

An Exploration of Prospective Imagery: The Impact of Future Events Scale

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Background: Mental imagery of the future has clear clinical importance, although little is known about intrusive, prospective imagery of personally-relevant events. Currently, no measure is available to assess this. **Aims:** The Impact of Future Events Scale (IFES) was created to assess the impact of intrusive, prospective, personally-relevant imagery. It was examined in relation to predictions about dysphoria. **Method:** To form the IFES, the IES-R (a measure of the impact of a past traumatic event on posttraumatic stress disorder symptomatology such as intrusive re-experiencing) was adapted item-by-item to assess intrusive “pre-experiencing” and imagery of specific, *future* events. Participants ($N = 75$) completed the IFES and assessments of depression, anxiety and general imagery use. **Results:** As predicted, the IFES significantly and positively correlated with depression scores. Analyses using subgroups of non-dysphoric and mild-dysphoric participants confirmed that the mild-dysphoric group reported significantly higher IFES scores, indicating higher levels of pre-experiencing of the future and related hyperarousal and avoidance. **Conclusions:** IFES provides a measure of the impact of “pre-experiencing” in the form of intrusive prospective, personally-relevant imagery, with sensitivity to group differences on the basis of depression scores. Further research is required to extend these findings into clinical depression and other psychopathological conditions.

Keywords: Mental imagery, prospection, depression, future thinking, intrusion.

Introduction

Intrusive, prospective imagery is the experience of involuntary, distressing mental images of events in the future that come to mind unbidden. Whereas people who have experienced a traumatic event may “re-experience” the trauma in symptoms such as intrusive memories and flashbacks, imagined events in the future can be “pre-experienced” (Schacter, Addis and Buckner, 2007) in a similarly involuntary, and at times, distressing way. Difficulties with prospective imagery may occur across a variety of disorders though this has been little studied. For example, a deficit in positive prospective imagery has been associated with unipolar depression (Holmes, Lang, Moulds and Steele, 2008; Williams et al., 1996). In contrast, an *excess* of prospective imagery has been associated with bipolar disorder and is predicted to contribute to the pattern of mood fluctuation that characterises the disorder (Holmes, Geddes, Colom and Goodwin, 2008).

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We propose that future orientated imagery may be important for several reasons. First, imagery has been demonstrated to have a stronger impact on emotion than verbal thought (Holmes, Lang and Shah, 2009; Holmes and Mathews, 2005; Holmes, Mathews, Mackintosh and Dalgleish, 2008) and therefore may be highly relevant for understanding emotional disturbance. We have proposed that imagery can amplify mood disturbance, for example mood swings in bipolar disorder (Holmes, Geddes et al., 2008). Second, *prospective* imagery is causal in determining future behaviour – imagining oneself completing a future event can lead to significantly greater likelihood of this event being completed in real-life (Libby, Shaeffer, Eibach and Slemmer, 2007). In Libby et al.'s study, people who imagined voting in an election from a third-person perspective were more likely to do so than those who used a first-person perspective. The impact of imaginal simulation on increasing behavioural actions may be of particular concern if the action is negative. For example, Holmes et al. (2007) have demonstrated that, in depression, the perceived “realness” of intrusive, prospective imagery of the act of suicide (“suicidal flashforwards”) has been found to be associated with the severity of suicidal ideation on the Beck Scale for Suicide Ideation (Beck and Steer, 1991), which holds predictive validity for suicidality (Beck, Brown and Steer, 1997; Beck and Steer, 1991).

Finally, mental imagery has already provided a distinct and critical Cognitive Behaviour Therapy (CBT) treatment target in conditions already associated with intrusive imagery, such as PTSD (Ehlers and Clark, 2000) and social phobia (Clark et al., 2006). Exposure to, and cognitive restructuring of, flashback images is critical to trauma-focused PTSD therapy (National Institute for Health and Clinical Excellence, 2005). In social phobia, behavioural experiments, video feedback and imagery restructuring are all CBT techniques for working with negative images of self (e.g. Hirsch, Clark, Mathews and Williams, 2003). Imagery thus offers a potential transdiagnostic treatment candidate in mood disturbance.

