On the relation between mind wandering, PTSD symptomology, and self-control.

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Abstract

In present study, we examined the association between mind wandering, PTSD symptomology, and self-control. In a large undergraduate sample (N = 2142), we assessed trait-level spontaneous and deliberate mind wandering, self-control (as indexed by the brief self-control scale; Tangney, et al., 2004), and PTSD symptomology using the PCL-5 scale. Results indicated that whereas spontaneous mind wandering was uniquely positively associated with PTSD symptomology, deliberate mind wandering and self-control were uniquely negatively associated with PTSD symptomology. These findings suggest that PTSD symptomology, and traumatic intrusions, may indeed reflect a similar mechanism as everyday mind wandering. Moreover, the unique association with self-control suggests that PTSD symptomology is characterized, not only by impairments in inhibiting unwanted thoughts specifically (as indexed by mind wandering), but also by impairments in inhibiting other unwanted behaviors.

Introduction

After a traumatic event, people commonly experience intrusive thoughts and memories. For most people, the frequency and severity of these traumatic intrusions subsides over time (Bonanno & Mancini, 2008; Mayou, Bryant, & Duthie, 1993; for a review, see Iyadurai, et al., 2019). However, persistent traumatic intrusions can be symptomatic of posttraumatic stress disorder (PTSD), a disabling anxiety disorder that develops in response to terrifying, life-threatening, or otherwise traumatic events (Brewin, 2014; Brewin & Holmes, 2003; Ehlers & Clark, 2000). Intrusions are considered symptomatic of PTSD when they are "recurrent, involuntary, and intrusive distressing memories of the traumatic event" (American Psychiatric Association, 2013). Though even when traumatic intrusions do not meet the full diagnostic criteria, such thoughts can still be associated with clinical impairment (sub-threshold PTSD; Zlotnick, Franklin, & Zimmerman, 2002). Accordingly, traumatic intrusions are typically considered to lie on a continuum with other non-clinical forms of involuntary thought (e.g., Berntsen, 2009; Bernstein, 2019; Iyadurai, et al., 2019; Meyer, et al., 2015).

Intrusive thoughts are central to PTSD symptomology because they can activate other symptoms of the disorder (Bryant et al., 2017; see also Haag, Robinaugh, Ehlers, & Kleim, 2017; Iyadurai, et al., 2019). For instance, experiencing a traumatic intrusion can cause emotional distress (Ehlers & Steil, 1995) and the distraction by internal thoughts can cause cognitive failures (e.g., Boals and Banks, 2012; Clark and Mackay, 2015; Pineles, et al., 2009) disrupting day-to-day functioning (e.g., Holmes et al., 2017). Predictably, intrusive thoughts characteristic of PTSD is associated with poor self-control (Walter et al., 2010) and, more specifically, impairments of inhibitory control (e.g., Andreson and Levy, 2009; Deguitis, et al., 2015; Bomyea and Lang, 2015; Verwoerd et al., 2009). This indicates that general deficits in control might amplify traumatic intrusions. Thus, it is important to understand what kinds of self-regulatory deficits might indicate heightened susceptibility to traumatic intrusions.

One potentially important (and relatively under-explored) factor is mind wandering, most often characterized as the orientation of attention toward internal thoughts and feelings (e.g., Smallwood &

Schooler, 2015; Smallwood et al., 2007). On the surface, mind wandering and intrusive thoughts (particularly those symptomatic of PTSD) appear intimately connected. Mind wandering, like intrusive thoughts, is associated with negative affect (Killingsworth & Gilbert, 2010), increased cognitive failures across different performance domains resulting in disrupted daily functioning (Szpunar, Khan, & Schacter, 2013; Risko et al., 2012; Knowles & Tay, 2002; Gil-Jardiné et al., 2017), and poor self-control (Moon et al., 2020; Phillips et al., 2016), particularly with shielding against distraction (Smallwood and Schooler, 2006) and worse sustained attention (Seli, Carriere, Levene, & Smilek, 2013; Seli, Cheyne, & Smilek, 2013). Moreover, neural evidence suggests overlapping mechanisms between mind wandering and PTSD-related thoughts. Both are associated with the default mode network (DMN), which is a set of brain regions that increase in functional connectivity during periods of internally-focused (typically self-oriented) thought (Andrews-Hanna 2012; Danckert and Merrifield, 2018; Buckner, Andrews-Hanna, and Schacter, 2008; Gusnard, Akbudak, Shulman, and Raichle, 2001; Mason et al. 2007; Raichle et al. 2001). Notably, mind wandering is associated with increased DMN activation (Christoff, Gordon, Smallwood, Smith, and Schooler, 2009; Gusnard et al. 2001; Mason et al. 2007; Stawarczyk et al. 2011), while PTSD symptomology is associated with decreased DMN activation (Terpou et al., 2020; Patriat, Birn, Keding, and Herringa, 2016; Sripada et al., 2012). However, recent work provides a more nuanced picture of the relationship between PTSD symptomology and DMN activity. Terpou et al. (2020) found that individuals diagnosed with PTSD demonstrated stronger functional connectivity between the DMN and midbrain periaqueductal gray (PAG) relative to healthy controls. The same pattern of functional connectivity between DMN and PAG is also observed in mind wandering (Kucyi, Salomons, & Davis, 2013).

