Establishing the Attention-Distractibility trait

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Failures to focus attention will impact any task engagement (e.g. at work, education, driving, etc.). At the clinical end, distractibility is a diagnostic criterion of Attention-Deficit Hyperactivity Disorder (ADHD). Here we examined whether inability to maintain attention focus varies in the overall population in a form of an Attention-Distractibility trait. To test this we administered an ADHD diagnostic tool to a healthy sample and assessed the relationship with task distraction. ADHD symptoms significantly predicted distractor interference on RT in letter search and name classification tasks, as long as the distractors were irrelevant (cartoon-images), rather than relevant (when the cartoon distractors were made response-congruent or incongruent with target names). Higher perceptual load in the task eliminated distraction for all people irrespective of ADHD scores. These findings suggest an Attention-Distractibility trait that that confers vulnerability to irrelevant distraction, and can be remedied by increased level of perceptual load in the task.

Key-words: Attention, Distraction, ADHD, perceptual load, personality traits

Establishing the Attention-Distractibility Trait

Focused attention is vital for all information processing, from the earliest stages of visual perception (including information that remains subliminal, e.g. Bahrami, et al., 2008) to encoding into memory (e.g. Jenkins, Lavie & Driver, 2005) and control over response selection (e.g. Lavie et al. 2004). It comes as no surprise therefore that inability to focus attention in the face of irrelevant distractions can lead to detrimental effects on task performance and behaviour. Indeed, individual differences studies have established that people who report greater frequency of attention failures are at increased risk of various accidents and task failures, ranging from reduced efficiency in the workplace (Wallace & Vodanovich, 2003) and potentially costly errors (e.g. failing to save work while computing; Jones & Martin, 2003), to serious accidents (e.g., car accidents or serious falls; Arthur & Doverspike, 1992; Larson et al, 1997; Larson & Merritt, 1991).

The most extreme manifestations of inattention are seen in the clinical syndrome of Attention Deficit Hyperactivity Disorder (ADHD): a neurodevelopmental psychiatric disorder involving two major symptom categories of inattentive and hyperactive-impulsive behaviours. Indeed being “Easily distracted by extraneous stimuli” (DSM-V) is a clinical diagnostic symptom for ADHD and the inattentive category as a whole persists into adulthood more commonly than hyperactive-impulsive symptoms (Wilens, Faraone & Biederman, 2004). This raises the important hypothesis of an underlying ‘Attention-Distractibility trait’ that confers vulnerability to distraction across the general population and at the clinical end of the spectrum is manifested as ADHD.

In the present research we sought to establish and index the putative Attention-Distractibility trait by assessing whether the magnitude of ADHD symptomology in a large non-clinical sample is correlated with the level of irrelevant distraction in an attention task. Since ADHD diagnosis is typically made during childhood, and adult diagnosis requires that symptoms have been present since childhood, we requested the adult sample to report the degree to which they had experienced symptoms of ADHD during childhood, using the ‘Childhood symptoms scale – self-report form’ (Barkley & Murphy, 1998). We then examined whether these symptoms correlate with the magnitude of irrelevant distractor interference effects on task performance using the ‘irrelevant distractor task’ (Forster & Lavie, 2008a; 2008b).

The irrelevant distractor task is designed to measure distraction by stimuli that are entirely irrelevant to the task at hand, in order to capture the type of irrelevant distractions that appear to reflect a true attention failure. For example, being distracted by noticing an interesting-looking person passing by, while trying to read some work-related material. Similarly, the irrelevant distractor task assesses performance costs of a letter search task (e.g. slowing down of the search reaction time (RT)) produced by colorful cartoon images that are presented in the periphery and are thus entirely irrelevant to the letter search task (e.g. in terms of visual appearance, meaning and location). Note that given the irrelevance of the distractor to the task, the interference effect does not depend on the specific nature of the task, and has indeed been generalized across several different tasks (Forster & Lavie 2008; 2011, 2013). The irrelevant distraction task thus provides a fairly robust index of distractibility, reflecting a fundamental focused attention failure.

