional or unrelated life events.

Conclusions: Avoidance and hyper-vigilance for others vomiting after the onset of the phobia may have slightly reduced the risk of vomiting. There is some evidence for associative learning in SPOV with aversive consequences of vomiting and an unrelated life event. It suggests a model of autobiographical memories of vomiting that have lost a time perspective and context, which are being reactivated with cues for vomiting. The limitations of the study are those of memory biases in both groups.

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1. Introduction

Vomiting is an almost universal experience for human beings. It is an unpleasant but necessary consequence of gastritis and serves the function of expelling toxins from the stomach. It may also be a non-specific consequence of a range of medical emergencies such as a brain tumour, renal failure, or appendicitis. A small number of people develop a specific phobia of vomiting (SPOV), yet there is very little evidence regarding its aetiology.

SPOV (also known as emetophobia) occurs predominantly in women and can be significantly handicapping. For example, women may avoid a desired pregnancy, or become significantly underweight from food restriction (Lipsitz, Fyer, Paterniti, & Klein,

2001; Veale, Costa, Murphy, & Ellison, 2011; Veale & Lambrou, 2006). Typically a person with SPOV will avoid a wide range of situations including potentially unwell, and therefore contagious, children or adults; people who are at risk of vomiting (e.g. people who are drunk); activities such as going abroad; or visiting people who are ill. Individuals with SPOV may also restrict their alcohol or food intake to reduce the risk of vomiting. They may also be excessively vigilant for cues for vomiting and frequently checking others for signs of illness.

The only epidemiological survey of specific phobias, which specifically enquired about a phobia of vomiting, found the prevalence of SPOV to be 0.1% (Becker et al., 2007). This prevalence may be under-estimated, however, as the symptoms often overlap with those of health anxiety, obsessive-compulsive disorder and anorexia nervosa for which the person with SPOV may be misdiagnosed (Veale, 2009; Kirkpatrick & Berg, 1981 as cited in Phillips, 1985) reported a prevalence of 1.7%–3.1% in males and 6%–7% in females for subclinical levels of a fear of vomiting that did not reach diagnostic criteria for SPOV.

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The origins of SPOV are unknown. There are several competing hypotheses for the origins of phobias in general. Associative theories suggest that phobias develop as a consequence of relevant associative learning experiences (Coelho & Purkis, 2009). Watson and Rayner (1920) originally argued that specific phobias are simply intense classically conditioned fears that develop when a neutral stimulus is paired with a traumatic event, such as when Little Albert acquired an intense fear of rats after hearing a frightening gong paired with the presence of a rat several times (Mineka & Zinbarg, 2006). Several studies have confirmed that many people with specific phobias can recall a traumatic conditioning event when their specific phobia began (see Muris & Mercklebach, 2001, for a review). However, these studies were based on retrospective recall, and therefore it is likely that there are interpretive biases in people's recollection of events (Mineka & Öhman, 2002). One case series showed that children developed a fear of nausea and vomiting shortly after a stomach virus or medical procedure (e.g. surgery), which had led to vomiting (Klonoff, Knell, & Janata, 1984). To account for the observation that many people with specific phobias do not appear to have had any relevant history of classical conditioning, Rachman (1978) suggested vicarious learning could also be a route for associative learning. He argued that simply observing others experiencing a trauma or behaving fearfully could be sufficient for some specific phobias to develop. The results of some retrospective studies support this idea (e.g. Muris & Mercklebach, 2001; Ost & Hugdahl, 1981). One such case involved a boy who had witnessed his grandfather vomit while dying; shortly afterwards the boy developed SPOV.

Non-associative theories of fear acquisition suggest that some fears (e.g. a fear of heights, strangers, loud noises or water) develop without any critical learning experiences (Poulton, Davis, Menzies, Langley, & Silva, 1998; Poulton & Menzies, 2002a). For example, Poulton et al. (1998) conducted a longitudinal study examining the relationship between conditioning events (before the age of 9 years) and the presence of height fear (at ages 11 and 18 years) and found no positive relationship between relevant traumatic events (e.g. head injury) and fear of heights. In fact, falls resulting in head injury between the ages of 5 and 9 occurred more frequently in those without a fear of heights at 18, a finding in the opposite direction to those predicted by associative theories. In this case, a response of fear may be acquired through evolution and innate pathways, and may have had the evolutionary advantage of avoiding dangerous situations or objects (Poulton & Menzies, 2002a, 2002b). It is hypothesised, however, that an innate pathway would be less likely in SPOV since vomiting allows harmful toxins to be purged and a response of fear is therefore not evolutionary advantageous.