Despite the neural and cognitive similarities between the two, there has been surprisingly little research investigating their potential relationship. Takarangi, Strange, and Lindsay (2014; 2016), using a behavioral trauma film paradigm, found that participants often lacked meta-awareness of trauma-related thoughts. Because mind wandering often occurs without meta-awareness (see Schooler et al., 2004), Takarangi et al. argued that their results provide a conceptual link between mind wandering and traumatic

intrusions. However, no work has yet examined directly the relationship between mind wandering and PTSD symptomology.

One issue with exploring this relationship is that mind wandering is considered a multi-dimensional construct encompassing a range of experiences with non-overlapping attributes (Seli et al., 2018). These different dimensions might differentially relate to intrusive thoughts characteristic of PTSD. Prior research has shown that mind wandering can occur either intentionally or unintentionally (Seli, Risko, and Smilek, 2016). These two forms of mind wandering are associated with different trait- and state-level variables both in the laboratory (e.g., Giambra, 1995; Seli, Cheyne, Xu, Purdon, and Smilek, 2015; Seli, Wammes, Risko, and Smilek, 2015) and in everyday life (e.g., Carriere, Seli, and Smilek, 2013; Seli, Carriere, and Smilek, 2015; Seli, Smallwood, Cheyne, and Smilek, 2015), and can be dissociated neurally (Golchert et. al., 2017). Some of these empirical dissociations are relevant to predicting potential relationships between mind wandering and PTSD. Unintentional mind wandering, for instance, is associated with self-control deficits (Isacescu et al., 2017; Phillips et al., 2016), increased distractibility, and lapses in task-attentiveness (Carriere et al., 2013; Seli, Carriere, and Smilek, 2015; Seli, et al., 2015). Intentional mind wandering, on the other hand, does not exhibit the same degree of executive dysfunction. Additionally, the tendency toward non-reactivity to internal experiences—a facet of mindfulness—is positively associated with intentional mind wandering and negatively associated with unintentional mind wandering. Taken together, unintentional mind wandering bears the hallmark of a control failure, an inability to maintain focused thought (McVay & Kane, 2010), while intentional mind wandering seems to reflect a successful exercise of cognitive control in directing attention internally (Carriere et al., 2013; O'Neill, et al. 2020; Seli, Carriere, & Smilek, 2015; Seli, Cheyne, Xu, Purdon, and Smilek, 2015; Seli, Risko, and Smilek, 2016).

We predict that PTSD symptomology will associate in different ways with these different kinds of mind wandering. Given the evidence listed above, we expect positive associations between unintentional mind wandering and traumatic intrusions due to potentially shared associations with deficits

in inhibitory control (Aupperle, Melrose, Stein, and Palaus., 2012; Deguitis, et al., 2015; Verwoerd et al., 2009, Bomyea et al., 2012) or regulatory control (Isacescu et al., 2016; Phillips et al., 2016). Intentional mind wandering, however, might relate to PTSD symptomology in two different ways. First, stronger tendency toward intentional mind wandering might rely on control processes that include *inhibiting* unintentional mind wandering (e.g., Brosowsky, Murray, Schooler, and Seli, under review). Insofar as we predict that PTSD symptomology will be *negatively* associated with inhibitory control, this would indicate a negative association between intentional mind wandering and PTSD symptomology. Second, intentional mind wandering is characterized by a desire to direct attention internally (hence, exercises of intentional mind wandering often constitute successful engagements of cognitive control). However, PTSD is often associated with a desire to avoid internally directed attention as a way of avoiding the negative consequences of entertaining trauma-related thoughts. Avoidance is a common coping strategy for those with PTSD and, though adaptive in the short-term, can lead to diminished inhibition of unwanted thoughts and persistent inadvertent direction of attention inward (e.g., Aupperle, et al., 2012; Foa and Kozak, 1986). In this case, we would expect PTSD to be negatively associated with intentional mind wandering, though on different grounds.