Deficits in generating specific images of the future have been demonstrated in both schizophrenia and depression using an adaptation of the autobiographical memory test (AMT: a well used measure of overgeneral memory) involving future cueing (D’Argembeau, Raffard and Van der Linden, 2008; Williams et al., 1996). The task used required participants to imagine future events using short sentences as specific cues (e.g. “a situation in which you feel guilty about something”; “a situation in which someone smiles at you”). Williams et al. (1996) found that deficits in being able to recall specific memories were associated with deficits in generating specific future images. Other research (Holmes, Lang et al., 2008; Stöber, 2000) has used ratings for the “vividness” of images generated in response to positive and negative cues on a prospective imagery task as designed and utilized by MacLeod, Tata, Kentish and Jacobsen (1997). Items included events such as “you will do well on your course” and “you will have a disagreement with a good friend”. These studies have found that high depression scores were associated with a reduction in the ability to generate *positive* prospective imagery. However, this effect appears specific to positive information since the generation of *negative* prospective imagery was not associated with elevated depression scores (Holmes, Lang et al., 2008; Stöber, 2000). Further, it is noted that these studies have investigated deliberately generated rather than involuntarily generated prospective imagery. Cognitive models of memory (e.g. Conway and Pleydell-Pearce, 2000) make an important distinction between voluntary and involuntary memories. A voluntary memory, for example, could include deliberately recalling

a stressful event, whereas an involuntary memory would be a spontaneous flashback of that event. These two forms of memory can show independence (Brewin and Holmes, 2003; Conway and Pleydell-Pearce, 2000; Ehlers and Clark, 2000). Depression is associated with high rates of distressing, intrusive involuntary memories (Birrer, Michael and Munsch, 2007). We therefore predict higher levels of intrusive, involuntary future imagery in depression compared to non-depressed participants, due to a reduced ability to control *involuntary* intrusions.

In depression, involuntary intrusive imagery for past negative events (e.g. previously experienced trauma) and the negative appraisal of such intrusions has been suggested to be a maintenance factor in the disorder (Starr and Moulds, 2006). However, the role of intrusive, involuntary imagery of future events in depression has yet to be explored. The findings discussed above for prospective imagery in depression (Holmes, Lang et al., 2008; Stöber, 2000; Williams et al., 1996) relate to laboratory procedures designed to elicit deliberate voluntary imagery of the future using constrained, specific word cues. It would be unwise to generalize findings from these tasks to spontaneous, intrusive imagery as experienced in the real-world for several reasons. These laboratory tasks are known to be subject to transient mood effects, and participant ratings for probability of the imagined event occurring are lower than for personally-relevant salient future events (Hepburn, Barnhofer and Williams, 2009). Finally, it has been argued that individuals may “over-ride” their normal response patterns when using word cueing tasks to generate specific events in the laboratory setting, thus limiting their real-world applicability and validity (Anderson and Dewhurst, 2009).

There is currently no available measure to adequately assess intrusive, involuntary prospective imagery. We suggest existing measures of mental imagery need to be tailored to best measure aspects of imagery predicted to be relevant in psychopathology. Imagery is a multifaceted domain (Pearson, 2001); thus general experimental psychology measures of imagery (e.g. general imagery use as measured by the Spontaneous Use of Imagery Questionnaire) and deliberate imagery generation (e.g. via the AMT) need to be complemented with other measures that tap into how intrusive imagery may manifest in psychological disorders, such as when images “flash-forward” unbidden into mind (Holmes, Geddes et al., 2008).

