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Validation of the “Mind-Wandering Spontaneous (MW-S) and the Mind-Wandering Deliberate (MW-D)” scales. Individual Differences in Spontaneous and Deliberate Mind-wandering and the Tendency to Experience Positive and Negative Affect

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Validation of the “Mind-Wandering Spontaneous (MW-S) and the Mind-Wandering Deliberate (MW-D)” scales. Individual Differences in Spontaneous and Deliberate Mind-wandering and the Tendency to Experience Positive and Negative Affect

**THESIS FULFILLED IN PROSPECT TO OBTAIN A
MASTER OF SCIENCE DEGREE IN PSYCHOLOGY**

ORIENTATIONS

Affective Psychology

Clinical Psychology

BY

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ABSTRACT

The Mind-wandering Spontaneous and Mind-wandering Deliberate scales (Carriere, Seli & Smilek, 2013) were first translated into French and then were answered, along with questionnaires measuring overall mind-wandering and attention lapses frequency as well as trait positive and negative affect, by 179 participants through an online survey. Psychometric properties of the MW-S and the MW-D were assessed and confirmatory factor analysis showed that the French version of the scales have satisfactory validity and reliability. Correlational analyses demonstrated that spontaneous mind-wandering was positively associated with trait negative affect and uniquely, negatively associated with trait positive affect. Contrary to predictions, neither positive nor negative trait affect were related to deliberate mind-wandering. Results support the utility, reliability and validity of the MW-S and the MW-D scales, enabling researchers working with French-speaking populations to finally be able to dissociate spontaneous from deliberate mind-wandering when investigating mind-wandering.



Déclaration sur l'honneur

Je déclare que les conditions de réalisation de ce travail de mémoire respectent la charte d'éthique et de déontologie de l'Université de Genève. Je suis bien l'auteur de ce texte et atteste que toute affirmation qu'il contient et qui n'est pas le fruit de ma réflexion personnelle est attribuée à sa source ; tout passage recopié d'une autre source est en outre placé entre guillemets.

Geneva, August, 2019

Phebe Petra Driebergen

Signature :

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1.Introduction

(...) certain mental phenomena are so self-evident their existence can hardly be questioned. Our propensity for mind-wandering is such a phenomenon. We all experience our minds drifting away from a task toward unrelated inner thoughts, fantasies, feelings, and other musings. (Smallwood & Schooler, 2006, p. 946)

Until 2006, mind-wandering had escaped mainstream attention as research had been confined to an array of disparate constructs known as stimulus-independent thought (Antrobus, 1968; Teasdale, Lloyd, Proctor, & Badgeley, 1993; Teasdale, Segal, & Williams, 1995; as seen in Smallwood & Schooler, 2006), task-unrelated images and thoughts (Giambra, 1995), zone outs (Schooler, 2002; Schooler, Reichle, & Halpern, 2005; as seen in Smallwood & Schooler, 2006), task-unrelated thought (Smallwood & Schooler, 2006) and mind pops (Kvavilashvili & Mandler, 2004; as seen in Smallwood & Schooler, 2006). As a matter of fact, Giambra and colleagues actually differentiated between spontaneous and deliberate task-unrelated images and thoughts (Giambra, 1995). Nevertheless, all these various lines of research had addressed the basic phenomenal characteristics of mind-wandering, a shift of attention away from a primary “task” towards internal information and were brought together under the umbrella term of mind-wandering (Smallwood & Schooler, 2006).

Coincidentally, as mind-wandering investigations in psychology were increasing, researchers using MRI scanners were independently discovering a network in the brain that becomes increasingly active when participants are not engaged in a designated “task” (i.e., when

they are “at rest”). Further research has indicated that this network is similarly active when individuals are mind-wandering while engaged in a task (Christoff, Gordon, Smallwood, Smith, & Schooler, 2009; Mason et al., 2007). Investigations of this “default network” have also helped accelerate research on mind-wandering.

Now, more than a decade later, laboratory and naturalistic studies on mind-wandering have increased dramatically and spread across the fields of psychology and neuroscience, interesting those who examine cognition, education, creativity, clinical populations and workplace functioning among others, however differentiating between spontaneous and deliberate types of mind-wandering has largely been dormant across this explosion of mind-wandering research. History thus shows us that behind the term “mind-wandering” lies a multitude of conceptualizations and operationalizations with backgrounds in various research traditions.

Indeed, the surge of scientific research into mind-wandering has occurred amidst a definitional blur and ‘mind-wandering’ has been used to encompass a variety of mental phenomena such as attentional lapses, free-flowing thought and perseverative rumination (Christoff et al., 2018). In the most general of terms, mind-wandering is understood by most researchers as self-generated thoughts either unrelated to the task at hand or unrelated to the surrounding environment. In today’s world, as a master’s student writing a research paper in psychology, it is nearly impossible to find an agreed-upon scientific definition of mind-wandering. Nor is there much knowledge on how or even why it happens. What mind-wandering is and how to define it, is still an area of active debate. Some researchers emphasize the unconstrained and spontaneous aspects of mind-wandering and attempt to anchor a definition

around those facets (Christoff et al., 2018) while others argue for a consensus to agree on a broader ‘family resemblances’ view of mind-wandering (Seli et al., 2018). The field isn’t even in unison on how to spell mind-wandering, with both *mind wandering* and *mind-wandering* freely being used across publications.

What both camps do agree on though, is that so far, researchers may be erroneously putting different experiences under the same category, a generic conception of mind-wandering. This has probably led to some research outcomes being overly generalized, leading to some ambiguous claims about the consequences of “mind-wandering” as too often, studies lack to clearly specify or define the type or the aspect of mind-wandering that is being studied.

1.1 The challenges of investigating mind-wandering and review of methods

The experimental investigation of mind-wandering poses a number of specific challenges. One challenge arises because researchers lack the ability to directly cause the mind to wander. The covert nature of mind-wandering creates a second challenge since self-generated thoughts and experiences are fundamentally happening internally, with few external proven manifestations. A third challenge arises because the assessment of mind-wandering typically depends on self-report, leading to potential validity issues (Smallwood & Schooler, 2015).

1.1.1 Probe-caught method.

Investigations of mind-wandering use the technique of experience sampling (Smallwood & Schooler, 2015) and the most common type is the probe-caught method of experience sampling, where participants are intermittently interrupted and probed regarding the contents of their experience. Normally these occur in a random or quasi-random manner. This method can be

used to investigate mind-wandering in daily life through experience-sampling apps that ask people to report their thoughts periodically through a mobile device (e.g., Killingsworth & Gilbert, 2010) or thought probes that are visual or auditory cues inserted within a task (Robison, Miller & Unsworth, 2019). However, since research in this field has exploded so quickly, even when using this same method there is not a set protocol (Weinstein, 2017). Indeed, a recent review revealed that among 145 studies that used the probe-caught method in the last decade, there were at least 69 different probe-and-response-option variants. Three sources of variation in this methodology include the frequency of thought probes, the number of response options provided for each probe, and how the probe questions are framed (see Robison et al., 2019; Weinstein, 2017). Fifty-six studies had only binary response options, for instance asking participants to choose between *yes* or *no* when asked if they were mind-wandering. It has been recommended to avoid binary probes as they may lead to acquiescence bias, such that participants will tend to default to responding yes and some studies have shown that probe wording could also unduly influence responses (Weinstein, De Lima & van der Zee, 2017).

1.1.2 Self-report methods.

There is also the self-caught method when participants are asked to spontaneously report when they catch their mind wandering, and the retrospective method, where data is gathered, for instance, at the end of a task via questionnaires (Smallwood & Schooler, 2015) or when assessing individual differences at trait-level mind-wandering. Participants can also be asked to describe in their own words what they experienced during a task. However, because meta-awareness is often lacking, there is not always a relationship between self-caught mind-wandering and performance in studies of mind-wandering (Schooler et al., 2011). The most frequently used self-report

questionnaires in mind-wandering research that I have observed were designed to provide a global assessment of mind-wandering: (i.e., *Daydreaming Frequency Scale of the Imaginal Process Inventory*, DDFS, Giambra, 1993; the *Mind Wandering Questionnaire*, MWQ, Mrazek, Phillips, Franklin, Broadway, & Schooler, 2013).

For Giambra, the term daydream was chosen as it is a common expression that is easily understood by participants, however, he uses the DDFS to estimate “unbidden task-unrelated thought or images” (Giambra, 1993, p. 486). The survey consists of 12 questions regarding “daydreaming” frequency and participants are advised to make a distinction between “thinking” about a task that you’re performing, and “daydreaming” which involves thoughts unrelated to the task that they are working on or else thoughts that they would have on a long bus or train ride. “Daydreaming” frequency has been found to correlate with depressive symptomatology as well as negatively with age (Giambra, 1993). The DDFS was used by Mason and collaborators (2007) to find a strong correlation in regional default network activity with participant’s daydreaming tendencies. It is also the only validated questionnaire available when investigating mind-wandering with French-speaking populations, as the DDFS has been translated into French and validated in 2012 by Stawarczyk, Majerus, Van der Linden, and D’Argembeau. In that study they found that the scores of the DDFS were also negatively related to age as well as positively related to trait negative affect, as measured by the Positive and Negative Affect Schedule (PANAS, Watson, Clark & Tellegen, 1988; cf. French version by Vautier & Raufaste, 2003).

The MWQ was developed to measure trait levels of the frequency of mind-wandering, conceptualized as task-unrelated thought, “irrespective of whether mind-wandering is deliberate or spontaneous” (Mrazek, Phillips, Franklin, Broadway & Schooler, 2013, p. 2). The authors

developed the MWQ, as in their eyes, the DDFS was predominantly useful to measure stimulus-independent thought rather than task-unrelated thought. They found that higher levels of mind-wandering in adolescents, as evaluated by the MWQ, was associated with worse mood, greater stress, and lower self-esteem.

The Mind Excessively Wandering Scale (MEWS, Mowlem et al., 2016) is a 12-item self-report measure developed to capture the frequency of mind-wandering in attention-deficit/hyperactivity disorder (ADHD), it assesses the mental phenomenon rather than the behavioral symptoms conventionally assessed with ADHD rating scales. Items reflect excessive spontaneous mind-wandering and is primarily used with ADHD populations.

Most of the investigations on the content of mind-wandering have been often done within the context of research using fMRI, also using certain self-report questionnaires, (i.e., *Resting State Questionnaire*, RSQ, Delamillieure et al., 2010; *Amsterdam Resting State Questionnaire 2.0*, ARSQ 2.0, Diaz et al., 2014; *Dundee Stress State Questionnaire*, DSSQ, Matthews et al., 1999; and the *New York Cognition Questionnaire*, NYC-Q, Gorgolewski et al., 2014). In brief, self-reports of the contents of mind-wandering episodes suggest that they tend to be related to distinct time periods either in the past or future, with a propensity for near future and show a slight positive emotional bias (Smallwood & Schooler, 2015). Indeed, the future temporal orientation of these episodes seems to be associated with problem-solving and autobiographical planning processes and those mind-wandering thoughts are closely related to personal goals. Mind-wandering thoughts are mostly about oneself or on specific, realistic events and generally occur under the form of images or inner speech (Stawarczyk, 2018).