There are also reasons to predict that mind wandering and traumatic intrusions are qualitatively distinct constructs and, thereby, unlikely to be empirically associated. Traumatic intrusions are often vivid memories of highly distressing and negative experiences. They are so vivid that they are sometimes likened to re-living the past as in a flashback. Mind wandering episodes are not as intensely valanced and can sometimes go by unnoticed. As noted above, some mind wandering is voluntary, while traumatic intrusions are exclusively involuntary. Finally, traumatic intrusions, by virtue of being traumatic require some awareness of the event *as* distressing. Mind wandering often occurs without such meta-awareness. Therefore, the phenomenological features of these two constructs provide evidence for dissociability, while considerations of cognitive etiology provide evidence for certain kinds of associations.

Finally, self-regulatory deficits often underwrite susceptibility to intrusive thoughts. Broadly construed, self-control is the general ability to maintain a goal over time in the face of contra-motivational factors (e.g., temptation, distraction, etc.; see Sripada, In press). Both PTSD symptomology and unintentional mind wandering are negatively associated with trait-level measures of self-control (e.g., Tangney, Baumeister, and Boone, 2004). However, it is unclear whether unintentional mind wandering is *uniquely* associated with PTSD symptomology. For instance, any relationship between mind wandering and PTSD symptomology might be perfectly mediated in terms of individual differences in self-control. Conversely, PTSD symptomology may only be associated with regulatory deficits to the extent that such symptoms relate to the ability to self-regulate one's stream of thought. As such, it is unclear to what degree trait-level measures of self-control and mind wandering (both intentional and unintentional) are uniquely associated with PTSD symptomology.

The Present Study

In the current study, we examined the relationship between mind wandering, self-control, and PTSD symptomology. In particular, we were interested in determining whether spontaneous and deliberate mind wandering would be uniquely associated with PTSD symptomology above and beyond general impairments in control. Similarly, given that a failure to control thoughts and memories is the hallmark of PTSD, we were also interested in determining whether general failures in self-control uniquely predict PTSD symptomology after taking into account deliberate and spontaneous mind wandering.

To that end, we conducted a large survey of undergraduate psychology students assessing (1) trait levels of deliberate mind wandering (assessed by the Mind Wandering: Deliberate Scale; MW: D; Carriere, Seli, and Smilek, 2013), (2) trait levels of spontaneous mind wandering

(assessed by the Mind Wandering: Spontaneous Scale; MW: S; Carriere et al., 2013), (3) PTSD symptomology (assessed by the DSM-version of the PTSD checklist; PCL-5; Weathers, Litz, Herman, Huska, & Keane, 1993; Weathers et al., 2013), and (4) trait levels of self-control (assessed by the brief self-control scale; BSCS; Tangney, Baumeister, and Boone, 2004).

Participants

Participants were 2350 undergraduate psychology students at the University of Waterloo (mean age was 21.21; 1800 participants identified as female). Each participant completed a series of questionnaires in the first month of classes. Included were the scales of interest (spontaneous and deliberate mind wandering scales, the brief self-control scale, and the PCL-5) as well as numerous other questionnaires that were of interest to other researchers and not analyzed in the present study. The order of the questionnaires was randomized and participants were unaware of the relatedness of our scales. Participants received partial course credit for completing the study.

Measures

Deliberate and spontaneous mind wandering

To measure mind wandering, we used the four-item spontaneous mind wandering scale (MW: S) and the four-item deliberate mind wandering scale (MW: D) for unintentional and intentional mind wandering, respectively (Carriere et al., 2013). The deliberate mind wandering scale includes items related to intentional mind wandering, such as: “I allow my thoughts to wander on purpose,” whereas the spontaneous mind wandering scale includes items related to unintentional mind wandering, such as: “I find my thoughts wandering spontaneously.” Both scales are scored using a seven-point Likert scale with “rarely” (1) and “a lot” (7) as anchors.