Moreover, other measures of distraction using response-competition tasks have not always shown increased distractor interference in ADHD (e.g., Albrecht et al., 2008; Booth et al., 2007; Brodeur & Pond, 2001; Chan et al., 2009; Chang et al., 2009; Guerts et al.; 2008; Hermann et al., 2010; Huang-Pollock et al., 2005; Lundervold et al., 2011; McLoughlin et al., 2009; Wild-wall et al., 2009), while a recent study using the irrelevant distractor task revealed strikingly increased distractor interference in adults diagnosed with ADHD compared to age-matched controls (Forster et al., 2013). Thus we anticipated that the irrelevant distractor task would be a more sensitive measure of the Attention-Distractibility trait than the response-competition task.

In addition to establishing a measure of the Attention-Distractibility trait we also examined whether this trait involves reduced ability to improve attention focus in conditions of higher perceptual load. The level of perceptual load in the task is a well-established, powerful determinant of distractor processing (e.g. Lavie 1995, 2005). High perceptual load in the task reduces or even eliminates distraction because attentional resources are more fully engaged in processing the relevant task stimuli. Would individuals prone to attention deficits also fail to engage more resources in tasks of higher perceptual load? Or would perceptual load be an effective "remedy" for all people alike (e.g. Forster & Lavie, 2007; Forster et al., 2013).

To test these questions we requested a healthy sample of participants to perform a visual search task involving either low (target and non-targets are dissimilar to each other) or high perceptual load (similar target and non-target letters); while instructed to ignore any irrelevant distractors. On 25% of the trials an irrelevant colorful cartoon image appeared outside the search array. Irrelevant distraction was measured thorough the RT interference in the presence versus absence of this distractor. The magnitude of childhood ADHD symptoms was assessed by administering the ADHD ‘Childhood symptoms scale – self-report form’ (Barkley & Murphy, 1998).

Experiment 1

Method

All research reported here was approved by the University College London (UCL) Research Ethics Committee, and carried out in accordance with the provisions of the World Medical Association Declaration of Helsinki.

Participants. In keeping with typical sample sizes in this field, we approached an entire class of around 110 students for participation in each experiment (a different class was approached for Experiment 1 than for Experiment 2). All willing participants were tested before data analysis commenced. Ninety-three students (twelve males), aged between 18 and 39 (*M* = 20, s.d. = 3.03), participated in Experiment 1. The results of 16 participants (one male) with either RTs more than 2 SD from the mean or chance level performance in the high load condition (< 55% accuracy) were excluded from the analysis (note 1). None of the participants reported a prior diagnosis of ADHD.

Stimuli and procedure. All stimuli were created and run using E-Prime program version 1.1, on IBM compatible PC computers with 15” monitors. A viewing distance of approximately 57cm was maintained using a string attached with masking tape to the head of the participant. Each trial of the distractor task commenced with a 500ms fixation, followed immediately by the stimulus display (presented for 100ms – see Figure 1a). This consisted of a search set of six letters arranged in a circular formation (radius subtending 1.6° degrees of visual angle). One of the six letters was either an X or an N (subtending 0.6° by 0.4°).This was the target letter - participants were asked to respond as fast as possible whilst being accurate, using the numerical keypad to press the '0' key if the target was X and the '2' key if the target was an N. In the low load condition the five non-target letters were small Os (subtending 0.15° by 0.12° of visual angle), whereas in the high load condition the non-target letters were heterogeneous angular letters of the same dimensions as the target, selected at random from the set K, V, W, Z, M, H. All letter stimuli were presented in grey on a black background. A tone sounded if an incorrect response was made or if no response was made within a 2000ms time window.