In order to identify the variance common to both mind-wandering and another indirect measure, researchers proceed by triangulation between these different measures. Findings have found that variability is characteristic of the mind-wandering state in terms of behavioral measures such as response times as seen in McVay and Kane's study (2009), and changes in physical posture as seen in Seli, Cheyne, and Smilek's study in 2013 (as seen in Smallwood & Schooler, 2015). Mind-wandering has also been linked to physiological measures including pupil dilation (Franklin, Broadway, Mrazek, Smallwood, & Schooler, 2013; as cited in Smallwood & Schooler, 2015) and changes in brain activity (e.g., Christoff, Gordon, Smallwood, Smith, & Schooler, 2009).

1.2 Conflicting outcomes in mind-wandering research

In 2018, Seli and associates, summarized more than a decade of research, revealing that mind-wandering, with all its meanings, has been correlated with affective dysfunction (Smallwood et al., 2003), unhappiness (Killingsworth & Gilbert, 2010), impaired performance in daily life and in the lab (McVay & Kane, 2010), attenuated processing of the environment (Kam & Handy, 2013; as seen in Seli et al., 2018), driving accidents (Yanko & Spalek, 2014; as seen in Seli et al., 2018) and disruptions to learning (e.g., Wammes et al., 2016; as seen in Seli et al., 2018) but its benefits have been associated with goal-directed thinking (Gorgolewski et al., 2014), creativity (Baird et al., 2012) and planning (Baird et al., 2011; as seen in Seli et al., 2018). Indeed, results from various studies on mind-wandering have claimed that we tend to spend about half our waking lives engaged in mind-wandering (e.g., Killingsworth & Gilbert, 2010) and that unhappiness is correlated with mind-wandering in general. A retrospective bias to mind-

wandering is associated with low mood in daily life and in the laboratory (Poerio et al. 2013; Ruby et al. 2013a; Smallwood & O'Connor 2011; Stawarczyk et al. 2013; as seen in Smallwood & Schooler, 2015). For example, Franklin and collaborators in 2013 (as cited in Stawarczyk, 2018) found that the presence of mind-wandering in daily life was generally associated with lower mood than moments where individuals reported being focused on their current task.

So it seems that there is a broad range of consequences related to a human's mind's tendency to wander. But we also know that it is common across different cultures and the relatively high frequency of the experience suggests that it is a normal rather than pathological aspect of the human condition (Smallwood & Andrews-Hanna, 2013).

Mind-wandering research outcomes seem to be conflicting and could partly be explained by the various conceptualizations, operationalizations and methodological variations and issues that I have covered so far. However, considering different types of mind-wandering might also resolve the contradictions in the literature. Indeed, "mind-wandering" incorporates experiences that range in terms of relationship to external stimuli, task-relatedness, but also in content and intentionality (Seli et al., 2018). Some researchers, for example, Smallwood and Andrews-Hanna (2013) have argued that distinguishing between types of mind-wandering based on content might be useful. For instance, positive valenced content might be associated with beneficial outcomes, while mind-wandering that contains negatively valenced content might be associated with detrimental outcomes. And they have urged researchers to distinguish between these different types of mind-wandering. However, it is also possible that episodes of mind-wandering might differ in terms of processes.

1.3 Distinguishing mind-wandering according to intentionality

Indeed, episodes of spontaneous and deliberate mind-wandering might, at times, both consist of identical trains of thought (i.e., same content) but these types of mind-wandering would nevertheless be distinct in that one would be engaged with intention, and the other without intention (Seli, Carriere, & Smilek, 2014). Most of the research done so far had not considered the potential importance of distinguishing between intentional and unintentional mind-wandering (Seli, Risko, Smilek, & Schacter, 2016) with the exception of Giambra (1995) and colleagues over 20 years ago, that did distinguish between unintentional and intentional task-unrelated imagery and thoughts (TUITs). Even if intentionality was considered at a conceptual level in some cases (Smallwood & Schooler, 2006), it has largely been assumed that the mind-wandering being measured was unintentional, particularly when it was being investigated in laboratory settings during tasks (Seli et al., 2016). Intentionality associated with episodes of mind-wandering has also been ignored because it has been largely assumed that mind-wandering is unintentional in nature and thus has been measured as a unitary construct (e.g., Bixler & D'Mello, 2014; Blanchard, Bixler, Joyce, & D'Mello, 2014; Carciofo, Du, Song, & Zhang, 2014; Qu et al., 2015; Rummel & Boywitt, 2014; as seen in Seli, Konishi, Risko & Smilek, 2018).

1.3.1 State intentionality findings in mind-wandering research and implications.

Results of a rereading manipulation study with thought-probe measures of mind-wandering found that participants mind-wandered more while rereading compared to an initial reading. However, when using probes that indexed the intentionality of mind-wandering, it showed that the effect of rereading on mind-wandering was driven by higher rates of intentional mind-wandering, and that rereading had no effect on unintentional mind-wandering (Phillips et

al., 2016; as seen in Seli et al., 2016). Also in 2016, Seli, Risko, and Smilek did a study where participants performed an easy or difficult variant of a task as well as respond to thought-probes that measured intentional and unintentional mind-wandering. The results showed that, whereas rates of intentional mind-wandering were greater in the easy compared to the difficult task, rates of unintentional mind-wandering were greater in the difficult compared to the easy task. This finding was at odds with McVay and Kane (2010) as with Smallwood and Schooler (2006) theories that unintentional mind-wandering ought to decrease with increasing task difficulty. But when intentional and unintentional types of mind-wandering were collapsed (producing an “overall” measure of mind wandering), there was no influence of task difficulty on overall rates of mind wandering.

Indeed, some of the most theoretically important findings in mind-wandering research is that people tend to mind-wander more while completing easy, relative to difficult, tasks (e.g., Giambra, 1989, Smallwood et al., 2011, Teasdale et al., 1995, Thomson et al., 2013; as seen in Seli, Konishi, Risko & Smilek, 2018). This finding has been a central feature of the most influential accounts of mind-wandering to date: The Attentional Resource account (Smallwood & Schooler, 2006) and the Executive Control Failures \times Concerns account (McVay & Kane, 2010). According to the Attentional Resource account (Smallwood & Schooler, 2006), easy tasks leave more resources to be taken over by mind-wandering than difficult tasks do, as they require the employment of relatively fewer executive resources and as such, explain why rates of mind-wandering are more elevated in easy tasks. On the other hand, according to the Executive Control Failures \times Concerns account (McVay & Kane, 2010), easy tasks require less cognitive control than difficult tasks, and this lack of cognitive control permits more frequent interference of task-

unrelated thoughts into consciousness. There has been much debate on which theory is more correct. More recently it has been speculated that these theories are not mutually exclusive but that they focus on different components of the mind-wandering episode (Smallwood, 2013). That McVay and Kane's (2010) Executive Control Failures \times Concerns account is concerned with the ignition point while Smallwood and Schooler's (2006) Attentional Resource account is concerned with the continuation of the mind-wandering episode, this is known as the process-occurrence framework (Smallwood, 2013).

More recently, Seli, Konishi, Risko, and Smilek (2018) replicated that study but this time with another type of task and again found that intentional mind-wandering was higher in the easy rather than in the difficult condition. However, they also found more unintentional mind-wandering during the difficult compared to the easy task. These types of results indicate that different task-difficulty manipulations can differentially impact intentional and unintentional mind-wandering and more specifically to my point, these results also have implications for the existing theoretical models of mind-wandering. Indeed, both accounts of mind-wandering would need to be refined to include intentional and unintentional types of mind wandering as well as the different effects of task difficulty.

1.3.2 Trait intentionality findings in mind-wandering research.

1.3.2.a MW-S and the MW-D scales development.

Intentional and unintentional mind-wandering has been investigated at trait level largely using a self-report questionnaire. Carriere, Seli, and Smilek in 2013 developed the Mind Wandering-Spontaneous (MW-S) and the Mind Wandering-Deliberate (MW-D) scales. These two self-report scales assess individual differences in trait-levels of spontaneous and deliberate mind-wandering.

The MW-S and the MW-D are 4-item scales. The MW-D items are “I allow my thoughts to wander on purpose,” “I enjoy mind-wandering,” “I find mind-wandering is a good way to cope with boredom,” and “I allow myself to get absorbed in pleasant fantasy.” The MW-D is scored using a 7-point Likert scale ranging from *rarely* (1) to *a lot* (7) for Items 1, 2, and 4, and ranging from *not at all true* (1) to *very true* (7) for Item 3. Participants are provided with this simple instruction: “For the following statements please select the answer that most accurately reflects your everyday mind-wandering.” Responses indicating a higher value, therefore, reflect a greater tendency to deliberately engage in mind-wandering in everyday life. The MW-S is similar to the MW-D but reflects inadvertent or uncontrolled mind-wandering behavior. Its items include “I find my thoughts wandering spontaneously,” “When I mind-wander my thoughts tend to be pulled from topic to topic,” “It feels like I don’t have control over when my mind wanders,” and “I mind-wander even when I’m supposed to be doing something else.” The MW-S is also scored using a 7-point Likert scale ranging from *rarely* (1) to *a lot* (7) for Items 1, 2, and 4, and ranging from *almost never* (1) to *almost always* (7) for Item 3. Participants are provided with the same instructions as for the MW-D. Responses indicating a higher value, therefore, reflect a greater tendency to spontaneously engage in mind-wandering in everyday life.

Originally the scales were elaborated to determine whether mind-wandering relates to self-reported fidgeting, fidgeting was measured via a new measure, the Spontaneous Activity Questionnaire (SAQ), which was developed for that study (Carriere et al., 2013) and the Mehrabian and Friedman (1986) Fidgeting Questionnaire (FQ) (as seen in Carriere et al., 2013). Originally the MW-S and MW-D were part of a 16-item questionnaire, called the Mind Wandering and Attentional Control Questionnaire, where the 8 attentional control items were

derived from the original Attentional Control Scale developed by Derryberry and Reed (2002) as seen in Carriere et al., (2013). Since then, the MW-S and MW-D are used as stand-alone scales. They also assessed the frequency of attention lapses using the Mindful Attention Awareness Scale–Lapses Only (MAAS-LO, Carriere, Cheyne, & Smilek, 2008). Except for having removed three items, and having direct rather than reverse-coded scoring, the MAAS-LO is identical to the MAAS that was originally developed by Brown and Ryan (2003) as a measure of mindfulness. In this format, it is intended to measure an individual’s typical experience of attention lapses. It has 12 items such as “I do jobs or tasks automatically, without being aware of what I’m doing.” and is scored using a 6-point Likert scale with higher scores indicating a greater frequency/propensity toward everyday attention lapses.