PCL-5 (PTSD checklist for DSM-5)

The PCL-5 is a 20-item self-report measure that assesses all DSM-5 PTSD symptoms (Weathers et al., 2013). Responses are rated on a scale of 0 to 4, with 0 indicating no experience of a symptom and 4 indicating an extreme experience with a symptom. Participants were instructed to indicate the extent to which they were bothered by each symptom in the past month. The PCL-5 has been found to exhibit strong reliability and validity in psychometric evaluation (Blevins, Weathers, Davis, Witte, & Domino, 2015). An item-level score of 2 or more indicates a clinical endorsement (Weathers et al., 2013). A cut-off score of 31 and greater indicates probable PTSD (Bovin et al., 2016).

Brief self-control scale

Self-control was assessed using the brief self-control scale (BSCS), a 13-item self-report measure of general self-control (Tangney et al., 2004). Participants used a 5-point scale to indicate how well statements described them (i.e., “I am good at resisting temptation”). The BSCS focuses on processes that directly involve self-control (e.g., working towards long-term goals or breaking a habit) and has shown good reliability and validity among college students (de Ridder et al., 2012; Tangney, et al., 2004).

Results

All data, analysis code, and manuscript preparation code has been made publicly available via Open Science Framework and can be accessed at https://osf.io/xxxx/. Prior to all analyses, we removed participants who chose not to respond to any of the questions within the scales of interest, including age. This reduced our final sample size to 2152 participants.

Table 1: Descriptive statistics (*N* = 2152)

Measure	*M*	*SD*	Skew	Kurtosis	α
MW: D	4.24	1.44	-0.16	2.51	0.88
MW: S	4.10	1.38	-0.07	2.67	0.89
BSCS	3.08	0.67	0.05	2.80	0.85
PCL-5 Subscales					
Intrusion	5.63	5.01	0.75	2.72	0.90
Avoidance	2.59	2.37	0.62	2.34	0.88
Cognitions and Mood	7.96	6.89	0.70	2.61	0.91
Arousal and Reactivity	6.17	5.37	0.80	2.94	0.86
PCL-5 Total	22.25	17.68	0.72	2.75	0.96

****p* < .001; ***p* < .01; **p* < .05

Note: BSCS = Brief Self-Control Scale; MW: S = Spontaneous Mind Wandering; MW: D = Deliberate Mind Wandering

Table 2: Pearson's product-moment correlations

	2.	3.	4.	5.	6.	7.	8.
1. MW: D	0.44***	-0.24***	0.09***	0.08***	0.10***	0.11***	0.11***
2. MW: S	-	-0.45***	0.35***	0.33***	0.39***	0.41***	0.42***
3. BSCS		-	-0.26***	-0.23***	-0.34***	-0.37***	-0.35***
PCL-5 Subscales							
4. Intrusion			-	0.79***	0.76***	0.71***	0.90***
5. Avoidance				-	0.69***	0.63***	0.82***
6. Cognitions and Mood					-	0.79***	0.94***
7. Arousal and Reactivity						-	0.90***
8. PCL-5 Total							-

****p* < .001; ***p* < .01; **p* < .05

Note: BSCS = Brief Self-Control Scale; MW: S = Spontaneous Mind Wandering; MW: D = Deliberate Mind Wandering

Descriptive statistics and correlations

Descriptive statistics for the MW: D, MW: S, BSCS and PCL-5 are presented in Table 1. As seen in Table 1, the skewness and kurtosis values were all within an acceptable range (i.e., skewness < 2 and kurtosis < 4; Kline, 1998). Next, we examined the Pearson product-moment correlation coefficients for all measures (see Table 2). Here, we see that deliberate and spontaneous mind wandering were both positively associated with PCL-5 scores and negatively

associated with BSCS scores. Lastly, as has been shown in previous studies (e.g., Carriere et al.,2013; Seli et al., 2014, 2015, 2017), deliberate and spontaneous mind wandering were positively correlated, $r = .44$, $p < .001$.