On 75% of trials the search set appeared alone – this was the "no distractor" baseline condition. On the remaining 25% of trials an entirely task-irrelevant distractor was presented either above or below the target search set, at 4.6° from fixation with a minimum of 0.6 ° edge to edge from nearest letter stimulus. The distractor was a full-colour image of one of six possible cartoon characters: Superman, Spiderman, Pikachu, Spongebob Squarepants, Mickey Mouse, Donald Duck. The distractor subtended 2.8° to 4° vertically by 2.8 to 3.2° horizontally. The distractors remained onscreen until a response was made. Target identity, target position, distractor position, load and their combinations were fully counterbalanced across blocks.

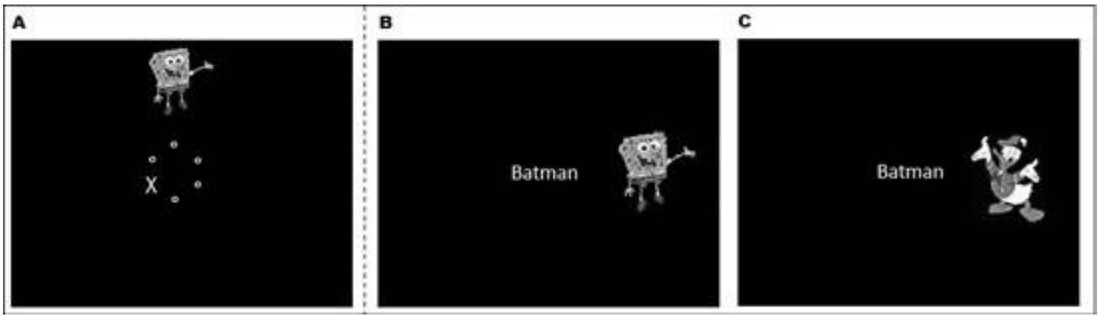

Figure 1. Stimulus display for the distraction task in Experiment 1 (A) and Experiment 2 (B, C). In Experiment 1 (panel A) participants searched for a target letter in the letter circle and an irrelevant distractor cartoon appeared either above or below the letter circle. In Experiment 2 participants classified a name in the display center as either a superhero or a Disney character name. An irrelevant distractor (B) or a response competition distractor (C) appeared on either the left or right of the display.

Participants first completed six practice trials (three for each load condition) with all stimuli remaining on screen until response, followed by 24 practice trials (twelve for each load condition) with the same durations used in the main experimental trials. If a participant failed to achieve an overall accuracy level of at least 65% they were given further instructions and repeated the practice trials. Participants then completed eight 48 trial blocks of the main task, with load manipulated between blocks in the order ABBAABBA or BAABBAAB (counterbalanced between participants). The first three trials in each block, which were always “no distractor” trials, were intended as warm-up trials and therefore excluded from analysis.

Finally, participants rated the extent to which they had experienced symptoms of ADHD during childhood on the “Childhood symptoms scale – self-report form” (Barkley & Murphy, 1998), administered via computer. This is an 18 item form on which participants are asked to rate on a Likert type scale of 0-3 (with 0 reflecting “never or rarely” and 3 reflecting “very often”) how often they experienced symptoms of ADHD when they were a child aged 5-12. Each of the 18 items is based closely on one of the 18 DSM-IV diagnostic criteria for ADHD, so that nine of the items correspond to the inattentive subtype and nine of the items correspond to the hyperactive-impulsive subtype.

Barkley and Murphy (1998) suggest two methods for calculating scores: ‘Summary scores’, which are the sum of each response (i.e. adding “1” to the score for every response of “1” and “3” for every response of “3” etc.) and ‘symptom count’ which involves counting the number of items with a response of 2 or 3. Summary scores were used in the present study to index childhood ADHD symptoms as these provide a more continuous measure and have greater sensitivity to capture sub-clinical variation in symptoms (i.e. reports of ‘1’ versus ‘0’).

Results

Distractor condition			
	Irrelevant distractor (ID)	No distractor (ND)	ID-ND
Low load			
RT (ms)	516 (6)	491 (6)	25
% Error	*14%*	*13%*	
High load			
RT (ms)	*692 (13)*	*699 (14)*	-7
%Error	*29%*	*26%*	

Table 1: Mean RTs and Error rates in each condition of distractor presence and load (SE in parentheses).