There is a comorbidity between SPOV and other anxiety disorders, such as panic disorder and social anxiety, in so far as they all share a common general anxiety vulnerability (Boschen, 2007). A cognitive behavioural formulation of SPOV (Boschen, 2007) highlights processes that occur in SPOV, which are similar to the ones occurring in panic disorder (Clark & Salkovskis, 2009), and contribute to the maintenance of the disorders. These include a catastrophic misinterpretation of certain bodily sensations (gastrointestinal symptoms in SPOV, and palpitations, breathlessness and dizziness in panic disorder), hypervigilance to the presence of interoceptive cues, and avoidant behaviour. The latter strategy maintains the patients' negative beliefs as the non-occurrence of the catastrophe (vomit in SPOV, and panic attack in panic disorder) is attributed to avoiding certain stimuli.

A previous survey conducted by our group found no significant differences between the number of lifetime memories of vomiting in those with SPOV and those with panic disorder (Veale & Lambrou, 2006). In this exploratory study, there were 100 participants with SPOV but a smaller group with panic disorder ($n = 28$).

Furthermore, specific details about each memory of vomiting were not recorded and no attempt was made to separate the number of memories of vomiting before and after the age of onset of the phobia. The present study addresses these methodological limitations with a much larger control group in the community. Secondly, the current study enquires into the individual's autobiographical memories and those of others vomiting before and after the age of onset of the phobia. Both studies were designed as exploratory and may have relevance in our understanding of the development, maintenance, and treatment of SPOV.

The main aims of the current study were to explore memories and associations of vomiting in people with SPOV. A secondary aim was to determine if the number of memories of vomiting was influenced by the phobia. Specifically, it was hypothesised that people with SPOV compared to a control group would (a) recall more memories of their own and others vomiting experiences, (b) rate the memories as more distressing, (c) be more likely to associate the memories with aversive consequences, and (d) engage in excessive vigilance and avoidance behaviours after the onset of their phobia, which would be somewhat successful in reducing the frequency of vomiting (or the sense of influence) and were therefore reinforcing the hypervigilance and avoidance behaviour.

2. Method

2.1. Participants

2.1.1. SPOV group

2.1.1.1. Recruitment. We recruited participants with SPOV (Total $n = 94$; females $n = 88$ and males $n = 6$). Twenty four (25.5%) were recruited from a clinical setting and 70 (74.5%) from a website or an Internet support group (Gut Reaction, International Emetophobia Society and Anxiety UK). Participants completed the Psychiatric Diagnostic Screening Questionnaire (PDSQ) (Zimmerman & Mattia, 2001). The screening questionnaire was used to identify possible Axis 1 diagnoses before the Structured Clinical Interview for DSM Disorders (SCID) (First, Spitzer, Gibbon, & Williams, 2002) was used to confirm a diagnosis of SPOV and to determine any co-morbidity suggested by the screening questionnaire. The researchers contacted participants recruited over the web in order to conduct the SCID over the phone. Participants recruited in the clinic were interviewed face to face. The only inclusion criterion for the study was that they had a diagnosis of SPOV.

2.1.2. Control group

Due to the aforementioned higher proportion of women with SPOV, the control group was matched for gender and age.

2.1.2.1. Recruitment. A community group (total $n = 90$; females $n = 87$ and males $n = 3$) was identified using the Mind Search database at the Institute of Psychiatry, King's College London. This database contains over 3500 individuals in the local community who have volunteered to participate in psychological or psychiatric research. The inclusion criterion was that they had no previous history of a psychiatric disorder and this included a diagnosis of SPOV.