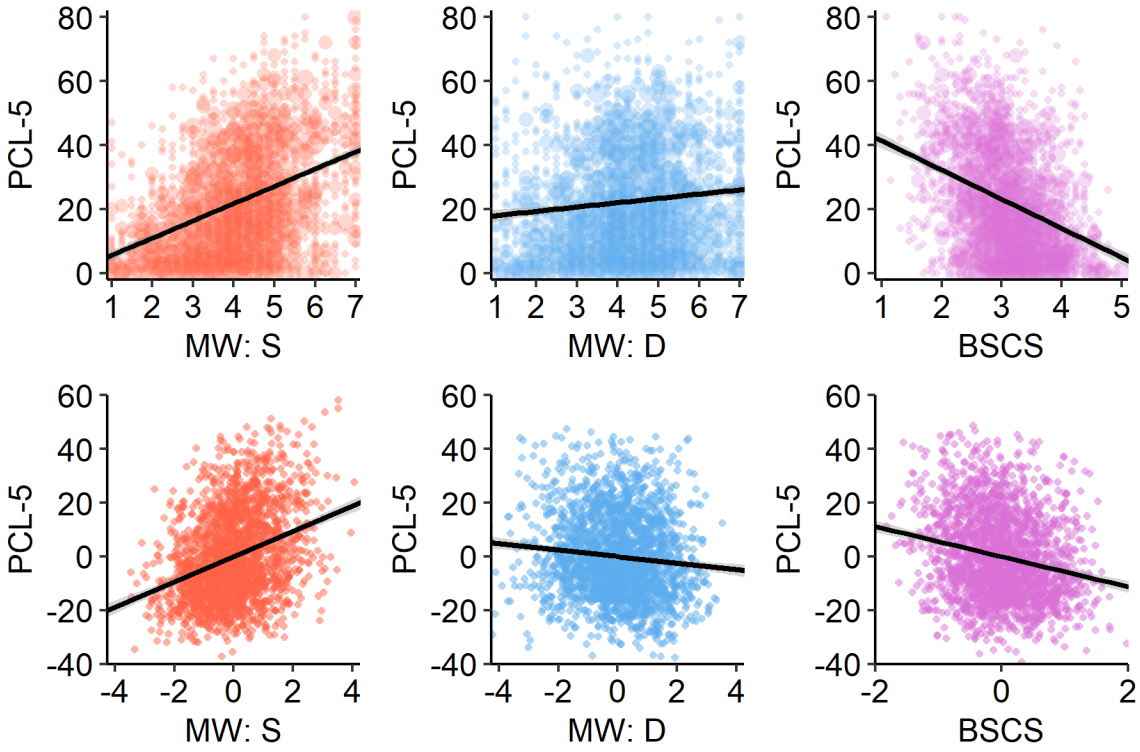

Figure 1
Pearson's product-moment correlations are plotted in the top panels. PCL-5 scores are plotted against spontaneous mind wandering (MW: S; top-left), deliberate mind wandering (MW: D; top-center) and self-control (BSCS; top-right). Partial regression plots are presented in the bottom panels. PCL-5 scores are plotted against spontaneous mind wandering (bottom-left), deliberate mind wandering (bottom-center) and self-control (bottom-right).

Regression analyses

A three-step hierarchal regression was conducted with PCL-5 scores as the dependent variable (see Table 3). Age and sex were added at step one, $F(2, 2152) = 6.64$, $p = .001$,

accounting for 0.5% of the variation. At step two, BSCS scores were added, significantly improving the model, $F(1, 2151) = 308.96$, $p < .001$, and accounting for an additional 12.54% of the variance. Finally, at step three, MW: S and MW: D scores were added, significantly improving the model, $F(2, 2149) = 126.54$, $p < .001$, and accounting for an additional 9.1% of the variance. In the final model, we found that whereas spontaneous mind wandering was positively associated with PCL-5 scores, deliberate mind wandering and self-control were negatively associated with PCL-5 scores.