As is standard using the irrelevant distractor task, only correct responses were included in RT analysis in this paper. RTs under 100ms were presumed to be anticipatory and therefore excluded from all analyses. To reduce noise in the data all RTs over 1500ms (accounting < 0.5% all responses across participants) were also excluded from all analyses. Mean RTs and percentage error rates in each condition of load and distractor can be seen in Table 1.

Overall group RT. Mean RTs were entered into a 2 X 2 repeated measures ANOVA with the factors of load and distractor condition. A significant main effect of distractor condition was found, reflecting slower performance in the presence versus absence of the distractor, F(1, 76) = 9.82, MSE = 637.73, p = .002, η^2_p = .114. In addition, a main effect of load, F(1, 76) = 283.00, MSE = 9998.94, p < .001, η^2_p = .788, confirmed that the manipulation of load was effective. As expected, there was an interaction between load and distractor condition, F (1, 76) = 42.18, MSE = 457.27, p < .001, η^2_p = .357, reflecting a significant reduction in the level of distractor interference under high load compared to low load. These results demonstrate that irrelevant distractors produce significant interference effects on task performance, in conditions of low load perceptual load, and that irrelevant distractor interference is significantly reduced under conditions of high perceptual load, in line with previous findings (Forster & Lavie, 2008a, Forster et al., 2013). We note that the reduced distractor interference under higher load was unlikely to be mediated by a larger effect of distraction by the neutral letters in the search array undermining the interference by the irrelevant yet salient cartoon distractor. If this was the case we would expect a positive correlation between the load effect on RT in the no-distractor condition (reflecting the strength of putative distraction by the neutral search letters) and distractor cost in the low load condition, because both would be mediated by the same distraction mechanism. However there was no such correlation, in fact, the trend was in the opposite direction, – r = -.133, p = .250. This is in line with the many previous findings of reduced distractor effect in conditions of high perceptual load that involve no increase in the relevant task set size (e.g. Lavie, 1995; Lavie et al. 2009; see Lavie, 2005; 2010 for reviews). These findings hence confirm the sensitivity of our distraction measure both to index irrelevant distractor interference effects and their modulation by perceptual load.

Individual differences. Our main research question concerned the relationship between ADHD symptoms and the magnitude of distractor interference effects. Given that high perceptual load eliminated the distractor interference effect (see Table 1), our individual differences analyses use the low load condition as our distraction index. To normalize the distractor interference effects across individual variations in overall reaction times, we calculated the percentage increase in the mean RT in the distractor present (P) compared to distractor absent (A) conditions (Mean RT (P-A)/ A). Percentage distractor interference was 5% on average (ranging from -3% to 19%). ADHD scores ranged between 1 and 38 (M = 13), with the mean score for symptoms relating to the inattention subtype being 6 (range 0-20) and the mean score for the hyperactive-impulsive subtype being 7 (range 0-27). In support of our proposal of an Attention-Distractibility trait, there was a significant correlation between childhood symptoms of ADHD and the magnitude of distractor interference, r(75) = .323, p = .004 (Figure 2a). Note that this correlation is found across the full range of scores, suggesting a continuous trait, rather than simply reflecting inflated distraction among those participants with a very high ADHD score. To further illustrate this point, we note that the correlation remains significant after excluding the only three participants with a score that appears to be in the clinical range for this scale (>34.4, e.g. Barkley and Murphy, 1998), r(72) = .355, p = .002. Examination of the scores for each ADHD subtype revealed the same pattern of results as was found for the overall ADHD scores. Scores on both subtypes correlated positively with the distractor interference RT cost: For the inattention subtype: r(75) = .319, p = .005; for the hyperactive-impulsive subtype, r(75) = .268, p = .019.