A population of undergraduate students completed the mentioned questionnaires along with other questionnaires not relevant to this paper. They subsequently examined the combined Mind Wandering and Attentional Control Questionnaire items and conducted an exploratory factor analysis with varimax rotation and obtained four factors with eigenvalues greater than 1.0. Together that accounted for 64.7% of the variance in the combined measure, with 31% coming from the first factor. All items from the MW-S loaded primarily on Factor 1 and all items from the MW-D loaded primarily on Factor 2. Good internal consistency for both scales was found (Cronbach's alpha of .83 for MW-S and .84 for MW-D). Although the MW-S and the MW-D scales were positively correlated ($r = .41, p < .001$), they did show discriminant validity as spontaneous, but not deliberate, mind-wandering was uniquely and positively associated with self-reported fidgeting.

1.3.2.b Subsequential research using the MW-S and the MW-D scales.

In an ensuing study, Seli, Carriere, and Smilek (2014) explored the possibility that deliberate and spontaneous mind-wandering might be differentially associated with some aspects of mindfulness, as assessed by the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The results of that study demonstrated that spontaneous mind-wandering was uniquely and negatively associated with difficulty taking a non-reactive stance toward internal experience (i.e., the FFMQ-NR) and that deliberate mind-wandering was uniquely and positively associated with the FFMQ-NR. They calculated the average of the combined reports of MW-S and MW-D for each participant and correlated the overall reports of mind-wandering with the five facets of the FFMQ. The correlation of the “overall”(conflated) mind-wandering with the FFMQ-NR was negative, even though MW-D, on its own, was shown to positively correlate with this subscale.

Since then the scales have been used within clinical populations providing findings that high trait-level tendency to spontaneously mind-wander but not to deliberately mind-wander was associated with ADHD symptomatology (Seli, Smallwood, Cheyne & Smilek, 2015) and with higher reports of obsessive-compulsive disorder (OCD) symptoms (Seli, Risko, Purdon, & Smilek, 2017).

To my knowledge, only one study has been done that tested both trait and state indices of mind-wandering in one sample. The study by Seli, Risko, and Smilek (2016) was done with over one hundred undergraduate psychology students, and they found that individuals whom more frequently reported intentional mind-wandering in their everyday lives using the MW-S and

MW-D scales also reported more frequently intentional mind-wandering when they were probed during a behavioral task in the laboratory. Correspondingly, individuals who more frequently reported unintentional mind-wandering also tended to report more unintentional mind-wandering in the laboratory.

1.3.2.c MW-S and MW-D Italian validation study.

Recently, these scales have been translated and validated in Italian by Chiorri and Vannucci in 2017. They investigated whether the factor structure and construct validity of the MW-S and the MW-D scales could be replicated across two different administration methods: paper-and-pencil in a sample of undergraduate psychology students, and an online survey in a sample of internet users. They also administered the Italian versions of the DDFS and the MWQ. Their results showed that the psychometric properties of the Italian version of the MW-S and the MW-D replicated almost perfectly across administration methods. They did an exploratory factor analysis using principal axis factoring. The EFA suggested that the items reflected distinct, but correlated, constructs, as all items had their primary loadings on the expected factor (Chiorri & Vannucci, 2017). They found that the two scales have adequate internal consistency (Cronbach's alpha of .77 and .73 for MW-S and .84 and .76 for MW-D). The MW-S showed significantly higher correlations than the MW-D with the MWQ, this was replicated across administration methods. The correlations of the MW-S and MW-D with the DDFS did not statistically differ, this result was similar in the two samples. The authors attributed this to the possibility that the DDFS items are ambiguous and might be unpredictably interpreted in terms of spontaneous or deliberate mind-wandering.

Using these newly validated scales, Vannucci and Chiorri (2018) then investigated in another study the associations between these two types of mind-wandering and two subtypes of private self-consciousness, self-rumination, and self-reflection. They found that while spontaneous and deliberate mind-wandering were positively associated with each other, spontaneous mind-wandering was uniquely and positively predicted by self-rumination and deliberate mind-wandering was uniquely and positively predicted by self-reflection.

These studies have shown that people unintentionally and intentionally mind-wander both during laboratory tasks and in everyday life and that these types of mind-wandering are dissociable cognitive experiences. The re-emergence of the distinction between intentional and unintentional mind-wandering has also opened the door to numerous opportunities for future research.

1.4 The present study

In light of these findings, I hope that I have demonstrated the importance to use a more nuanced approach when it comes to measuring mind-wandering and why it could be fruitful to re-investigate some previous research outcomes on mind-wandering with this perspective. Particularly since the extensive majority of the research to date hasn't been measuring mind-wandering in ways that distinguished between unintentional and intentional mind-wandering. Specifically, certain individual-differences variables are more strongly associated with unintentional than intentional mind-wandering (e.g., ADHD, OCD, and self-rumination), and there has been at least one demonstration in which a trait variable shared opposing unique

associations with intentional and unintentional mind-wandering (e.g., the FFMQ-NR). Taken all together, the importance of assessing trait levels of these two types of mind-wandering is clear. As reviewed earlier, mind-wandering research has found associations between affective dysfunction, unhappiness, negative mood and mind-wandering frequency. However, one important factor that has not been taken into consideration in these investigations was the intentionality of these mind-wandering episodes.

1.4.1 Objectives.

In this study, I sought to expand upon previous research linking mind-wandering to negative affect by distinguishing between intentional and unintentional types of mind-wandering to determine whether these types differentially relate to the general tendency to experience negative and positive affect. To do so, to a certain extent I have replicated the validation study done by Stawarczyk et al., in 2012, when the DDFS was translated into French and was found to be positively related to trait negative affect, as measured by the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988; cf. French version by Vautier & Raufaste, 2003). I have also sought to develop and validate a French version of the MW-S and the MW-D scales thus enabling researchers within French-speaking populations to dissociate spontaneous from deliberate mind-wandering when investigating mind-wandering at trait levels.

The construct validation portion for this study will assess to the best possible ability the French version of the MW-S and the MW-D scales as per the guidelines in Ahire and Devaraj (2001). Evaluating the unidimensionality (the extent to which the items are associated and represent a single concept), reliability (the degree of consistency of different measures of the construct), convergent validity (the degree to which different measures of the construct are

related), discriminant validity (the degree to which one concept and its indicators differ from another construct and its indicators), nomological validity (the extent to which a construct relates with prior research).

1.4.2 Specifications.

Specifically, for this non experimental, correlational study, this meant translating the MW-S and the MW-D scales into French, recruiting participants to anonymously complete an online survey with the following: a demographics questionnaire with control questions, along with the translated versions of the MW-S and MW-D as well as the French versions of the DDFS, the MAAS-LO and the PANAS.

Since Geneva is a multicultural city and Switzerland is a multilingual country participants' comprehension of French is not a given. The demographics and control questionnaire contains questions on the principal language(s) of the respondents, their gender, as well as age. I haven't come across any indications of gender difference in the mind-wandering research, so as such I don't expect to see any differences by gender in this study. However, age effects in mind-wandering research have been documented. At this point in time, I have no predictions to how age relates to MW-S and MW-D specifically, nonetheless, mind-wandering frequency has been shown to decline with age (cf. Giambra, 1993), so I do expect that all mind-wandering measures will have a negative relation with age in this study as well. Questions on meditation and yoga practice are also included in the questionnaire. Indeed, Smallwood and Schooler's review on mind-wandering in 2015, highlighted mindfulness training as a strategy to reduce the negative effects of mind-wandering. Mrazek, Smallwood, and Schooler (2012) found that 8 minutes of mindful breathing subsequently reduced mind-wandering rates measured using

probes in laboratory task as compared with 8 minutes of passive relaxation or reading. Mrazek et al. (2013) also found that a two-week mindfulness training program significantly reduced mind-wandering compared to a two-week nutrition training program (as reported in Smallwood & Schooler, 2015). A 2-week meditation program also showed reduced activation of the default-mode network (Brefczynski-Lewis et al., 2007; Tang et al., 2009; as seen in Mrazek, Smallwood & Schooler, 2012). These types of findings could give support to the hypothesis that certain types of meditation practices reduce “overall mind-wandering”. Since certain meditation practices are also incorporated within yoga, questions on yoga habits and practices were thus also part of the questionnaire. As such spontaneous and deliberate mind-wandering hasn’t been studied specifically in meditators but has been linked to certain aspects of mindfulness as conceptualized by Baer et al., (2006). According to the literature, I could expect to see a difference in overall mind-wandering frequency or potentially in scores of the MWS and MWD in yoga and or meditation practitioners. Lastly, I will also check if survey access or administration method has any influence on the outcomes. In the case of this research, the survey can be accessed through a QR code, and a survey link and can be filled out by computer, mobile phone or tablet. However, I don’t expect to see any differences, as Chiorri and Vannucci (2017) found no differences between a paper and pen administered survey sample and their internet survey sample.

1.4.3 Hypotheses.

1.4.3.a Validity and reliability of the MW-S and the MW-D scales.

Similarly to the findings of Chiorri and Vannucci (2017) and the original validation study, I expect that a 2-factor structure will be confirmed as the best fit for data, with one factor for MW-S and one factor for MW-D, thus finding acceptable unidimensionality. In a related vein, I

also expect that the French versions will have high internal consistency and good psychometric properties as the original and the Italian versions, thus finding sufficient reliability.

Since the DDFS, the MW-S and the MW-D all measure “mind-wandering”, I do expect them to correlate together in a positive manner (e.g., in Chiorri & Vannucci, 2017). The DDFS, although originally conceptualized to measure the frequency of “unbidden” task-unrelated thoughts or images, should theoretically be related to the MW-S only, however in reviewing the 12 items and response options, I find that a few could relate to the MW-D over the MW-S, for example, the items “Whenever I have time on my hands I daydream” and “When I am at a meeting or show that is not very interesting, I daydream rather than pay attention” implies intentionalism. Convergent validity will be shown if the DDFS, the MW-S, and the MW-D are all positively correlated to each other.

As the MAAS-LO is expected to measure the frequency of attention lapses, I expect that it will have stronger positive correlations with the DDFS and the MW-S than the MW-D. As mentioned above, (most but not all of the items of) the DDFS and the MW-S share that notion of involuntary and unintentionality which is also reflected in most of the items in the MAAS-LO like “I find myself doing things without paying attention” and with items starting like “It seems I am running on automatic (...)” And we could imagine that unintentionally mind-wandering seemingly leads to the experience of having attention lapses. However, I cannot rule out that there will be no correlation with the MW-D based on an inspection of items of the MAAS-LO, as, for example, people that find that mind-wandering is a good way to cope with boredom and that allows themselves to get absorbed in pleasant fantasy (as per items on the MW-D) could also potentially “tend not to notice feelings of physical tension or discomfort until they really grab my

attention” if they are very absorbed in a mind-wandering episode. Discriminant validity will be shown if indeed, the MW-S has a stronger positive correlation with the MAAS-LO than the positive correlation between the MW-D and the MAAS-LO. On another note, another way to determine the discriminant validity of the MW-S and the MW-D will be if they do indeed differentially relate to the general tendency to experience negative and positive affect (as measured by the PANAS).