Table 3: Summary of hierarchical regression analysis predicting PCL-5 scores

Step 1					
	Predictors	Estimates	95% CI	*t*	*p*-value
	(Intercept)	26.17	20.62 - 31.72	9.25	<.001***
	Age	-0.27	-0.53 - -0.02	-2.14	0.032*
	Sex: Female	2.62	0.87 - 4.38	2.94	0.003**
	R^2 / R^2 adjusted	0.006 / 0.005			
Step 2					
	Predictors	Estimates	95% CI	*t*	*p*-value
	(Intercept)	54.37	48.3 - 60.44	17.57	<.001***
	BSCS	-9.29	-10.32 - -8.25	-17.58	<.001***
	Age	-0.29	-0.52 - -0.05	-2.4	0.016*
	Sex: Female	3.58	1.94 - 5.23	4.28	<.001***
	R^2 / R^2 adjusted	0.131 / 0.13			
Step 3					
	Predictors	Estimates	95% CI	*t*	*p*-value
	(Intercept)	26.88	19.71 - 34.05	7.35	<.001***
	MW: S	4.7	4.12 - 5.28	15.84	<.001***
	MW: D	-1.23	-1.74 - -0.72	-4.72	<.001***
	BSCS	-5.6	-6.7 - -4.5	-9.98	<.001***
	Age	-0.16	-0.38 - 0.06	-1.42	0.156
	Sex: Female	2.71	1.15 - 4.27	3.41	<.001***
	R^2 / R^2 adjusted	0.226 / 0.224			

***$p < .001$; **$p < .01$; *$p < .05$

Note: BSCS = Brief Self-Control Scale; MW: S = Spontaneous Mind Wandering; MW: D = Deliberate Mind Wandering

In addition to the hierarchical regression analyses, we also examined the relationship between mind wandering and each of the PTSD symptom clusters (see Table 3). For each analysis, we included the mind wandering and self-control measures as explanatory measures

together with age, sex, and the remaining subscales. The results of these analyses show no significant association between mind wandering and the Intrusion subscale, but a significant positive association with self-control. The Avoidance, Cognitions and Mood, and Arousal and Reactivity subscales were all positively associated with spontaneous mind wandering. However, deliberate mind wandering was only associated with Arousal and Reactivity (p = .055). Finally, self-control was negatively associated with both the Cognitions and Mood and Arousal and Reactivity subscales, but not the Avoidance subscale.

Table 4: Regression analyses of PCL-5 subscales

Intrusion

Predictors	Estimates	95% CI	*t*	*p*-value
(Intercept)	-0.17	-1.4 - 1.06	-0.28	0.782
MW: S	0.05	-0.05 - 0.16	1.03	0.305
MW: D	0.02	-0.06 - 0.11	0.49	0.622
BSCS	0.19	0 - 0.38	1.97	0.049*
Avoidance	0.99	0.93 - 1.06	29.13	<.001***
Cognitions and Mood	0.22	0.19 - 0.25	15.05	<.001***
Arousal and Reactivity	0.16	0.12 - 0.19	8.88	<.001***
Age	-0.03	-0.07 - 0.01	-1.49	0.137
Sex: Female	0.23	-0.03 - 0.5	1.72	0.086
R^2 / R^2 adjusted	0.724 / 0.723			

Avoidance

Predictors	Estimates	95% CI	*t*	*p*-value
(Intercept)	-0.2	-0.86 - 0.46	-0.6	0.549
MW: S	0.06	0 - 0.12	2.09	0.036*
MW: D	-0.01	-0.06 - 0.03	-0.62	0.534
BSCS	0.07	-0.03 - 0.17	1.33	0.185
Intrusion	0.29	0.27 - 0.3	29.13	<.001***
Cognitions and Mood	0.06	0.04 - 0.07	7.05	<.001***
Arousal and Reactivity	0.03	0.01 - 0.05	2.96	0.003**
Age	0	-0.02 - 0.02	-0.08	0.939
Sex: Female	0.22	0.08 - 0.37	3.11	0.002**
R^2 / R^2 adjusted	0.644 / 0.643			

Cognitions and Mood

Predictors	Estimates	95% CI	*t*	*p*-value
(Intercept)	2.59	0.88 - 4.31	2.97	0.003**
MW: S	0.17	0.03 - 0.32	2.33	0.02*
MW: D	-0.09	-0.21 - 0.03	-1.4	0.162
BSCS	-0.58	-0.85 - -0.31	-4.25	<.001***
Intrusion	0.43	0.38 - 0.49	15.05	<.001***
Avoidance	0.39	0.28 - 0.5	7.05	<.001***
Arousal and Reactivity	0.58	0.53 - 0.62	25.84	<.001***

Age	0.01	-0.05 - 0.06	0.23	0.816
Sex: Female	-0.44	-0.81 - -0.07	-2.35	0.019*
R^2 / R^2 adjusted	0.715 / 0.714			