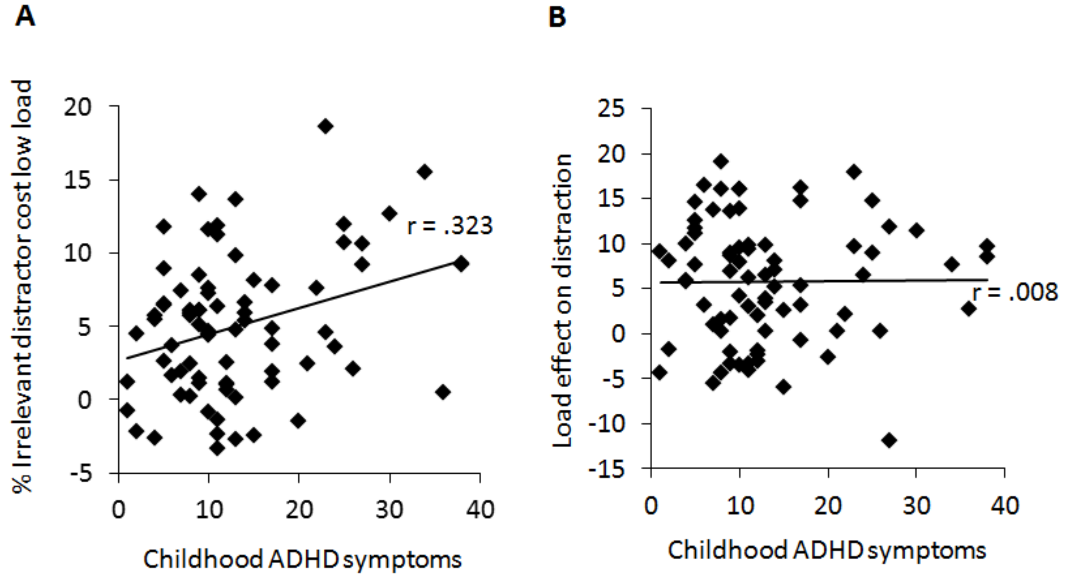

Figure 2: (A). In low load, % irrelevant distractor cost to RT (the percentage increase in mean RT between the irrelevant distractor present versus absent conditions) is positively related to childhood ADHD symptoms (total summary score on Barkley and Murphy's (1998) "Childhood symptoms scale – self-report form"). (B). The perceptual load effect on distraction (% irrelevant distractor costs in low minus high load) was not moderated by ADHD symptoms.

We next examined whether the effect of perceptual load on distraction is moderated by the ADHD scores. Individual magnitude of load effects on distraction (i.e. the subtraction of percentage distractor costs in high load from those in the low load conditions) was calculated for each participant and the correlation with ADHD scores computed. The findings showed no correlation with ADHD scores (r = .008, p >

.250), indicating that load was equally effective in reducing distractor interference for all individuals regardless of their ADHD scores (see Figure 2b, note 2).

Errors. Main effects of both load, $F(1, 76) = 185.02$, $MSE = 79.39$, $p < .001$, $\eta^2_p = .709$, and distractor condition, $F(1, 76) = 12.17$, $MSE = 29.93$, $p = .001$, $\eta^2_p = .138$, were found on percentage error rates in the overall group. These effects mirror the pattern of results found on the RT measure, reflecting more errors in the high load condition and in the presence of a distractor. The load by distractor condition interaction was not significant on the percentage error rates ($F(1, 76) = 1.61$, $MSE = 21.40$, $p = .208$, $\eta^2_p = .021$). There were no significant correlations between childhood ADHD symptoms and the magnitude of any effect of distractors or load on errors (all ps >.250).

Experiment 2

The results of Experiment 1 establish our irrelevant-distractor task as a sensitive index of individual differences in the likelihood of attention failures as measured with the ADHD diagnostic tool across the general population. We propose that our irrelevant distractor task is more sensitive than previous distraction measures to capture the Attention-Distractibility trait, because it measures failures to ignore distractors despite their utter irrelevance to the task. In contrast, the popular response-competition distractor measures assess interference from distractor items that are associated with target responses (compatible or incompatible with the correct target response on a given trial) and are thus task-related. Failures to ignore items that are task-related may reflect a more subtle attention deficit than that measured with

ADHD diagnostic tools. Task-relevance may thus be the key factor for a sensitive measure of the Attention-Distractibility trait.