I will be “comparing” the results of this study, in an observational manner, with the correlational findings from Carriere et al., (2013), and Chiorri and Vannucci (2017). I have no reason to not expect to find similar results, and indeed, that would give support to nomological validity.

1.4.3.b Relations between trait spontaneous and deliberate mind-wandering and affect.

Investigating if spontaneous and deliberate mind-wandering are dissimilarly related to the general tendency to experience negative and positive affect is effectively exploratory research at this point in time. Nonetheless, I have tentatively made some predictions on potential outcomes. Since Stawarczyk et al., (2012) found a positive correlation between the DDFS and the negative trait affect scale of the PANAS, which I expect to replicate in this study, and, as mentioned earlier, the DDFS has been linked to depressive symptomatology (Giambra, 1993) and since I find that the majority of the items of the DDFS are more related to unintentional mind-wandering than to intentional mind-wandering, I thus expect to find that the MW-S will have a positive relationship to negative affect as measured by the trait negative affect PANAS scale. If MW-S and MW-D are dissociable, then MW-D could have the opposite relationship to negative affect, so I expect to find a negative correlation between MW-D and PANAS neg. It is more likely that

intentional mind-wandering would be associated with some of the beneficial outcomes found in previous research, like planning and problem-solving (Smallwood & Schooler, 2015) and, if MW-S and MW-D are dissociable, I could expect to see that MW-D will have a positive association with PANAS positive trait affect score, while MW-S will have a negative association with the positive trait form of the PANAS.

In brief, I expect to have the following results, finding a 2-factor structure as best fit, so one factor per scale, that the French versions of the MW-S and MW-D will have a high internal consistency (Cronbach's alphas over .70), that the DDFS, the MW-S, and the MW-D will be positively correlated to each other, that the DDFS and the MW-S will have stronger positive correlations with the MAAS-LO than the MW-D, that the DDFS will have a positive relationship to the PANAS neg., that the MW-S will have a positive relationship to PANAS neg and a negative relationship to PANAS pos and that MW-D will have a negative relationship to PANAS neg but a positive relationship to PANAS pos.

2. Method

2.1 Participants

Recruitment for voluntary anonymous participants was facilitated by flyers that were posted in the main buildings of the University of Geneva, (Uni Mail, Sciences and Uni Dufour) advertising the study along with a QR code and a survey link. The study was also announced and mini versions of the flyer were handed out to first and second-year psychology bachelor students during a mandatory lecture. Funding was secured for lottery draw prizes for a 20 CHF gift card

for the Fnac, an audiovisual store, for every 20 participants that completed the survey. The lottery draw was advertised on the flyer, as an incentive to participate in the study. However, it was clearly stated that it was an optional opt-in, leaving the participants free to participate in the draw or not, as entering in the lottery meant leaving an email address that would only be used to contact the winners. The e-version of the flyer was also distributed over email and Whatsapp to the author's personal French-speaking network and was further shared, comparable to a snowball method recruitment method.

A sample of 179 respondents completed the survey via Qualtrics Survey Software, an online survey platform. There were no missing responses. A total of 139 respondents opted to participate in the lottery prize draw. Ages ranged from 17 to 69 years old, with a mean of 25 years ($SD = 10.4$). There were 36 males and 143 females who completed the survey, the vast majority of whom considered French as their principal language ($n = 172$). Of the 7 respondents who did not consider French to be their principal language, all rated their comprehension of French the highest rating available, of "very good". The 6 people that knew their CECRL (The Common European Framework of Reference for Languages) French level, all had the highest level of proficiency. The QR code was used by 52.5% of the respondents to access the survey while 47.5% used the survey link. Only 1.1% of participants used a tablet to answer the survey whereas 57% of participants used a mobile phone and 41.9% used a computer. Of the 179 respondents, 34.1% have practiced meditation and 26.8% have practiced yoga, 14.5% have done both.

2.2 Measures

2.2.1 Spontaneous and deliberate mind-wandering scales.

In brief, as reported earlier, the original MW-S and the MW-D scales (Carriere et al., 2013) are 4-item scales that intends to measure spontaneous and deliberate mind-wandering, respectively. Participants are provided the simple instruction, “For the following statements please select the answer that most accurately reflects your everyday mind-wandering.” The MW-S and the MW-D are scored using a 7-point Likert-type scale. Higher scores indicate a greater tendency to spontaneously or deliberately mind-wander. Both scales were first translated into French by the author and the newly developed French version was shared with one native French speaker and three bilingual French-speaking individuals in order to check the translation as well as the comprehension of the items, which were found to be easily understood and score. The French versions of the MW-S and the MW-D, along with all the questionnaires used in this study can be found in the Appendix.

2.2.2 Daydreaming frequency scale.

The DDFS (Giambra, 1993) intends to measure the frequency of daydreaming in everyday life and the 12 items are scored on a 5-point Likert scale. The original version has a high internal consistency (Cronbach's alpha .91) and good test-retest reliability ($r_{tt} = .76$ for an interval of one year or less). The French version of the DDFS was developed and validated by Stawarczyk et al., in 2012. The factorial structure of the French version of the DDFS was first analyzed using a principal component analysis. The internal reliability of the scale was estimated using Cronbach's alpha and was .91, which is very good. The second study found a Cronbach's alpha of .88 and

confirmatory factor analysis of the DDFS indicated that a one-factor structure was indeed well-founded.

2.2.3 Mindful attention awareness scale-lapses only.

The MAAS-LO (Carriere et al., 2008) is identical to the MAAS that was originally developed by Brown and Ryan (2003) as a measure of mindfulness, with the exception of having removed three items, and having direct rather than reverse-coded scoring of the 12 remaining items. It is intended to measure an individual's typical experience of attention lapses and is scored using a 6-point Likert scale ranging from *almost never* (1) to *almost always* (6). Cronbach's alpha of the MAAS-LO was reported in the original validation study and showed good internal consistency at .83. The MAAS was adapted into French by Jermann and collaborators in 2009 and was further adapted by this author into the MAAS-LO by removing the following 3 items "Je casse ou renverse des choses parce que je suis inattentif(ve) ou parce que je pense à autre chose; J'oublie le nom d'une personne presque immédiatement après l'avoir entendu pour la première fois; Je me déplace en voiture « en pilotage automatique » et il m'arrive d'être étonné(e) de me retrouver là où je suis" as well modifying the scale to direct scoring. This version can be found in the Appendix.

2.2.4 The positive and negative affect schedule.

The PANAS (Watson et al., 1988) consists of two 10-item mood scales that measure positive and negative affect, and depending on the instructions can measure either states and traits. In this study, only the trait form was used and respondents were asked to rate the extent to which they experience each emotion in general on a five-point Likert scale ranging from *very slightly or not at all* to *very much*. Cronbach's alphas of the PANAS in the original validation study was .88 for

the positive affect scale and .87 for the negative affect scale. The PANAS was translated into French by Vautier and Raufaste in 2003 but no internal consistency measures were reported. The French version of the PANAS was used by Stawarczyk et al., in 2012, who reported a Cronbach's alpha of .77 for the positive affect scale and .74 for the negative affect scale.

2.3 Procedure

The survey was constructed and hosted on the Qualtrics Survey Software platform. Once respondents accessed the survey they were greeted with an introduction page that briefly described the research, the procedure as well as information related to the data management of the study. After giving their consent to use their data for scientific and educational purposes as well as for publication (under the condition of anonymity), all participants filled out the survey in the following order: the DDFS, MW-S + MW-D, MAAS-LO and PANAS trait. The items were randomized for all questionnaires except for the 20 item PANAS trait scale which has a specific order for each item. Since the MW-S and MW-D are both just 4 items each and have the same instructions, they were combined and given in one block with all 8 items appearing in a randomized order. After completion, all participants then answered the control questions. If respondents answered yes to having had or having experience with meditation and/or yoga they were redirected to more detailed questions on their practice, before moving on, like the other participants to demographic and language questions. They were able to input their email address if they choose to enter into the lottery draw after completing the final question on what device they answered the survey with.

2.4 Analyses

For inferential statistics, α was set to .01, two-tailed. The bootstrap method was used when confidence intervals were computed. 5000 random samples of the dataset were taken and a 99% bootstrap bias-corrected and accelerated (BCa) confidence intervals were generated when possible. Bonferroni Correction (Bland & Altman, 1995) was used to set a minimum p -value for significance testing when multiple correlations were computed. When the assumptions of parametric tests were violated, nonparametric tests such as Spearman's rho was used. For internal consistency estimates, Cronbach's alphas were computed as well as Guttman Split-Half Coefficients for the MW-S and MW-D specifically; values greater than .70 are generally considered acceptable (Bland & Altman, 1997). All analyses were done using SPSS (Version 25; IBM Corporation) except for the confirmatory factor analysis (CFA) that was performed using Statistica (Version 13.4.0.14; TIBCO Software Inc., 2018).

2.4.1 Data screening.

Data checks revealed there were no missing values. Three anomalies cases were detected for extreme response scores, one participant for the MAAS-LO, another for the MW-D and another for the DDFS but among close inspection, the pattern of responses on the other variables were comparable to the norm thus their responses were kept in the analysis. Normality was assessed graphically with frequency histograms and statistically with skewness and kurtosis computation. Scatterplots were assessed to confirm linearity.