2.1.3. Exclusion criteria

To ensure that the clinical and control groups were at a similar risk of vomiting we sought to exclude participants that were at a greater risk of vomiting and would be regarded as outliers in the control group. Therefore we excluded people who:

- (a) had an eating disorder with self-induced vomiting
- (b) had severe suicidal intent and could take an overdose that could induce vomiting

- (c) were regularly binge drinking and at greater risk of vomiting
- (d) took illegal substances that might cause vomiting (e.g. opiates)
- (e) were taking medication or having treatment that can cause vomiting (e.g. chemotherapy, radiotherapy)
- (f) had a known medical problem (e.g. peptic ulcer, cancer, migraine) that could cause regular vomiting
- (g) were currently pregnant.

The participants received a high street gift voucher for their time after completion of the questionnaire. SelectSurveyASP (TM) version 8.1.1 was used to create a web based version of the questionnaires completed by the control group and participants in the SPOV group recruited over the internet. The format and structure of the questions were identical to the paper version used in the clinical setting. Some of the programme features, such as request for answers to avoid missing answers were utilized if appropriate.

The South London and Maudsley NHS Trust Research Ethical Committee approved this study.

2.2. Materials

Participants completed general questions on demographics. People in the SPOV group were asked about the age of onset of their fear of vomiting and the age when it became a problem. They were also asked about the locus of fear and whether they mainly feared their own or others vomiting or whether it did not matter.

All participants were asked to recall each episode of their own and others vomiting on a self-report questionnaire. The questions were:

- (a) Have you had any experience of vomiting in your life? If yes, please list your past experience(s) of vomiting (not retching) from the earliest age you can remember up to the present day.
For each episode of vomiting, participants were asked:
 - (i) How old were you?
 - (ii) How distressing is the memory of the experience on a scale of 0–10 (where 0 is “not at all distressing” and 10 is “severely distressing”)?
 - (iii) What were the circumstances or reasons for vomiting (e.g. infection, being drunk, pregnancy, travel sickness)?
 - (iv) Did you experience any bad consequences from vomiting (e.g. reaction of a relative)? Does the episode carry any associations from that time (e.g. other unpleasant events happening in your life? Or did you have a sense that something bad nearly happened?)
- (b) Have you had experiences of seeing vomit or other people vomiting from the earliest age you can remember up to the present day? If yes, please list your past experiences of vomit or others vomiting from the earliest age you can remember.
For each episode of experiencing vomit or others vomiting, participants were asked:
 - (i) How old were you?
 - (ii) How distressing is the memory of the experience on a scale of 0–10 (where 0 is “not at all distressing” and 10 is “severely distressing”)?
 - (iii) What were the circumstances surrounding your past experience of vomit or others vomiting?
 - (iv) Did you experience any bad consequences from vomiting (e.g. reaction of a relative)? Does the episode carry other associations from that time (e.g. other unpleasant events happening in your life? Or did you have a sense that something bad nearly happened because of this experience?)

Participants had the opportunity to record a maximum number of 10 episodes of vomiting for either their own or others vomiting. The two most distressing episodes of vomiting were analysed regarding their experienced consequences.

3. Statistical procedures

Each SPOV participant was individually matched with a control participant on gender and age with no more than 2 years difference. This was used to calculate for number of memories of own vomiting and number of memories of others vomiting, before and after their age of onset. Participants were excluded if they had incomplete data or if it was not possible to match a control participant more than 2 years older or younger than the SPOV participant. The age of the phobia becoming a problem of each SPOV participant was used to divide the matched control group in terms of number of memories of their own vomiting – *before* and *after* the age at which the matched SPOV participant recalled their phobia of vomiting becoming a significant problem. The same method was repeated for memories of others vomiting. The maximum number of episodes of vomiting recorded was capped at 10. However 5.3% ($n = 5$) of the SPOV group and 27.8% ($n = 25$) of the control group reached the maximum 10 episodes for their own vomiting. The number of episodes of vomiting that each participant could recall after 10 episodes was not recorded. Mann–Whitney U tests were used when the data were not normally distributed and t tests when data were normally distributed.