However, apart from their task-irrelevance the cartoon images we presented were highly salient both in terms of visual appearance (e.g., being colourful complex images), familiarity, and meaning; and infrequent presentation (the latter is known in itself to enhance attention capture, Forster & Lavie, 2007). All these features are not characteristic of the distractors typically presented in response-competition tasks. These do not tend to be visually complex (e.g., letters or arrows) or salient, and appear on every trial.

To examine our proposal that task irrelevance is the key factor in measuring the Attention- Distractibility trait we therefore assessed the relationship between levels of distractor interference and rate of ADHD symptoms for irrelevant distractors and response-competition distractors that were matched in their salience, familiarity, meaning and frequency. Thus we presented cartoon images infrequently (20% of trials) either as response-competition distractors or response-irrelevant distractors during a speeded name classification task. As the distractors were now equated on all factors except response relevance this experiment could determine if this is the critical factor for measuring the Attention-Distractibility trait.

Method

Participants. One hundred and one UCL undergraduate students (81 females), aged between 18-22 (M = 18.94, S.D. = .92), participated in Experiment 2. Four of the participants reported having been previously diagnosed with ADHD, but were not taking any ADHD medication at the time of testing. The data of five participants were excluded from the analysis on the basis of either RT being more than 2 SDs greater than the mean or showing chance level (<55%) accuracy in any of the experimental conditions. A further 22 participants were excluded due to reporting having not recognized more than one cartoon distractor image in the post-test (note 2).

Stimuli and procedure. All stimuli and procedure was similar to Experiment 1, with the following exceptions. High load condition was not included. Each task display consisted of one of 12 possible target names, presented in grey on a black background. The target name was equally likely to be selected from six superheroes (Superman, Spiderman, Batman, Robin, Hulk, Wolverine) and six Disney characters (Mickey, Donald, Pluto, Pooh, Tigger, Piglet). The target name subtended 0.5 º vertically by 0.9˚-2.3º horizontally, and was presented with equal likelihood in one of six locations 0.3, 1.3, or 2.3 degrees of visual angle above or below fixation. Participants were asked to classify the name as referring to a superhero or a Disney character, pressing 0 for a superhero and 2 for a Disney character. Cartoon distractor images (subtending 3.8 º-5º by 2.4 º-3.8º) were presented either to the left of right of the target name (4.4˚ from fixation, minimum of 0.7º nearest edge to edge of target name). These distractors were equally likely to be either irrelevant to task responses (see Figure 1b), or compatible (e.g., an image of Mickey Mouse with the name Mickey Mouse), or incompatible (e.g., an image of Mickey Mouse with the name Spiderman, see also Figure 1c) with the target response. Each block consisted of 60 trials - 48 with no distractor present and 12 with a distractor (four for each distractor category). All stimuli remained onscreen until either a response was made or 2000 ms passed. A 90 ms beep sounded on incorrect or missed responses. Participants first completed 72 practice trials with no distractors, which were repeated until 65%

accuracy was reached, before completing six blocks of the main experiment. Finally, as the distinction between irrelevant distractors and response-competition distractors is dependent on the ability of participants to recognise and correctly classify the characters this was checked in a post-test at the end of the testing session: Following completion of the ADHD Questionnaire participants were presented with each of the distractor images presented in the experiment and asked to confirm whether they recognised the character prior to the experimental session, and to classify the image as being a superhero, Disney character, or other cartoon character (neither superhero nor Disney). This was followed with a computerised question asking participants to report by button press whether they had ever been diagnosed with ADHD, and if so whether they were currently taking any medication prescribed to treat ADHD.

Results

Mean overall classification accuracy in the post-test was 99%.

Distractor condition						
	Incompatible distractor	Compatible distractor	*I-C*	Irrelevant distractor	No distractor	*ID-ND*
RT (ms)	752 (12)	645 (9)	*107*	733 (11)	622 (8)	*112*
% Errors	20%	6%		11%	9%	

Table 2: Mean RTs (S.E. in parentheses) and percentage error rates in each distractor condition.