The Impact of Event Scale – Revised (IES-R; Weiss and Marmar, 1997) is a widely-used self-report measure used after a traumatic event to assess the PTSD symptoms of re-experiencing (e.g. intrusive imagery and flashbacks) and related avoidance and hyperarousal (Horowitz, Wilner and Alvarez, 1979; Sundin and Horowitz, 2002; Weiss and Marmar, 1997). In the current study, the Impact of Future Events Scale (IFES) was designed to assess intrusive, prospective imagery, based on an item-by-item adaptation of the IES-R.

This paper reports the development of the IFES and its use in participants categorized into two analogue subsamples for depression (non-dysphoric and mild-dysphoric). This approach is established as an important first step in experimental psychopathology (e.g. Grant and Beck, 2006). We predicted that the impact of intrusive, prospective imagery for the future, as assessed by the IFES, would significantly and positively correlate with current dysphoria (BDI-II) score in the entire sample, independent of general imagery use and trait anxiety. We also predicted that higher IFES scores would be seen in the mild-dysphoric group compared to the non-dysphoric group.

Method

Measures

Impact of Future Events Scale (IFES). The IES-R was specifically adapted to create the IFES in this study. Rather than identify one previous traumatic event as in the IES-R, the IFES required participants to identify three future events and indicate whether each event was “positive” or “negative”. In scoring the IFES, the number of negative events per individual is summed. The maximum score is three.

Participants were provided with the instructions “*Below is a list of comments made by people about imagining events in the future. Please read each item, indicating how frequently each comment was true for you during the past 7 days due to imagining the future*”. Each item on the IES-R was re-worded so to assess response to prospective, rather than past, intrusive imagery for real events. For example, the original item “Pictures of it <the past> popped into my mind”, was reworded to “Pictures about the future popped into my mind”. To assess hyperarousal due to imagining the future (which, unlike the IES which refers only to trauma, might include positive as well as negative events for a given participant), an additional two questions were added: “I felt elated and optimistic” and “I felt energetic and excitable”. Note that even nominally positive aspects of hyperarousal (i.e. elation and excitability) may be negative when associated with a pre-occupation with the future and goal pursuit such as seen in hypomanic and manic states (Johnson, 2005). The IFES therefore consisted of 24-items, rated on a scale from 0 (“not at all”) to 4 (“extremely”), see Appendix 1.

Scoring for the IFES is calculated as per the IES-R: a summation of the total score of responses (Horowitz et al., 1979; Weiss and Marmar, 1997).

Beck Depression Inventory-second edition. (BDI-II; Beck, Steer and Brown, 1996). The BDI-II was used to measure depressive symptoms. Participants responded to 21 depression-related questions with respect to how they had been feeling during the past 2 weeks. The BDI-II has high validity (Beck, Steer and Garbin, 1988) as well as high internal consistency with an alpha level of 0.9 (Beck, Steer, Ball and Ranieri, 1996). One week test-retest reliability is also high, $r = 0.93$ (Beck et al., 1996).

State-Trait Anxiety Inventory – Trait version. (STAI-T; Spielberger, Gorsuch, Lushene, Vagg and Jacobs, 1983). The STAI-T was used to measure trait anxiety. STAI-T consists of 20 anxiety-related items on which participants rated how they “generally feel” on a 4-point scale: almost never, sometimes, often, or always. The STAI-T is widely used with satisfactory reliability and validity (Spielberger et al., 1983).

Spontaneous Use of Imagery Scale. (SUIS; Reisberg, Pearson and Kosslyn, 2003). SUIS is a 12-item measure of general imagery use in day to day situations, for example: “When I think about visiting a relative, I almost always have a clear mental picture of him or her”. Participants rated each item on a 5-point scale, anchored with the instructions “*If a description is always completely appropriate, please write 5; if it is never appropriate, write 1; if it is appropriate about half of the time, write 3; and use the other numbers accordingly.*” A significant relationship between scores on the SUIS and the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973) has been demonstrated with high-vividness imagers reporting higher use of imagery than low-vividness imagers (Reisberg et al., 2003), suggesting they measure a related construct.