2.4.2 Confirmatory factor analysis (CFA).

To evaluate whether the data collected is in keeping with the theoretically expected structure of the constructs of spontaneous and deliberate mind-wandering, a factor analysis has

been done thereby determining if the scales used have indeed measured what they are intending to measure. More specifically, a confirmatory factor analysis was done as it is employed to test an existing theory by hypothesizing an a priori model of the underlying structure of the construct and then examining how well that model fits the data using various fit statistics (Matsunaga, 2010). To run the CFA, I specified a number of parameters to be estimated in the hypothesized model, first the latent factors, which in this case, I have specified as two factors, one factor called MWS and one called MWD. Secondly, I specified that each item from the MW-S scale would load onto the MWS factor and that the four items from the MW-D scale would load on the MWD factor. As a third step, I specified that the two factors were related to each other. The analysis parameters were specified to run the analysis on the covariances and the discrepancy function was set to 5 iterations of generalized least squares (GLS) followed by maximum likelihood (ML). Two other models were tested as it is best practice to analyze and compare several competing models thus retaining the model that best fits the data. The second model tested differs from the first model described above, only in that the factors were directed to not relate to one another in the third step. The third model tested, was a one-factor model, with all eight items, so the 4 items from the MW-S and the 4 items from the MW-D, all specified to load on one “overall mind-wandering” factor called MW. To examine if the model tested fits the data adequately a number of fit indices and evaluation criteria exist. I have followed the recommendations found in the article “How to Factor-Analyze Your Data Right: Do's, Don'ts, and How-To's ..” by M. Matsunaga and published in the International Journal of Psychological Research. To evaluate how close the model fits the data, the root mean square error of approximation (RMSEA; Steiger, 1990; as cited by Matsunaga, 2010) which estimates the amount of error of approximation while

considering sample size was computed. The RMSEA should ideally be .06, although .08 is acceptable in most circumstances (as per Hu & Bentler, 1999; and Marsh et al., 2004; as seen in Matsunaga, 2010). To evaluate to what degree the tested model accounts for the variance compared to a baseline model (a hypothetical model that has no structural path, inter factor correlations or factor loadings) the comparative fit index (CFI; Bentler, 1990; as cited by Matsunaga, 2010) is reported. The CFI ideally has a value of .95 or higher but a value of .90 is considered acceptable (as per Hu & Bentler, 1999; Russell, 2002; as seen in Matsunaga, 2010). A third type of model fit index, a residual-based index, was computed, the standardized root mean square residual (SRMR), which indicates the average value of the standardized residuals between observed and predicted covariances. It is suggested that the SRMR should be less than .10 (as per Hu & Bentler, 1999; Kline, 2005; as seen in Matsunaga, 2010). Additionally, the chi-square statistic of the model is reported, which is a test of the model's ability to reproduce accurately the sample variance/covariance matrix (as per Joreskog & Sorbom, 1989; as cited in Doll, Raghunathan, Lim & Gupta, 1995). However, its significance level is sensitive to sample size, so the ratio between the chi-square value of the model and the degrees of freedom of the model was calculated and are privileged as an overall goodness of fit measure. A ratio value of less than 2 is considered acceptable. Factor loadings can be interpreted as a measure of validity. The larger the factor loading, as compared with their standard errors and expressed by their *t* values, the stronger the evidence that the measured variables are representing the underlying constructs (as per Bollen, 1989; as cited by Doll et al., 1995). Factor loadings above 0.7 are usually considered good measures of their latent construct and are be considered as a threshold measure in this study.

3.Results

The present study aimed to develop the French versions of the MW-S and the MW-D, to assess their psychometric properties and factor structure in a sample of French-speaking internet users. In order to assess the validity of the scales, the MAAS-LO and the DDFS were also administered. To explore if MW-S and MW-D are differentially associated with positive and negative affect, the PANAS trait form was also given along with a demographic questionnaire with control questions. The following hypotheses were tested: that similarly to the original scales, a 2-factor structure, meaning one factor per scale will be found and that the French versions will have a high internal consistency and good psychometric properties, that the DDFS, the MW-S, and the MW-D will be positively correlated to each other, that the DDFS and the MW-S will have stronger positive correlations with the MAAS-LO than the MW-D, that the DDFS will have a positive relationship to the PANAS neg. The exploratory hypotheses were that MW-S will have a positive relationship to PANAS neg and a negative relationship to PANAS pos and that MW-D will have a negative relationship to PANAS neg but a positive relationship to PANAS pos.

3.1 Descriptive and psychometric statistics

As shown in Table 1, all main measures were found to have good distributional and psychometric properties, with a good range of scores, no significant deviations from normality in skewness and kurtosis, and very satisfactory internal consistencies.

Further examination revealed certain differences in means when comparing scores of measures among groupings according to control measures. The 143 women reported significantly higher levels of spontaneous mind wandering ($M = 4.55$, $SD = 1.26$, 99% CI = 4.29, 4.80) than

the 36 men ($M = 3.85$, $SD = 1.42$, 99% CI = 3.16, 4.53), $t(177) = -2.92$, $p = .004$. Women also reported significantly more attention lapses ($M = 3.37$, $SD = 0.73$, 99% CI = 3.22, 3.52) than men ($M = 2.98$, $SD = 0.74$, 99% CI = 2.69, 3.27), $t(177) = -2.83$, $p = .005$. Women also reported significantly higher levels of negative affect ($M = 23.85$, $SD = 7.21$, 99% CI = 22.30, 25.36) than men ($M = 19.64$, $SD = 5.20$, 99% CI = 17.61, 21.64), $t(177) = -3.30$, $p < .001$. Other differences of interest are that the 61 people who reported doing meditation are significantly older ($M = 28.48$, $SD = 12.01$, 99% CI = 25.07, 32.54) than the 118 people who reported to not meditate ($M = 23.83$, $SD = 9.12$, 99% CI = 21.98, 26.05), $t(177) = 2.89$, $p = .004$, as are the 48 people that report doing yoga ($M = 29.21$, $SD = 12.21$, 99% CI = 25.14, 34.02) compared to the 131 non-yoga practitioners ($M = 24.02$, $SD = 9.32$, 99% CI = 22.29, 26.09), $t(177) = 3.02$, $p = .003$. No differences were found when comparing scores according to distribution channel (all p -values ranged from .11 to .96). As the median age was 21 years old, despite a broad age range (17 to 69 years old) in the sample, meaningful groups of sufficient size according to age could not be computed.

Table 1

Descriptive and Psychometric Statistics for All Measures of Interest and Age (n = 179)

	<i>M (SD)</i>	Skewness ^a	Kurtosis ^b	Cronbach's Alpha	Guttman Split-Half Coefficient
MW-S	4.41 (1.32)	-0.33	-0.30	.79	.75
MW-D	4.51 (1.49)	-0.61	-0.37	.84	.83
DDFS	44.90 (8.18)	-0.75	0.49	.89	
MAAS-LO	3.29 (0.74)	0.05	0.38	.82	
PANAS pos	31.98 (5.95)	-0.31	0.12	.79	
PANAS neg	23.01 (7.04)	0.51	0.10	.83	
Age	25.41 (10.40)	2.47	5.78		

Notes. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only; PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale.

^a Standard error .18. ^b Standard error .36.

3.2 Psychometric, validity and reliability statistics of the MW-S and MW-D

As seen in Table 1, values of skewness and kurtosis are under 3.0 so are not considered extreme, for MW-S and MW-D, indicating no substantial deviation from normality (Kline, 2010). Results show that as expected, akin to the original and the Italian versions, the French versions of the MW-S and MW-D have high internal consistency and good psychometric properties. Cronbach's alphas and Guttman's split-half coefficient for MW-S and MW-D are greater than .70, indicating that the internal reliability of the scales is very good. As shown in Table 2, neither

scale would be improved by the removal of an item, as all estimated values of Cronbach's alpha if an item would be deleted are lower than the Cronbach's alpha for each 4 item scale.

Table 2

Item and reliability statistics for the MW-S and the MW-D

	Item <i>M (SD)</i>	Cronbach's Alpha if Item Deleted
MW-S		
Je trouve que mes pensées vagabondes spontanément.	4.84 (1.59)	.71
Quand j'ai l'esprit errant, mes pensées ont tendance à se déplacer d'un sujet à un autre.	4.69 (1.71)	.78
C'est comme si je n'avais aucun contrôle quand mon esprit vagabonde.	3.82 (1.71)	.73
J'ai l'esprit errant même quand je suis censé faire autre chose.	4.29 (1.74)	.72
MW-D		
Je laisse exprès mes pensées vagabonder.	3.79 (1.75)	.80
J'aime quand j'ai l'esprit errant.	4.56 (1.74)	.79
Je trouve que errer dans mes pensées est un bon moyen de faire face à l'ennui.	4.89 (1.95)	.84
Je me permets d'être absorbé dans une fantaisie agréable.	4.82 (1.78)	.77

Note. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale.

3.2.1 Factor structures of the French version of MW-S and MW-D.

Table 3 reports the fit indices for the three models. The null hypothesis is that there is no difference between the patterns observed in the data and the specified model, however the null hypothesis of perfect fit is rejected for all the models tested, as the chi-square values and associated *p* values signify that the data is more different from the models than what would be expected by chance alone, meaning the models tested are not the exact fitting model. However,

based on the RMSEA, CFI, SRMR and the ratio of Chi-square value to the degrees of freedom, only Model 1 can be considered to have an acceptable fit, as expected. Indeed, Model 1, with 1-factor MWS and 1-factor MWD and with the two factors stipulated to be correlated, has a RMSEA of 0.077, which whilst higher than the ideal value of 0.06 is still considered acceptable as it is lower than the 0.08 threshold. The CFI is 0.97, higher than 0.95 and the SRMR is 0.06, lower than 0.1, fulfilling the fit criteria of both measures. The X^2/df is 1.96, under the threshold of acceptability of 2. Model 2 only barely meets the criteria of acceptability for the CFI, with a value of 0.92, which is less than the ideal threshold of 0.95 but over 0.90 so is still considered acceptable. However, the RMSEA, SRMR and the X^2/df of Model 2 are all subpar. All the fit indices for Model 3 are below par so will not be reported but can be examined in Table 3. As seen in Table 4, the measured variables (mws1-mws4; mwd1-mwd4) load significantly onto the latent variables MWS and MWD with loadings ranging from 0.99 to 1.49, all over the 0.7 threshold. The correlation between factor MWS and factor MWD is significant at $r = .43, p < 0.001$.

Table 3

Fit Indices for the tested models

Models	RMSEA (<0.08)	CFI (>0.9)	SRMR (<0.10)	X ²	df	X ² /df (<2)
M1: 1-factor MWS, 1-factor MWD; correlated	0.077	0.97	0.06	37.15 <i>p</i> = 0.008	19	1.96
M2: 1-factor MWS, 1-factor MWD; uncorrelated	0.104	0.92	0.17	60.70 <i>p</i> < 0.001	20	3.04
M3: 1-factor MW	0.249	0.69	0.15	182.91 <i>p</i> < 0.001	20	9.15

Note. MWS = Mind wandering Spontaneous; MWD = Mind wandering Deliberate; MW = Mind wandering; RMSEA = root mean square error of approximation; CFI = comparative fit index; SRMR = standardized root-mean-square residual.

Table 4

Model 1 parameter estimates

Latent factor	Indicator	Factor loading	Standard Error	<i>t</i>
MWS	mws1	1.22	0.11	10.82*
MWS	mws2	0.99	0.13	7.62*
MWS	mws3	1.19	0.13	9.51*
MWS	mws4	1.28	0.13	10.22*
MWD	mwd1	1.33	0.12	11.20*
MWD	mwd2	1.34	0.12	11.42*
MWD	mwd3	1.32	0.14	9.56*
MWD	mwd4	1.49	0.12	12.70*

Note. * < *p* .001

3.3 Correlational analyses

Bonferroni Correction was computed as follows, $p_{adj} = .01/15$, α was set to .01 and $k = 15$, the number of simultaneous comparisons in this study. The Pearson product-moment correlation coefficients for all measures of interest are presented in Table 5. MW-S has a moderate positive correlation of $r = .36$, 99% CI [.13, .57], $p < .001$ with MW-D which, as predicted, is well within the ranges of .27 to .50 observed in previous work (Carriere et al., 2013; Chiorri & Vannucci, 2017). MW-S has a strong positive relation with the DDFS of $r = .66$, 99% CI [.52, .76], $p < .001$ which, unexpectedly, is higher than the $r = .40$ ($p < .01$) and $r = .48$ ($p < .01$) found by Chiorri and Vannucci in 2017. MW-D has a medium positive correlation of $r = .47$, 99% CI [.27, .64], $p < .001$, with the DDFS in line the $r = .47$ ($p < .01$) and $r = .50$ ($p < .01$) found by Chiorri and Vannucci in 2017. Results are as anticipated, all “mind-wandering” measures positively correlate together.