Mean RTs to correct responses and percentage error rates were entered into two repeated measures ANOVAs with the factor of distractor condition (incompatible, compatible, irrelevant, no distractor).

RTs. A main effect of distractor condition was found, F(3, 219) = 199.71, MSE = 1545.06, p < .001, η^2_p =.732. Planned comparisons revealed that, consistent with previous findings (e.g., Forster & Lavie, 2007; 2008), significant interference was found both with the presence of irrelevant distractors compared to the distractor absent condition, t(73) = 17.71, SEM = 6.33, p <.001, p < .001, and with the presence of incompatible versus compatible distractors, t(73) = 14.78, SEM = 7.26, p < .001. Note that similarly to Forster and Lavie (2008) the overall mean level of interference associated with response competition effects (i.e. incompatible versus compatible distractors) did not differ from the cost associated with the presence (vs. absence) of irrelevant distractors, t < 1. Thus any divergence in the extent to which these measures relate to ADHD symptoms cannot be attributed to a differences in the interference potency of the two distractor types.

Individual differences. Percentage irrelevant distractor interference effects ranged from 0.5% to 41% (M = 18%). ADHD scores ranged between 3 and 39 (M = 13.48), with a mean score of 6 for inattentive symptoms and 7 for hyperactive-impulsive symptoms. As in Experiment 1, the ADHD scores were positively correlated with the magnitude of percentage irrelevant distractor interference: r(72) =

.323, p = .005, two-tailed (see Figure 3). As in the previous experiment this correlation was found in relation to both inattentive symptoms, r(72) = .242, p = .038, and hyperactive-impulsive symptoms, r(72) = .329, p = .004.

Percentage response-competition interference effects ranged from -4% to 49% (M = 16%). In contrast to the pattern found with irrelevant distractor interference, there was no correlation of ADHD scores and the magnitude of percentage response-competition interference: r(72) = .034, p >.250, two-tailed.

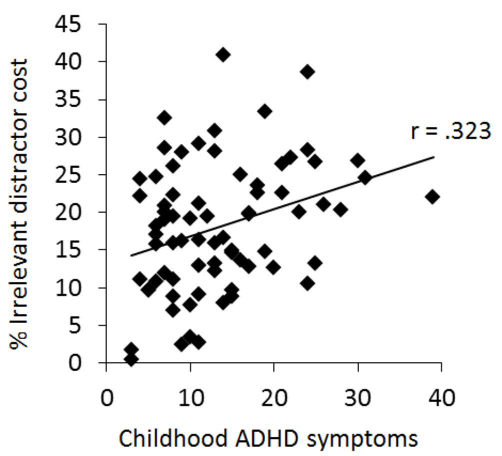

Figure 3. In Experiment 2, percentage irrelevant distractor cost (the percentage increase in RT between the irrelevant distractor present versus absent conditions) was positively related to childhood ADHD symptoms.

Errors. Across subjects the error data showed the same pattern as RT effects: A main effect of distractor condition, F(3, 219) = 89.54, p <.001, η^2_p = 551, reflecting significant interference from irrelevant distractors versus no distractor: t(73) =2.17, SEM = 0.76, p = .03, and from incompatible versus compatible distractors, t(73) =13.29, SEM = 1.03, p < 0.01. As in Experiment 1, there were no significant correlations on the error measure (all p. values > 0.250)

General Discussion

The present findings establish an Attention-Distractibility trait that confers vulnerability to irrelevant distraction across the general population and can be measured with the individual magnitude of distractor interference effects in our irrelevant-distractor task. In two experiments involving a total of 194 participants our findings demonstrate that the level of task interference produced by entirely irrelevant distractors is significantly correlated with the level of reported ADHD symptomology. These correlations reflected a trait-like continuum of variation across our sample, rather than being driven by the effects of high scoring participants. In addition, both inattentive and hyperactive-impulsive symptoms were significantly correlated with the magnitude of irrelevant distractor interference. This is consistent with the view that the full set of ADHD symptoms form a cohesive trait. Our findings thus appear to reflect this trait, rather than being simply due to the items specifically mentioning distraction. Overall the results suggest an Attention-Distractibility trait in the general population.