4. Results

4.1. Demographics

The mean age of the SPOV group was 32.3 ($SD = 11.7$) and the mean age of the control group was 32.5 ($SD = 11.0$). There were no significant differences in age ($t(183) = 0.1, p = 0.90$) or sex ($\chi^2(1) = 0.4, p = 0.54$) between the SPOV and control groups. The mean age of onset in the clinical group was 15.7 ($SD = 7.3$). There were no clinically significant differences between the group recruited from the internet and from the clinic on age or severity of symptoms and they were therefore combined (Veale et al., 2011).

In the SPOV group, 35.7% had a comorbid diagnosis and 14.3% had two or more comorbid diagnoses. The most common comorbidities in participants with SPOV were depression ($n = 8, 11.4\%$), generalized anxiety disorder (GAD) ($n = 7, 10.0\%$), obsessive compulsive disorder (OCD) ($n = 6, 8.6\%$), somatisation disorder ($n = 5, 7.1\%$), panic disorder ($n = 4, 5.7\%$), social phobia ($n = 4, 5.7\%$), agoraphobia ($n = 2, 2.9\%$), health anxiety ($n = 1, 1.4\%$), and other specific phobia ($n = 1, 1.4\%$).

4.2. Memories of own vomiting

A significantly greater number of people in the SPOV group (100.0% [$n = 94/94$]) could recall at least one memory of their own vomiting compared to the control group (93.3% [$n = 84/90$]) ($\chi^2[1] = 4.5, p < 0.05$). The SPOV group recalled a memory of their first episode of vomiting at a significantly younger age than the control group (Table 1). The SPOV group recalled significantly less lifetime memories of their own vomiting compared to the control group. The memories of their own vomiting experiences were rated as significantly more distressing compared to the control group.

It was possible to individually match 67 participants in the SPOV group with 67 control participants on gender and age with no more than 2 years difference (Table 1). The memories of their own vomiting in the SPOV group were divided into two – the number before and after the age that each participant recalled their phobia

Table 1
Memories of own vomiting in SPOV and control groups.

Variable	SPOV		Control		Mann–Whitney <i>U</i> test
	<i>N</i>	Md (IQR)	<i>N</i>	Md (IQR)	
Age of earliest memory of own vomiting	93	6.0 (5.0–7.8)	74	7.0 (5.0–11.3)	<i>U</i> = 2831.0*
Number of memories of own vomiting in lifetime	93	4.0 (3.0–6.0)	85	6.0 (3.5–10.0)	<i>U</i> = 2897.0**
Number of memories of own vomiting before the age of onset of phobia	67	2.0 (2.0–4.0)	67	2.0 (0.0–4.0)	<i>U</i> = 1857.5
Number of memories of own vomiting after the age of onset of phobia	67	1.0 (0.0–2.0)	67	3.0 (1.0–5.0)	<i>U</i> = 1445.0***
Most distressing memory of own vomiting (rated 0–10)	92	9.0 (7.0–10.0)	82	4.0 (1.0–7.0)	<i>U</i> = 1270.5***

Note: ****p* < 0.001, ***p* < 0.01, **p* < 0.05. Md = Median. IQR = Interquartile range.

of vomiting becoming a significant problem. The SPOV group did not significantly differ from the control group in the median number of memories *before* the age of onset of the phobia. However, the SPOV group recalled significantly fewer memories of their own vomiting compared to the control group *after* the age of onset of the phobia.

Table 1 shows the median and inter-quartile range. It shows that the SPOV group had significantly fewer memories of their own vomiting after the age of onset. The SPOV group had a mean of 1.6 memories (SD = 2.2) of their own vomiting compared with 3.3 in the control group (SD = 2.9) after the age of onset of the phobia. This means the SPOV group recalled a mean of 1.7 less memories of their own vomiting over 16.6 years compared to the control group. Therefore the SPOV group recalled one less memory of their own vomiting every 9.8 years compared to the control group.

4.3. Memories of others vomiting

At least one memory of others vomiting was recalled in 87.4% (*n* = 76/87) of the SPOV group compared to only 23.6% (*n* = 21/89) of the control group, which was statistically significant ($\chi^2 [1] = 69.7, p < 0.001$). Nine percent (*n* = 8) of the SPOV group and 2.3% (*n* = 2) of the control group reached the maximum of 10 memories of others vomiting. The SPOV group recalled memories of others vomiting at an earlier age than the control group (Table 2). In addition, the SPOV group recalled significantly more memories of others vomiting compared to the control group. Lastly, the memories recalled were rated as more distressing in the SPOV group compared to the control group.