Arousal and Reactivity

Predictors	Estimates	95% CI	*t*	*p*-value
(Intercept)	2.14	0.7 - 3.59	2.91	0.004**
MW: S	0.34	0.22 - 0.46	5.48	<.001***
MW: D	-0.1	-0.2 - 0	-1.92	0.055
BSCS	-0.68	-0.9 - -0.46	-5.95	<.001***
Intrusion	0.22	0.17 - 0.27	8.88	<.001***
Avoidance	0.14	0.05 - 0.23	2.96	0.003**
Cognitions and Mood	0.41	0.38 - 0.44	25.84	<.001***
Age	0.01	-0.03 - 0.06	0.47	0.637
Sex: Female	0.06	-0.25 - 0.38	0.39	0.694
R^2 / R^2 adjusted	0.666 / 0.665			

***$p < .001$; **$p < .01$; *$p < .05$
Note: BSCS = Brief Self-Control Scale; MW: S = Spontaneous Mind Wandering; MW: D = Deliberate Mind Wandering

Discussion

In the current study, we found that PTSD symptomology (as assessed by the PCL-5) was positively associated with spontaneous mind wandering and negatively associated with deliberately mind wandering after controlling for individual differences in self-control (as indexed by the brief self-control scale; Tangney et al., 2004). Similarly, we found the negative association between self-control and PTSD symptomology remained after including mind wandering measures. These results reinforce prior work demonstrating dissociations between deliberate and spontaneous mind wandering (e.g., Carriere, Seli, & Smilek, 2013; Seli, Carriere, & Smilek, 2015; Seli, Smallwood, Cheyne, & Smilek, 2015) and add to the growing evidence demonstrating the relationship between self-control and PTSD symptomology (e.g., Walters, et al., 2011).

More importantly, however, the unique associations between PTSD symptomology and mind wandering suggests that they may reflect the same underlying mechanism. The current results are consistent with neural evidence that has implicated a role for the default mode network in both mind wandering (Christoff et al. 2009; Gusnard et al. 2001; Mason et al. 2007; Stawarczyk et al. 2011) and PTSD symptomology (Josh et al., 2020; Patel, Spreng, Shin, & Girard, 2012; Patriat, Birn, Keding, & Harringa, 2016; Sripada et al., 2012). However, the negative association between deliberate mind wandering and PTSD symptomology is suggestive of a more complicated relationship further demonstrating the need to distinguish between intentional and unintentional mind wandering.

Additionally, some particularly intriguing results came from the subscale analyses. Surprisingly, we found no evidence that mind wandering was associated with the Intrusion subscale. Given that this subscale includes questions about the frequency of re-experiencing trauma-related thoughts and memories, one might have predicted a strong association here. Instead, we found that both spontaneous and deliberate mind wandering were most strongly associated with the Arousal and Reactivity subscale. This result is important because deliberate mind wandering is, at times, associated beneficial functions like the ability to reflect one's inner experiences in a non-reactive manner (Seli et al., 2014). Thus, it suggests that mind wandering might not only be associated in terms of failing to inhibit unwanted thoughts, but also in terms of successful control over internally directed attention.

Finally, it is worth noting that our sample consisted of undergraduate students, over 75% identifying as female. Experiencing traumatic events is extremely common. It is estimated that 50% to 60% of individuals will experience at least one traumatic even during their lifetime (e.g., Kessler, Sonnega, Bromet, Hughes, and Nelson, 1995, Ozer, Best, Lipsey, and Weiss, 2003), and

although not all traumatic experiences result in PTSD, the majority of undergraduate students (85%) report having experienced at least on traumatic event in their lifetime (Frazier, 2009; see Frazier, 2012, for a review; see also: Duncan, 2000; Green, Miranda, Daroowalla, and Siddique, 2005; Kessler, et al., 2005; McDevitt-Murphy, Weathers, Flood, Eakin, & Benson, 2007). Our results are consistent with these assessments. Adopting the recommended cut-off score of 31 (Ashbaugh, et al. 2016), for instance, results in a 25.7% prevalence of probable PTSD. Similarly, we found that participants identifying as female reported higher total PCL-5 scores, replicating prior work (e.g., Breslau, 2009; Kessler, et al., 2005; Lilly, et al., 2009). However, breaking down responses into symptom clusters, we found that whereas female participants reported higher Avoidance scores, they also reported *lower* Cognitions and Mood scores.

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