MW-S also has a medium positive correlation of $r = .48$, 99% CI [.29, .62], $p < .001$, with the MAAS-LO in line with $r = .52$ ($p < .01$) found by Carriere et al., (2013). Unexpectedly and in contrast with the results found in Carriere et al., (2013), where MW-D was found to have a small positive correlation with the MAAS-LO of $r = .30$ ($p < .001$), MW-D has no significant correlation with the MAAS-LO with $r = .18$, 99% CI [-.03, .40], $p = .014$. The DDFS has a medium-sized correlation with the MAAS-LO of $r = .40$, 99% CI [.19, .59], $p < .001$. As predicted, MW-S and DDFS and MAAS-LO have positive correlations with each other, all stronger than the non-significant relationship between MW-D and MAAS-LO.

Similarly to the results in Stawarczyk et al., in 2012, where the correlation between the DDFS with PANAS neg was .21 ($p < .05$), the DDFS has a small non-significant positive correlation with PANAS neg ($r = .25$, 99% CI [.07, .41], $p = .001$), however since the Bonferroni

correction can also be too conservative, these results could conceivably still be interpreted as significant when taking into account the confidence interval and the p -value of .001.

As predicted, the MW-S has a moderate, positive correlation of $r = .31$, 99% CI [.11, .49], $p < .001$, with PANAS neg. The MW-S has a small negative non-significant correlation of $r = -.20$, 99% CI [-.41, .02], $p = .007$, with PANAS pos. Contrary to what was expected, the MW-D has no significant correlations with the PANAS pos ($r = .13$, 99% CI [-.11, .35], $p = .09$) nor with PANAS neg ($r = .01$, 99% CI [-.20, .21], $p = .93$). Also a result of interest, the MAAS-LO has a moderate positive relation with PANAS neg with $r = .45$, 99% CI [.26, .62], $p < .001$.

Table 5

Pearson Product–Moment Correlation Coefficients for All Measures of Interests (N=179)

	MW-S	MW-D	DDFS	MAAS-LO	PANAS pos	PANAS neg
MW-S	1	.36**	.66**	.48**	-.20*	.31**
MW-D		1	.47**	.18	.13	.01
DDFS			1	.40**	-.22*	.25*
MAAS-LO				1	-.21*	.45**
PANAS pos					1	-.14
PANAS neg						1

Notes. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only; PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale.

* $< p .01$ (two-tailed). ** $< p_{adj} .0007$.

Since certain control measures were not distributed normally, Spearman's rho correlation coefficients were computed for all measures of interest. Then, partial correlations of all measures of interest were calculated while controlling for all control measures. Overall Spearman's rho and Pearson's zero-order correlation coefficients are very similar in size. As can be seen in Table 6, the significant Spearman's rho correlation coefficients have very slight changes in magnitude after controlling for age, gender, yoga practice and meditation practice and distribution channel but the direction of the relationships remain the same. MW-S still has a moderate positive correlation with MW-D and a strong positive relation with DDFS while MW-D still has a medium positive correlation with the DDFS. The MW-S and the DDFS still have a medium positive correlation with MAAS-LO while MW-D still has no significant correlation with the MAAS-LO. Under the Bonferroni correction there are non-significant small relationships between MW-S and PANAS neg with $r_s = .24$, $p = .001$, and MW-D and the PANAS pos with $r_s = .25$, $p = 0.001$, however since the Bonferroni correction can also be too conservative, these results could still be prudently interpreted as significant. Correlations between DDFS and PANAS neg, MW-D and PANAS neg and MW-S and PANAS pos are non significant when controlling for all control measures.

Table 6

Spearman's rho Correlation Coefficients and Partial Correlation Coefficients for All Measures of Interests (N=179)

	MW-S	MW-D	DDFS	MAAS-LO	PANAS pos	PANAS neg
MW-S	1	.31**	.62**	.43**	-.17	.28**
MW-D	.26**	1	.42**	.20*	.17	-.00
DDFS	.58**	.37**	1	.39**	-.16	.19*
MAAS-LO	.37**	.15	.33**	1	-.13	.41**
PANAS pos	-.12	.25*	-.11	-.01	1	-.11
PANAS neg	.24*	.02	.17	.39**	-.01	1

Notes. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only; PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale. Spearman's rho correlation coefficients are presented above the diagonal. Spearman's rho correlation coefficients controlled for age, gender, yoga practice, meditation practice and distribution channel are presented below the diagonal.

* < p .01 (two-tailed). ** < p_{adj} .0007.

3.3.1 Additional analyses.

Because the MW-D and MW-S were moderately correlated it is interesting to also examine their unique contributions to the relationships with each of the variables of interest. So partial correlation coefficients whilst controlling for MW-D and then for MW-S were computed. As can be seen in Table 7, controlling for MW-D, leads to slight changes in the magnitude of the

correlation coefficients compared to the zero-order Pearson correlations. The partial correlations between MW-S and the DDFS and the MAAS-LO are all still positive and relatively strong. The DDFS still has a moderate positive correlation with the MAAS-LO. The MAAS-LO still has a moderate positive relation with PANAS neg. When controlling for MW-D, the results support the hypothesis that the correlation between MW-S and the PANAS pos is negative, significant and modest ($r = -.27$, 99% CI $[-.47, -.05]$, $p < .001$) and relation between MW-S and the PANAS neg remain positive and moderately strong. Other notable results are that the DDFS now also has a significant negative moderate correlation with PANAS pos at $r = -.32$, 99% CI $[-.51, -.11]$, $p < .001$. The DDFS now has a modest significant positive correlation with PANAS neg at $r = .28$, 99% CI $[.07, .46]$, $p < .001$.

Table 7

Partial Correlation Coefficients for All Measures of Interests (N=179) when controlling for MW-D

	MW-S	MW-D	DDFS	MAAS-LO	PANAS pos	PANAS neg
MW-S	1	.36**	.66**	.48**	-.20*	.31**
MW-D		1	.47**	.18	.13	.01
DDFS	.60**		1	.40**	-.22*	.25*
MAAS-LO	.45**		.36**	1	-.21*	.45**
PANAS pos	-.27**		-.32**	-.24*	1	-.14
PANAS neg	.33**		.28**	.46**	-.14	1

Notes. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only;

PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale. Uncontrolled correlation coefficients are presented above the diagonal. Correlation coefficients controlled for MW-D are presented below the diagonal.

* < p .01 (two-tailed). ** < p_{adj} .0007.

As can be seen in Table 8, when controlling for MW-S, MW-D still has a medium positive correlation with the DDFS and still has no significant correlation with the MAAS-LO. MW-D still has no significant correlations with the PANAS neg and PANAS pos. The MAAS-LO still has a moderate positive relation with PANAS neg and no significant relation with PANAS pos. However, the relationship between the DDFS and the MAAS-LO ($r = .02$, 99% CI [-.23, .25], $p = .85$) is negligible once controlling for spontaneous mind-wandering.

Table 8

Partial Correlation Coefficients for All Measures of Interests (N=179) when controlling for MW-S

	MW-S	MW-D	DDFS	MAAS-LO	PANAS pos	PANAS neg
MW-S	1	.36**	.66**	.48**	-.20*	.31**
MW-D		1	.47**	.18	.13	.01
DDFS		.33**	1	.40**	-.22*	.25*
MAAS-LO		.02	.13	1	-.21*	.45**
PANAS pos		.22*	-.12	-.13	1	-.14
PANAS neg		-.12	.06	.36**	-.09	1

Notes. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only; PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale. Uncontrolled correlation coefficients are presented above the diagonal. Correlation coefficients controlled for MW-S are presented below the diagonal.

* < p .01 (two-tailed). ** < p_{adj} .0007

In light of the significant gender differences in the MW-S, MAAS-LO and the PANAS neg scores, it is important to explore if there are any significant differences in the relationships between these variables for each gender. So additional analyses were run to see if the correlation coefficients between the measures of interest varied by gender. The Pearson product-moment correlation coefficients for all measures of interest for men are presented in Table 9. With the Bonferroni correction, only one correlation coefficient can be considered significant, MW-S has a strong positive relation with DDFS of $r = .69$, 99% CI [.39, .85], $p < .001$. I will report other correlations of interest that, albeit are not significant under the adjusted p -value, but whose confidence interval at 99% gives support of significance.

MW-S has a moderate positive correlation of $r = .45$, 99% CI [.05, .71], $p = .006$ with MW-D.

The MW-S has a moderate, positive correlation of $r = .42$, 99% CI [.06, .72], $p = .01$, with

PANAS neg. The DDFS has a negative moderate correlation with PANAS pos at $r = -.47$, 99% CI [-.78, -.03], $p = .004$.

The Pearson product-moment correlation coefficients for all measures of interest for women are also presented in Table 9. Since our sample is predominantly female, these results are quite similar to the overall correlational analyses and so only results involving MW-S and MW-D will be reported. MW-S has a moderately strong positive correlation of $r = .36$, 99% CI [.09, .59], $p < .001$ with MW-D as well as with the MAAS-LO with $r = .49$, 99% CI [.30, .65], $p < .001$. MW-S has a strong positive correlation with the DDFS of $r = .64$, 99% CI [.48, .76], $p < .001$. MW-D has a strong positive correlation of $r = .50$, 99% CI [.28, .67], $p < .001$, with the DDFS. Other correlations of interest that, albeit are not significant under the adjusted p -value, but whose confidence interval at 99% gives support of significance are as follows. The MW-S has a

moderate, positive correlation of $r = .25$, 99% CI [.02, .45], $p = .003$, with PANAS neg. MW-D has a small positive correlation with the MAAS-LO of $r = .22$, 99% CI [-.03, .46], $p = .009$ and with the PANAS pos ($r = .22$, 99% CI [-.04, .45], $p = .01$).