After individual matching of SPOV and control participants, the number of memories of others vomiting in the SPOV group was separated into two – before and after the age that each participant recalled their phobia of vomiting becoming a significant problem. The age of onset in participants with SPOV was used to match against a control participant's number of memories of others vomiting (see Table 2).

The SPOV group recalled significantly more median numbers of memories of others vomiting compared to the control group before and after the age of onset.

The SPOV group had a mean of 2.6 (SD = 2.7) memories of others vomiting after the age of onset compared to 0.4 in the control group (SD = 1.3). Therefore after the age of onset, the SPOV group recalled a mean of 2.2 more memories of others vomiting compared to the

control group over a mean of 16.6 years compared to the control group. This means that the SPOV group could recall one more memory of others vomiting after the onset of the phobia every 7.5 years compared to the control group.

4.4. Locus of fear

Within the SPOV group, 51.1% (*n* = 48) reported only or mainly fearing their own vomiting, 40.4% (*n* = 38) reported fearing their own or others vomiting equally, and 8.5% (*n* = 8) reported only or mainly fearing others vomiting. The SPOV participants who reported only or mainly fearing their own vomiting did not have more distressing memories of their own vomiting (Md = 9.0, IQR = 8.0–10.0) than others vomiting (Md = 10.0, IQR = 8.0–10.0) ($z = -0.3, p = 0.73$). However the SPOV participants who reported only or mainly fearing others vomiting reported more distressing memories of others vomiting (Md = 10.0, IQR = 10.0–10.0) than their own vomiting (Md = 8.0, IQR = 7.0–9.8) ($z = -2.0, p < 0.05$).

4.5. Associations with vomiting

Responses to the open ended questions about the consequences of vomiting were classified as either:

(a) inter-personal consequences

Examples from participants included “My Dad got mad and was shouting”; “My teacher told me off”; “My sister and some kid laughed at me”; “My father saw me and I experienced his feeling of disgust”; “Reaction from relative – horror”.

(b) health or emotional consequences for self

Examples included “I was left alone in the toilet feeling scared”; “I collapsed afterwards”; “I felt I nearly died”.

(c) association with an unrelated life event

Examples included “my parents had just separated”; “I was upset having learnt my teenage brother had cancer”; “My grandmother took me to my father's business and there was a smashed window

Table 2
Memories of others vomit or vomiting in SPOV and control groups.

Variable	SPOV		Control		Mann–Whitney <i>U</i> test
	<i>N</i>	Md (IQR)	<i>N</i>	Md (IQR)	
Age of earliest memory of others vomiting	73	7.0 (5.0–10.5)	19	26.0 (18.0–28.0)	<i>U</i> = 126.0***
Number of memories of others vomiting	88	3.0 (2.0–6.8)	87	0.0 (0.0–0.0)	<i>U</i> = 862.5***
Number of memories of others vomiting before the age of onset of phobia	67	2.0 (0.0–2.0)	67	0.0 (0.0–0.0)	<i>U</i> = 698.5***
Number of memories of others vomiting after the age of onset of phobia	67	2.0 (1.0–4.0)	67	0.0 (0.0–0.0)	<i>U</i> = 816.0***
Most distressing memory of others vomiting (rated 0–10)	76	10.0 (8.0–10.0)	20	2.0 (1.0–5.0)	<i>U</i> = 126.0***

Note: ****p* < 0.001, ***p* < 0.01, **p* < 0.05. Md = Median. IQR = Interquartile range.

as it had been unsuccessfully petrol bombed the night before”; “I had an argument with someone on the same night”.

For others vomiting there was an additional category of health or emotional consequences for others. Examples included: “The child vomiting was crying and scared”; “My daughter had to be looked after by my mother when she continued to vomit and this was quite distressing for her as she wanted me there”; “My grandfather died because he was sick”.

For their own or others vomiting, the SPOV group reported significantly more associations than the control group for the total number of associations and for all categories except unrelated life events in their own vomiting (Tables 3 and 4).