Table 1. Means and Standard Deviations for both non-dysphoric and mild-dysphoric groups

	Non-dysphoric (<i>N</i> = 35)		Mild-dysphoric (<i>N</i> = 19)	
	M	SD	M	SD
BDI-II	1.49	1.29	11.00	2.92
STAI	32.91	7.54	41.16	8.03
SUIS	39.37	8.8	39.37	8.73
IFES				
Negative Events	0.63	0.65	0.95	0.91
IFES				
Total Score	4.46	8.37	14.36	21.87

Note: BDI-II = Beck Depression Inventory; STAI = State Trait Anxiety Inventory – Trait; SUIS = Spontaneous Use of Imagery Scale; IFES = Impact of Future Events Scale

Participants and procedure

Ethical approval was obtained and all participants provided written informed consent. Participants (*N* = 75; 34 males and 41 females) were students or members of the general public recruited via advertisements placed online, at two university campuses and in the local community. Mean age was 27.3 years (*SD* = 9.9).

A subgroup of participants were categorized on the basis of BDI-II scores (e.g. Holmes, Lang et al., 2008) as currently non-dysphoric (with a BDI-II score of 4 or less, *n* = 35) and mild dysphoric (with a BDI-II score of 8 or greater, *n* = 19) in order to maximize sensitivity for detecting low mood in a non-clinical sample (e.g. Sprinkle et al., 2002; Wells and Beevers, in press).

Results

Inspection of the individual events on the IFES confirmed participants correctly reported discrete, specific events they had been imagining over the past 7 days. Examples included, “losing friends”, “meeting someone tonight” and “my grandmother’s terminal illness”. No participant reported difficulty completing the measure, or provided incomplete or non-events. All responses were credible future events and no responses were overtly past events.

As predicted, IFES total score significantly and positively correlated with BDI-II in the total sample, although with a low correlation coefficient, $r(73) = .26, p = .02$. No statistically significant correlations were seen between IFES score and STAI-T, $r(73) = .12, p = .31$, or general imagery use, $r(73) = .09, p = .44$. Partial correlations confirmed that the correlation between IFES and BDI-II remained significant when controlling for STAI-T, $r(72) = .24, p = .04$ and for SUIS, $r(72) = .26, p = .03$.

When split by non-dysphoric/mild-dysphoric subgroup, no differences were seen between age, $t(52) = 0.71, p = .48$, or gender, $\chi^2(1, N = 54) = .43, p = .51$. No significant differences were seen for general imagery use (SUIS) $t(52) = 0.001, p = .99$.

As predicted, comparison between the non-dysphoric versus mild-dysphoric subgroups confirmed there was a significant difference between total IFES score, with higher scores in the mild-dysphoric group, $t(52) = 2.39, p = .021, d = .65$. There was no significant difference

between the two groups in terms of the mean number of IFES negative events, $\chi^2(3, N = 54) = 3.78, p = .29$.

Discussion

The IFES was developed for the current study and demonstrated utility to measure the impact of “pre-experiencing” in the form of intrusive, prospective imagery of personally-relevant events. Findings confirmed two core predictions relating to dysphoria, thus demonstrating sensitivity to mild but clinically-relevant phenomena. First, the prediction of a significant correlation between higher IFES scores and BDI-II score was confirmed. Second, as predicted, analyses of the non-dysphoric and mild-dysphoric subgroups confirmed statistically significant greater impact of intrusive, prospective imagery in the mild-dysphoric participants.