Table 9

Pearson Product–Moment Correlation Coefficients for All Measures of Interests, males ($n = 36$) and females ($n = 143$)

	MW-S	MW-D	DDFS	MAAS-LO	PANAS pos	PANAS neg
MW-S	1	.45*	.69**	.31	-.41	.42*
MW-D	.36**	1	.41	.10	-.23	.25
DDFS	.64**	.50**	1	.27	-.47*	.28
MAAS-LO	.49**	.22**	.42**	1	-.03	.18
PANAS pos	-.11	.22*	-.12	-.23**	1	-.26
PANAS neg	.25*	-.03	.22*	.47**	-.09	1

Note. MW-S = Mind Wandering-Spontaneous scale; MW-D = Mind Wandering-Deliberate scale; DDFS = Daydreaming Frequency Scale; MAAS-LO = Mindful Attention Awareness Scale–Lapses Only; PANAS pos = Positive and Negative Affect Schedule (trait form) positive affect scale; PANAS neg = Positive and Negative Affect Schedule (trait form) negative affect scale.

Correlation coefficients for males are presented above the diagonal. Correlation coefficients for females are presented below the diagonal.

* $< p .01$ (two-tailed). ** $< p_{adj} .0007$

A nonparametric correlation analysis was also done to explore if there are any significant differences in the relationships between the variables of interest and age. Since age in this sample isn't distributed normally, Spearman's rho was computed. Age and MW-D have a moderate, negative correlation of $r = -.36$, 99% CI [-.52, -.18], $p < .001$, as with DDFS ($r = -.27$, 99% CI [-.46, -.09], $p < .001$). Other correlations of interest that, albeit are not significant under the

adjusted p -value, but whose confidence interval at 99% gives support to significance are as follows. Age's correlation with MW-S and with MAAS-LO are small and negative ($r = -.25$, 99% CI $[-.44, -.06]$, $p = .001$; $r = -.21$, 99% CI $[-.38, -.03]$, $p = .004$).

4. Discussion

This research first evaluated the psychometric properties, reliability and validity of two scales measuring spontaneous and deliberate mind-wandering that had been translated into French. To be able to shed light on how individual differences in spontaneous and deliberate mind-wandering relate to the general tendency to experience positive and negative affect, 179 participants completed the MW-S and MW-D, along with questionnaires measuring overall mind-wandering frequency, an individual's typical experience of attention lapses and trait forms of positive and negative affect through an online survey. Confirmatory factor analysis and correlational analyses were computed to inspect the factor structures of the scales and to examine the relations between intentional and unintentional mind-wandering, overall mind-wandering and attention lapses frequency, and trait levels of affect. Results will first be discussed in light of the translated MW-S and MW-D as measurement instruments, then the results of the exploratory correlational analysis will be reviewed.

4.1 Validity of the French versions of the MW-S and the MW-D scales

The results extend upon previous factor analysis findings (Carriere et al., 2013; Chiorri & Vannucci, 2017) by confirming a two-factor structure of the MW-S and MW-D thus displaying satisfactory unidimensionality of each scale, with large factor loadings supporting these results.

As predicted, the CFA results suggest that the scales are better fitted with a two-factor solution than a one-factor solution and that the items reflect distinct, although correlated constructs. The original two-factor structure, already empirically validated using the English version and the Italian version of the scales, are also confirmed as the best solution to represent the structure of the French scales. Indeed, the two other models tested but did not yield satisfying solutions.

In line with expectations, the scales show good internal consistency with Cronbach's alphas in the same range as in other studies (cf. Carriere et al., 2013; Chiorri & Vannucci, 2017). Neither scale can be improved by the removal of an item, as per the item analysis. The split-half coefficient for each scale also shows good internal reliability. However, the test-retest reliability wasn't in the scope of this study but for the sake of thoroughness, in a future study, it would be preferable to design the study in such a way to have at minimum, a sub-sample of respondents to re-answer the questionnaires at a later date.

The construct validity of the scales is also assessed by evaluating convergent validity, and as expected, the overall measurement of mind-wandering, the DDFS, is systematically, significantly, positively and strongly correlated with spontaneous mind-wandering, whilst the magnitude of the correlation between the DDFS and deliberate mind-wandering is smaller. The correlations are quite similar to what was found in the Italian validation study between the DDFS and MW-D, but the correlation between the DDFS and MW-S is stronger in this study. There were no confidence intervals reported in Chiorri and Vannucci (2017), so potentially their results could have overlapped with the ones found in this study. Even if these results show convergent validity, it does rely solely on self-report measures, so the results may be biased by common-method variance. It would be interesting in a future study to replicate the work of Seli et al.,

(2016) which is the only study (so far) to have examined both state and trait-level measures of deliberate and spontaneous mind-wandering in one sample, but to use the French version of the MW-S and MW-D scales and modifying the language of the task to French.

The discriminant validity of the MW-D and the MW-S scales is provided by the pattern of correlation with respect to measures of attentional lapses, and incidentally the general tendency to experience negative and positive affect. As hypothesized, the MW-S shows a moderately strong, positive correlation with the MAAS-LO, similarly to the correlation found in the original validation study, while the MW-D has a small, negligible positive correlation with the MAAS-LO in contrast to the original study, which had found significant positive moderate correlations (cf. Carriere et al., 2013). The correlations between affect and spontaneous and deliberate mind-wandering will be discussed in a further section, but also show additional support of the MW-S and MW-D scales' discriminant validity.

In regards to the nomological validity, results are mixed when comparing results from this study to previous studies. Results supporting nomological validity are the 2-factor structure, good internal consistency shown with Cronbach's alphas, similar correlations between MW-S/MW-D, DDFS/MW-D and MW-S/MAAS-LO. Results that limit nomological validity are that MW-D and the MAAS-LO are not significantly correlated in this study, in contrast to the correlation found in Carriere et al., in 2013. Also, even though the DDFS and MW-S were correlated in Chiorri and Vannucci (2017), the correlation found in this study was stronger. However, since previous studies didn't compute confidence intervals it isn't possible to compare judiciously just by looking at a correlation value. This study also used relatively stringent criteria of significance by setting the α value at .01 and further using Bonferroni corrections in

comparison to Carriere et al., (2013) as well as to Chiorri and Vannucci (2017). Indeed, if α was set to .05, the correlation between MW-D and the MAAS-LO in this study would be considered significant.

Even if this result is out of the scope of the nomological validity of the MW-S and MW-D, this discussion point is also valid for the results of the correlation between the DDFS and PANAS negative trait form. Indeed, I expected to find a positive correlation between the DDFS and the negative affect scale of the PANAS, as was found by Stawarczyk et al., in 2012. The results in this study, admittedly while not significant with the Bonferroni correction, the resulting confidence interval does suggest that it is highly likely that there is a small significant positive correlation between the DDFS and with PANAS neg.

A more general consideration to have in mind, is that the concept of mind-wandering, in English, is very well understood and is a term that is commonly used, however, even though the concept of mind-wandering is by all means well understood in French, the translated terms of “vagabondage de l’esprit” and “avoir l’esprit errant” are not used as ordinarily as the term “mind-wandering” in English. It is possible that the concept of mind-wandering doesn’t transmute in the same way in a French-speaking population or that there are certain cultural connotations around the notion of mind-wandering that haven’t been taken into consideration. And, like with all studies using self-report measures, social desirability bias and lack of insight, just to name a few, are likely to influence scores. However, the results show that the French version of the MW-S and MW-D scales do have satisfactory validity and reliability.

In conclusion, the French adaptation of the MW-S and MW-D offers French-speaking researchers an instrument that satisfactorily measures individual differences in intentional and unintentional mind-wandering.

4.2 Spontaneous and deliberate mind-wandering and trait affect

The MW-S and the MW-D scales were used to investigate if spontaneous and deliberate mind-wandering were dissimilarly related to the general tendency to experience negative and positive affect. This can be considered an exploratory research. Nonetheless, certain predictions were made on potential outcomes and trait levels of negative affect were expected to be related to MW-S in a positive manner and be negatively related to MW-D. In contrast to positive trait affect, that was hypothesized to be related negatively to MW-S but positively to MW-D.

The results of this study demonstrated that spontaneous mind-wandering was positively associated with trait negative affect and uniquely negatively associated with trait positive affect. However, the causal structure of these relationships is unknown. One possibility is that higher rates of unintentional mind-wandering cause more negative affect and less positive affect. Or that more negative affect causes more spontaneous mind-wandering and that leads to less positive affect, or that less positive affect leads to more unintentional mind-wandering which leads to more negative affect. Conclusions from experimental and experience sampling methods differ (Poerio, Totterdell & Miles, 2013) so negative mood could be a precursor of mind-wandering whilst some suggest that a lower mood is a consequence of mind-wandering. Of course these possibilities are not mutually exclusive; and neither could be the case, as there may be a third variable explanation.

Contrary to predictions, deliberate mind-wandering has no significant relationship to trait affect, as neither positive nor negative trait affect was found to be related to deliberate mind-wandering. However, when the partial correlation coefficients were computed controlling for the effects of age, meditation and/or yoga experience and distribution channel, a small positive relation between deliberate mind-wandering and positive affect appeared but didn't meet significance with the Bonferroni correction. Similarly, when controlling for spontaneous mind-wandering, a small positive relation between deliberate mind-wandering and positive affect appeared but didn't meet significance with the Bonferroni correction. Also, when just looking at the female subgroup a small positive relation between deliberate mind-wandering and positive affect is also there but again, not considered significant with the Bonferroni correction.

This study does help clarify that it is probably only spontaneous mind-wandering that is associated with negative mood and thus it is indeed important to not just use an "overall mind-wandering" measure. This study also gives a direction for future investigative work to clarify the relation between deliberate mind-wandering and mood, as quite likely, age and gender could be influencing this relationship. Concerning the possibility of a third variable is interesting when considering the relation between affect and mind-wandering, and another track worth investigating further is the role of lapses of attention in the link between unintentional mind-wandering and negative affect. Indeed, systematically the MAAS-LO scores have shown a moderately strong association with trait negative affect, this association stays true, even when controlling for MW-S and MW-D. Only in the (small) males sub-group is this association nonsignificant. Indeed, the women in this study had higher levels of spontaneous mind-wandering, negative affect and more attention lapses than men. One explanation could be an

hormonal one, as, Raymond et al., in 2019, found in a small study, that women currently using oral contraceptives reported having less attentional control than men but naturally-cycling women, but did not differ from men. In a future research, in this regard, it would be useful to have more information on the female participants and to further investigate this line of inquiry. Also in the male subsample, it seems that both spontaneous and deliberate mind-wandering, as well as overall mind-wandering could be negatively associated with positive affect but it is not possible to draw any conclusions on this point. It would be great in a further study to have a larger sample of men to investigate more thoroughly the relations between gender differences, mood and individual differences in intentionality in mind-wandering, particularly since the sample of this study is skewed towards females and younger adults. It seems that age is moderately, negatively related to deliberate mind-wandering as well as more weakly, negatively related to the DDFS, MW-S, and the MAAS-LO. So even if this study's sample age had a good range, to be able to generalize these results, it would be necessary to replicate this study with a sample that has a substantial amount of people in each age range. This would also give the opportunity to do a multiple-group analysis and check the 2-factor correlated model found for MW-S and MW-D for model equivalency across gender or/and across ages which would further support the construct validity of a scale.