5. Discussion

5.1. Support for the hypotheses

This is the first study to investigate the autobiographical memories of one’s own and others vomiting in a population with SPOV. Specifically, it was found that people with SPOV compared to a control group rated the memories of vomiting as more distressing and were more likely to associate the memories with aversive consequences.

When age of onset of the phobia was statistically controlled, there was no difference between the SPOV and control groups in the number of episodes of their own vomiting recalled before the age at which vomiting became a problem. Contrary to our hypothesis, after the age of onset of their phobia, they recalled less memories of their own vomiting compared to the control group. However, in terms of memories related to others vomiting, people with SPOV recalled more memories of vomiting than the control group. Even when age of onset was accounted for, the SPOV group still recalled more experiences of others vomiting.

If the number of memories of their own vomiting was related to the actual number of experiences of vomiting, then the SPOV group appeared to be somewhat “successful” at reducing the frequency of their own vomiting with one less episode of vomiting every 9.8 years compared to the control group. In favour of this explanation, there were no significant differences between the groups in the number of memories of vomiting before the age of onset of the phobia. This supports the hypothesis that people with SPOV engage in excessive vigilance and avoidance behaviours of cues to vomiting after the onset of their phobia. This therefore reinforces the hypervigilance for cues to vomiting and that this may be a factor in reducing the frequency of vomiting. Specifically it suggests that people with SPOV tend to engage in avoidant behaviour of nausea symptoms because of fear these symptoms may place them at risk of experiencing nausea attacks (Boschen, 2007). However the strategy to reduce the risk of vomiting may cause a significant cost in the quality of life and interference in social life and relationships (Veale & Lambrou, 2006). The control group may have a memory bias against recalling their own vomiting, as they were more likely to have forgotten about some episodes of vomiting compared to the

Table 4

Associations with others vomiting in SPOV and control groups.

Variable	SPOV		Control		Chi-square test
	N	%	N	%	
Total number of associations/consequences	36/87	41.4%	1/89	1.1%	$\chi^2(1) = 40.5^{***}$
Inter-personal consequence	11/87	12.6%	0/89	0.0%	$\chi^2(1) = 9.9^{**}$
Health or emotional consequence for self	15/87	17.2%	0/89	0%	$\chi^2(1) = 14.6^{***}$
Health or emotional consequence for others	6/87	6.9%	0/89	0.0%	$\chi^2(1) = 4.4^*$
Association with unrelated life event	8/87	9.2%	1/89	1.1%	$\chi^2(1) = 4.4^*$

Note: $^{***}p < 0.001$, $^{**}p < 0.01$, $^*p < 0.05$.

SPOV group. The frequency of vomiting in the control group may therefore be an under-estimate. This suggests that the SPOV group might have been slightly more “successful” in reducing the frequency of vomiting compared to the control group. Alternatively, it could be that people with SPOV may have a reduced gastric sensitivity to vomiting and are biologically less likely to vomit.

The finding that people with SPOV recalled more memories of others vomiting could support vicarious learning processes of fear acquisition (Rachman, 1978). The experiences of others vomiting were more distressing and were also associated with more aversive consequences. It is possible that people with SPOV might have been more exposed to others vomiting than controls. However a memory bias is likely to occur in the control group recalling memories of other people vomiting. The SPOV group is likely to selectively attend to others vomiting and the control group is more likely to have forgotten episodes of other people vomiting compared to their own vomiting. Indeed only 23.6% of the control group could ever recall another person vomiting compared to 87.4% of the SPOV group. This suggests that the SPOV group is more aware of others vomiting (or people who may be at risk of vomiting) than the control group. This may be due to a variety of reasons. It may be due to selective attention and hypervigilance towards threat stimuli, as reported to occur in general cognitive models of phobias (Beck, Emery, & Greenberg, 1985) and demonstrated in specific phobias. For example, Rinck and Becker (2006) conducted an eye-tracking study in people with spider phobia and found an early reflexive attentional bias towards threat, which was followed by avoidance. It may also be the case that individuals with SPOV have a bias towards retrieval of generally negative memories in comparison with the control group, as has been found in previous research examining autobiographical memories in fearful individuals (e.g. spider, or blood/injury) and non-fearful individuals (Wenzel, Jackson, Brendle, & Pinna, 2003). However, if the excessive vigilance and avoidance behaviour is effective in reducing the frequency of their own vomiting, it does not appear to be effective in reducing their contact with other people vomiting. In this case, the selective attention to others vomiting and a memory bias in recalling others vomiting may contribute to the difference observed between the groups.