In demonstrating increased impact of intrusive, prospective and personally-relevant imagery, these data provide a complementary extension of previous findings assessing responses to deliberately generated, non-personally relevant images in response to specific word cues in depression. Specifically, these data suggest that dysphoria is associated with greater intrusive imagining of personally-relevant future events, in comparison to non-dysphoric participants. Further research is required to establish whether our findings are in accordance with predictions that an overriding focus on negative (rather than positive) imagery may be a mechanism for maintenance of depressed mood (e.g. Holmes, Lang and Deeprose, 2009; Holmes, Lang et al., 2008; MacLeod et al., 1997; Starr and Moulds, 2006). Given the powerful effect of mental imagery on emotion (Holmes et al., 2009; Holmes and Mathews, 2005; Holmes, Mathews et al., 2008), we predict that intrusive negative mental imagery of the future may be particularly toxic in this way. The interplay between mental imagery and verbal thought is also worthy of exploration. In generalized anxiety disorder, Borkovec and colleagues have proposed that during worry, verbal thought is used to avoid emotional and physiological arousal associated with distressing mental imagery (Borkovec, Alcaine and Behar, 2001). Therefore the focus has typically been on verbal thought, which is unsurprising given its predominance over imagery (Freeston, Dugas and Ladouceur, 1996). IFES may provide one tool for use in exploring the impact of prospective mental imagery within worry, for example in the context of generalized anxiety disorder and other anxiety-based psychological disorders.

In conclusion, the data suggest that IFES provides a clinically relevant measure for assessing the impact of “pre-experiencing” in the form of intrusive prospective, personally-relevant imagery. Further investigations are required to extend findings into clinical depression and to explore the psychometric properties of the IFES. We also suggest this measure might be useful in exploring the impact of intrusive, prospective imagery in a range of psychopathological conditions, including bipolar disorder where it is predicted to be problematic (Holmes, Geddes et al., 2008).

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Appendix 1

Please identify **three future events** which you have been thinking about by imagining over the past 7 days (e.g. positive or stressful life events). For each event, please indicate whether your imagining of it was positive or negative by circling the appropriate response below.

1. _____ (Positive/Negative)
2. _____ (Positive/Negative)
3. _____ (Positive/Negative)

Below is a list of comments made by people about imagining events in the future. Please read each item, indicating how frequently each comment was true for you during the past 7 days due to imagining the future. If they did not occur during that time, please circle the “not at all” answer.

Please circle the answer closest to the way you have felt about future life events over the past 7 days		Not at all	A little bit	Moderately	Quite a bit	Extremely
1.	I believed my thoughts about the future would definitely happen and would become real	0	1	2	3	4
2.	I had trouble staying asleep	0	1	2	3	4
3.	Other things prompted me to think about the future	0	1	2	3	4
4.	I felt irritable and angry	0	1	2	3	4
5.	I avoided letting myself get emotional when I thought about the future or was reminded about it	0	1	2	3	4
6.	I thought about the future when I didn't mean to	0	1	2	3	4
7.	Any reminders evoked feelings about the future	0	1	2	3	4
8.	I stayed away from reminders of the future	0	1	2	3	4
9.	Pictures about the future popped into my mind	0	1	2	3	4
10.	I was jumpy and easily startled	0	1	2	3	4
11.	I tried not to think about the future	0	1	2	3	4
12.	I was aware that I had a lot of feelings about the future, but I didn't deal with them	0	1	2	3	4
13.	My feelings about the future were kind of numb	0	1	2	3	4
14.	I found myself acting or feeling like it was really happening	0	1	2	3	4
15.	I had trouble falling asleep	0	1	2	3	4
16.	I had waves of strong feelings about the future	0	1	2	3	4
17.	I tried to remove thoughts of the future from my mind	0	1	2	3	4
18.	I had trouble concentrating	0	1	2	3	4
19.	Reminders of the future caused me to have physical reactions, such as sweating, faster breathing, or a racing heart	0	1	2	3	4
20.	I had dreams about the future	0	1	2	3	4
21.	I felt watchful and alert	0	1	2	3	4
22.	I tried not to talk about the future	0	1	2	3	4
23.	I felt energetic and excitable	0	1	2	3	4
24.	I felt elated and optimistic	0	1	2	3	4