Our findings also clarify that a critical factor for producing a sensitive measure of the Attention-Distractibility trait is the presentation of distractors that are entirely irrelevant to the task. This is demonstrated by the dissociation found between the relation of ADHD symptoms to irrelevant distraction, and lack of such relation to task-related distraction in the form of response-competition effects. This dissociation was observed despite the response-competition distractors being meaningful and salient cartoon characters, similar to those used for irrelevant distractors.

Attention serves as the gateway to all information processing, therefore attention failures are known to have profound and wide-ranging impact on many mental functions (from perception to response selection and memory) and their underlying neural recruitment. Thus, establishing a high level of the Attention-Distractibility trait is critical for determining the efficiency with which individuals can use their neural and cognitive resources. Individuals that score high on the Attention-Distractibility trait are therefore likely to not make the best use of such resources, impacting their performance in a variety of tasks. For example, a student may fail to learn material from a lecture, not due to any memory deficit as such, but rather because they did not pay sufficient attention to allow encoding into memory.

Recognising and being able to measure the Attention-Distractibility trait may be an important step to understanding why some individuals are more vulnerable to inattentive accidents and failures. In our tasks, distraction led to slowing of up to 19% (Experiment 1) and 41% (Experiment 2) of performance speed for the most distractible participants. Such costs are likely to produce significant impairments in performance of daily-life tasks and activities. Indeed at the clinical end, ADHD has been associated with increased risk of accidents and failures, both in education, workplace and daily life (for example greater likelihood of car accidents, Faraone, 2000). Longitudinal studies find that parental and teacher ratings of ADHD symptoms predict a similar pattern of subsequent educational underachievement and traffic accidents (Fergusson, Lynskey & Horwood, 1997; Woodward, Fergusson & Horwood, 2000). Our study suggests that, rather than being limited to a distinct clinical population, the level of risk for these negative outcomes varies across the general population depending on their level of Attention-Distractibility trait. This trait may thus be a significant, yet an under-recognised, determinant of general wellbeing.

A recent finding that our irrelevant distractor task can also be used to predict the propensity to mind wandering (Forster and Lavie, 2013), suggests that vulnerability to both internal and external forms of irrelevant distraction share a common determinant. An interesting possibility is that this common determinant could be the Attention-Distractibility trait – predisposing individuals to increased distraction from both external and internal sources. Indeed ADHD symptoms have also been found to correlate with increased reports of mind wandering (Franklin et al, 2014; Shaw & Giambra, 1993.

We note that the finding that increased perceptual load in our task was equally effective in reducing interference from irrelevant distractors across all participants, irrespective of ADHD symptoms, has an encouraging implication that individuals with high levels of the Attention-Distractibility trait may find some respite from distraction during tasks with high perceptual demands. Finally, while so far we discussed the importance of recognizing the implications to those individuals that score high on the Attention-Distractibility trait, it is also important to identify those individuals that score low on the Attention-Distractibility trait and thus are able to focus attention effectively even in the face of salient yet irrelevant distractions. Future research addressing the potential differences in neural networks associated with the Attention-Distractibility trait, as well as any the impact of the trait on a variety of cognitive measures should prove important for further establishing this important trait.

Footnotes

1. We note that a similar patterns of results was found with these participants included, in particular the correlation between ADHD and distractor interference remained significant, r (93) = .241, p = .02.

2. We note that either including all participants in the analysis or excluding the participants that reported being diagnosed with ADHD did not change the pattern or significance of our results.

Author contributions

Both authors contributed to the study concept and design, as well as drafting the manuscript. Data collection and analysis was performed by S. Forster, with N. Lavie also contributing to the latter. Both authors approved the final version of the manuscript for submission.

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