It was also hypothesised that the SPOV group was more likely to make associations with vomiting and that one of the origins of SPOV could be through associative learning. The SPOV group was more likely to recall a wide range of associations from inter-personal and health or emotional consequences. Interestingly, the associations with others vomiting were also more likely to occur with an unrelated life event. Although unrelated life events were associated only with others vomiting, this has not previously been identified as a possible pathway for associative learning in the acquisition of phobias.

The SPOV group recalled their own memories of vomiting to be more distressing than the controls. They also recalled others

Table 3

Associations with own vomiting in SPOV and control groups.

Variable	SPOV		Control		Chi-square test
	N	%	N	%	
Total number of associations/consequences	51/94	54.3%	15/90	16.7%	$\chi^2(1) = 26.6^{***}$
Inter-personal consequence	27/94	28.7%	6/90	6.7%	$\chi^2(1) = 13.7^{***}$
Health or emotional consequences	23/94	24.5%	10/90	10.0%	$\chi^2(1) = 5.7^*$
Association with unrelated life event	6/94	6.4%	2/90	2.2%	$\chi^2(1) = 1.0$

Note: $^{***}p < 0.001$, $^{**}p < 0.01$, $^*p < 0.05$.

vomiting at a younger age and reported a greater level of distress compared to the control group. People with SPOV who mainly feared others vomiting could recall more distressing memories of others vomiting rather than their own vomiting. There may have been factors related to vomiting that made it more distressing for the participants with SPOV (for example, that the vomiting was more unpredictable; or the cause of the vomiting was more distressing; or that the person was alone and not comforted). Such factors could alter the distress of vomiting, and future research will need a more detailed interview to understand the context of the vomiting and whether both groups had similar experiences.

The data support an associative model of learning in a specific phobia of vomiting, perhaps from both direct experiences of vomiting (Watson & Rayner, 1920); social learning (Bandura, 1977) and vicarious learning (Rachman, 1978). Further research, which explore patients' imagery and associations of memories of vomiting through in depth interviews are needed to further develop this line of research. It could also explore whether the memories prior to the onset of the phobia have more meaning and associations than those after the onset of the phobia (Price, Veale, & Brewin, 2012).

The memories of others vomiting in the current study include reports of observing the fear or disgust response of others. Children may obtain emotional information from their caregiver to appraise an uncertain situation (Feinman, 1992). Social referencing may therefore be the basis for vicarious learning of fear and disgust that potentially contributes to the development of SPOV. Furthermore, some distress or aversive consequences with one's own or others vomiting may be normal and there may be an unknown protective factor in people who do not go on to develop a phobia. van Overveld, de Jong, Peters, van Hout, and Bouman (2008) found that people with SPOV have a higher level of disgust sensitivity and this may make an individual at greater risk of developing SPOV. Disgust sensitivity has been proposed to play a role in the aetiology of a number of anxiety psychopathologies, including spider and small animal phobias and blood/injury phobias (Davey, 2011). Therefore, it is possible that the people with SPOV, particularly the subgroup that mainly fears other people vomiting, are more prone to disgust sensitivity as they develop fears of contagious disease from others. Davey and Hurrell (2009) also hypothesised that the experience of disgust may activate anxiety sensitivity; that is, fear of one's own bodily sensations and perhaps losing control. Further research is required to determine if the people with SPOV have greater disgust sensitivity prior to the onset of the phobia or if it develops as a symptom after the onset of the phobia.

5.2. Strengths and limitations

One strength of the current study is the large dataset of people with SPOV. Another strength is the inclusion of a matched control group from the community and the gathering of detailed information about their memories of vomiting, which has not been done in previous studies (e.g. Veale & Lambrou, 2006). One limitation is that some questionnaire items prompted individuals to provide associations with vomiting and an alternative was not provided (for example, obtaining information about vomiting) (Merckelbach, Arntz, & De Jong, 1991; Ost, 1991). Different types of phobias may originate by different routes. However, previous studies did not have a control group and none of the participants in the current study spontaneously mentioned they had been given negative information about vomiting. Further in-depth interviews or cross-validation by a relative at the time of the vomiting are required to confirm this. In contrast to some specific phobias, most of the participants in the current study do remember conditioning events that might have contributed to fear acquisition (Graham & Gaffan, 1997; Kleinknecht, Dinnel, & Kleinknecht, 1994; Menzies &

Clarke, 1993, 1995; Ollendick & King, 1991). The use of a control group for autobiographical memories for other events that are uncommon but universal (e.g. choking, rejection) may also be helpful in exploring the development of other phobias.

The main limitation of the study is that the data is retrospective and may not be specific to SPOV and there is a need to replicate the study in other anxiety disorders. Furthermore participants with SPOV may be trying to give meaning to the development of their phobia. However, the finding that there is a greater association with aversive memories in the SPOV group compared to the controls is of importance (whether the memories are accurate or not) as such emotional memories may be re-activated whenever there are cues that are associated with vomiting. Ehlers and Clark (2000) suggest that the reason that Post Traumatic Stress Disorder becomes persistent is because individuals process a trauma in a way that leads to a sense of serious, current threat. The sense of threat arises as a consequence of: (1) excessively negative appraisals of the trauma and/or its sequelae and (2) a disturbance of autobiographical memory characterised by poor elaboration and contextualisation, strong associative memory and strong perceptual priming. There is evidence for intrusive imagery in people with SPOV that may be experienced as "flashbacks" or "flashforwards" (Price et al., 2012). The sensory impressions of vomiting in a panic may be experienced without a time perspective and context rather than being memories from the past. The fear and disgust (including the physical reactions) accompanying them may be the same as those experienced at the time of the original vomiting. People with SPOV may also lack the awareness of remembering what usually characterizes autobiographical memories or ones that are situationally accessible memories (Brewin, Hunter, Carroll, & Tata, 1996). Situationally Accessible memories (SAMS) are not deliberately retrievable like verbally accessible memories (VAMS) are, they are automatic and cue driven. The memories of vomiting in the SPOV group may be predominantly laid down as SAMS and are therefore not deliberately retrievable, accounting for the lower number of reported memories of vomiting by the SPOV group after the onset of the phobia. This suggests that following reliving some vomiting experiences, their memory for prior experiences may increase. For example, following reliving for PTSD people often remember parts of the trauma that were not previously accessible (Ehlers & Clark, 2000; Grey, Young, & Holmes, 2002).

Some of the distress in SPOV may be related to comorbidity or an underlying disorder, such as panic disorder and social anxiety. Thus they may share a common general anxiety vulnerability (Boschen, 2007). A cognitive behavioural formulation of SPOV (Boschen, 2007; Veale, 2009) highlights processes that occur in SPOV, which are similar to the ones occurring in panic disorder (Clark & Salkovskis, 2009), and contribute to the maintenance of the disorders. These include a catastrophic misinterpretation of certain bodily sensations (gastrointestinal symptoms in SPOV, and palpitations, breathlessness and dizziness in panic disorder), hypervigilance to the presence of interoceptive cues and others at risk of vomiting, and avoidant behaviour, the latter maintaining the patients' negative beliefs because the non-occurrence of the catastrophe is attributed to avoiding certain stimuli. A developmental model of aversive memories of vomiting with poor elaboration and contextualisation, strong associative memory and strong perceptual priming being reactivated may be added to our understanding of the development of SPOV and possibly other phobias or obsessive compulsive disorder.

5.3. Clinical implications

The current study provides evidence that a person with SPOV may be very slightly successful in reducing the frequency of

vomiting, and this may open a discussion between therapist and client on the costs of avoidance and checking behaviour to the individual.

During engagement in therapy, it may be helpful to make an emotional link with past memories of vomiting. Introducing a developmental model in which memories of vomiting from the past are being re-activated and fused with the current experience and now lack a time perspective and context may also be helpful to facilitate the client's understanding of their symptoms. This would also support the use of imagery re-scripting for aversive memories to both place such memories in their context and defuse them from their associations.

Declaration of interest

None.

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