Even though the PANAS French version has been used in other studies, and despite the extensive usage of the PANAS in general (Seib-Pfeifer, Pugnaghi, Beauducel & Leue, 2017), there have been repeated findings that the PANAS has a more complex factor structure than the originally proposed uncorrelated factors of PA and NA. With that in mind, it would be beneficial to extend the findings of this study by using other measures of affect (validated in French) to

continue investigating the relation between trait spontaneous and deliberate mind-wandering and affect.

4.3 Conclusions

This study supports a recent call for the need to consider intentionality when relating mind-wandering to personality, cognitive and affective variables (Seli, Risko, Smilek & Schacter, 2016). This study evaluated the psychometric properties, reliability and validity of two scales measuring spontaneous and deliberate mind-wandering translated into French and found encouraging evidence for their utility enabling researchers working with French-speaking populations to dissociate spontaneous from deliberate mind-wandering in future studies when investigating mind-wandering. The results of this study demonstrated that unintentional mind-wandering was positively associated with trait negative affect and uniquely, negatively associated with trait positive affect. Contrary to predictions, neither positive nor negative trait affect was related to intentional mind-wandering. However, further research is needed to clarify the causal structure of these relationships.

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APPENDIX

Survey Qualtrics - Mind-wandering

Informations aux participants et consentement de participation

Objectifs généraux de la recherche:

Dans cette étude, nous désirons explorer les liens entre l'errance de l'esprit (mind-wandering en anglais) et la tendance générale à ressentir de l'affect positif et négatif.

Procédure:

Vous allez remplir plusieurs questionnaires. Il n'y a pas de bonne ou de mauvaise réponse. Nous nous intéressons ici à votre expérience personnelle. Nous vous remercions de répondre seul(e) aux questions et de manière sincère.

Les questions vont apparaître à l'écran, répondez-y et cliquez sur [>>] pour continuer.

Cela devrait vous prendre au maximum 15 minutes pour tout remplir. Vous avez un délai de deux semaines pour répondre à la présente étude. Vous pouvez renoncer à participer à l'étude à n'importe quel moment.

Avantages et bénéfices:

En répondant à ce questionnaire, vous pouvez participer à un tirage au sort pour gagner un bon de 20CHF d'achat à la FNAC. Un bon sera à gagner par groupe de 20 participants! Après la soumission de vos réponses, laissez votre adresse email d'étudiant pour y participer!

Inconvénients et risques:

Il n'y a aucun inconvénient ni aucun risque éventuel liés à la participation dans cette étude.

Protection des données et mesures d'archivage:

L'accès aux données est réservé uniquement aux deux responsables de la recherche (Phebe DRIEBERGEN et Kerstin BRINKMANN). Toutes les données seront archivées et conservées au moins cinq ans après la fin de la récolte des données. Cette enquête est anonyme. La liste des

emails des participants au tirage au sort est stockée séparément de toutes les autres données et ce sous la responsabilité de Kerstin BRINKMANN. Cette liste sera utilisée pour le tirage au sort uniquement, et sera détruite ensuite.

Accès aux résultats:

Les deux responsables de la recherche seront à votre disposition pour vous informer des résultats à partir de Septembre 2019. Veuillez noter que les restrictions de la protection de données ne permettent pas d'identifier les données d'un certain individu en particulier. Pour cette raison, uniquement des informations par rapport à l'échantillon entier seront disponibles.

Consentement de participation à la recherche:

Sur la base des informations qui précèdent, je confirme mon accord pour participer à la recherche: «Étude sur les liens entre l'errance de l'esprit et la tendance générale à ressentir de l'affect positif et négatif».

J'ai choisi volontairement de participer à cette recherche. J'ai été informé(e) du fait que je peux me retirer en tout temps, sans fournir de justification et que je peux, en ce moment précis, demander la destruction de toutes les données me concernant.

Ce consentement ne décharge pas les organisateurs de la recherche de leurs responsabilités. Je conserve tous mes droits garantis par la loi.

J'autorise:

-L'utilisation des données à des fins scientifiques et la publication des résultats de la recherche dans des revues ou livres scientifiques, étant entendu que les données resteront anonymes et qu'aucune information ne sera donnée sur mon identité.

-L'utilisation des données à des fins pédagogiques (cours et séminaires de formation d'étudiants ou de professionnels soumis au secret professionnel), étant entendu que les données resteront anonymes et qu'aucune information ne sera donnée sur mon identité.

OUI, je consens (1)

NON, je ne consens pas (0)

Start of Block: DDFS

Nous vous demandons votre coopération pour répondre à un questionnaire portant sur votre tendance à rêvasser, à laisser votre esprit vagabonder et à être perdu dans vos pensées.

Soyez attentif à bien faire la différence entre réfléchir à ce que vous êtes en train de faire à un moment donné (par exemple, imaginer activement des solutions à un problème que vous êtes en train d'essayer de résoudre sur le moment) et rêvasser sur quelque chose d'autre (par exemple, penser à une prochaine sortie alors que vous essayez d'étudier). Penser à une tâche alors que vous êtes en train de la réaliser n'est pas une rêverie.

Par contre, penser à cette tâche à d'autres moments, par exemple juste avant de dormir ou durant un long trajet de bus est une rêverie.

Chaque affirmation porte sur les rêveries ou sur le fait de rêvasser. Veuillez indiquer, pour chacune, la réponse qui vous correspond le mieux.

Q1 Je rêve:

Peu fréquemment (1)

Une fois par semaine (2)

Une fois par jour (3)

Quelques fois par jour (4)

De nombreuses fois par jour (5)

Q2 Les rêveries et le vagabondage de l'esprit représentent:

0% de mes pensées de la journée (1)

Moins de 10% de mes pensées de la journée (2)

Au moins 10% de mes pensées de la journée (3)

Au moins 25% de mes pensées de la journée (4)

Au moins 50% de mes pensées de la journée (5)

Q3 En ce qui concerne les rêveries, je me définirais comme quelqu'un qui:

Ne rêve jamais (1)

Rêve très rarement (2)

Rêve occasionnellement (3)

Rêve modérément (4)

Est un rêveur invétéré (5)

Q4 Je me rappelle de mes rêveries ou je réfléchis à mes rêveries:

Peu fréquemment (1)

Une fois par semaine (2)

Une fois par jour (3)

Quelques fois par jour (4)

De nombreuses fois par jour (5)

Q5 Quand je ne prête pas beaucoup d'attention à un travail, à un livre ou à la tv, j'ai tendance à rêvasser:

0% du temps (1)

10% du temps (2)

25% du temps (3)

50% du temps (4)

75% du temps (5)

Q6 A la place de faire attention aux gens et aux événements autour de moi, je passe:

0% de mon temps perdu dans mes pensées (1)

Moins de 10% de mon temps perdu(e) dans mes pensées (2)

Au moins 10% de mon temps perdu(e) dans mes pensées (3)

Au moins 25% de mon temps perdu(e) dans mes pensées (4)

Au moins 50% de mon temps perdu(e) dans mes pensées (5)

Q7 Je rêveasse au travail ou en cours:

Peu fréquemment (1)

Une fois par semaine (2)

Une fois par jour (3)

Quelques fois par jour (4)

De nombreuses fois par jour (5)

Q8 Me souvenir du passé, penser au futur, ou imaginer des évènements inhabituels occupe:

0% de mes pensées de la journée (1)

Moins 10% de mes pensées de la journée (2)

Au moins 10% de mes pensées de la journée (3)

Au moins 25% de mes pensées de la journée (4)

Au moins 50% de mes pensées de la journée (5)

Q9 Je me perds dans des rêveries:

Peu fréquemment (1)

Une fois par semaine (2)

Une fois par jour (3)

Quelques fois par jour (4)

De nombreuses fois par jour (5)

Q10 Je rêveasse à chaque fois que j'ai du temps libre:

Jamais (1)

Rarement (2)

Parfois (3)

Fréquemment (4)

Toujours (5)

Q11 Je rêve au lieu de faire attention lorsque j'assiste à une réunion ou à un spectacle qui n'est pas très intéressant:

- Jamais (1)
- Rarement (2)
- Parfois (3)
- Fréquemment (4)
- Toujours (5)

Q12 Je rêve lors d'un long trajet en bus, train, ou avion:

- Jamais (1)
- Rarement (2)
- Parfois (3)
- Fréquemment (4)
- La plupart du temps (5)

End of Block: DDFS

Start of Block: MWS

Pour les affirmations suivantes, sur une échelle de 1 à 7, sélectionnez la réponse qui reflète le mieux votre tendance à vous engager dans le vagabondage de l'esprit (le mind wandering, en anglais) dans la vie quotidienne.

Q1 Je trouve que mes pensées vagabondes spontanément.

- 1. Rarement (1)
- 2. (2)
- 3. (3)
- 4. (4)
- 5. (5)
- 6. (6)
- 7. Souvent (7)

Q2 Quand j'ai l'esprit errant, mes pensées ont tendance à se déplacer d'un sujet à un autre.

Rarement (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Souvent (7)

Q3 C'est comme si je n'avais aucun contrôle quand mon esprit vagabonde

1. Presque jamais (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Presque toujours (7)

Q4 J'ai l'esprit errant même quand je suis censé faire autre chose.

1. Rarement (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Souvent (7)

End of Block: MWS

Start of Block: MWD

Q1 Je laisse exprès mes pensées vagabonder.

Rarement (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Souvent (7)

Q2 J'aime quand j'ai l'esprit errant.

Rarement (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Souvent (7)

Q3 Je trouve que errer dans mes pensées est un bon moyen de faire face à l'ennui.

Pas du tout vrai (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Très vrai (7)

Q4 Je me permets d'être absorbé dans une fantaisie agréable.

Rarement (1)

2. (2)

3. (3)

4. (4)

5. (5)

6. (6)

7. Souvent (7)

End of Block: MWD

Start of Block: MAAS-LO

Voici une série de propositions décrivant des expériences de la vie quotidienne. Veuillez indiquer à l'aide de l'échelle allant de 1 à 6 la fréquence avec laquelle vous vivez chacune de ces expériences actuellement. Veuillez s'il vous plaît répondre selon votre expérience réelle plutôt que selon ce que vous pensez que votre expérience devrait être.

Q1 Il m'arrive d'éprouver une émotion et de ne pas en prendre conscience avant un certain temps.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q2 J'ai des difficultés à rester concentré(e) sur ce qui se passe dans le présent.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q3 J'ai tendance à marcher rapidement pour me rendre là où je veux aller, sans prêter attention à ce qui se passe durant le trajet.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q4 J'ai tendance à ne pas remarquer des sensations de tension physique ou d'inconfort jusqu'à ce qu'elles captent vraiment mon attention.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q5 Il me semble que je fonctionne « en mode automatique » sans être très conscient(e) de ce que je fais.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q6 Je fais les choses très rapidement sans y prêter vraiment attention.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q7 Je suis tellement focalisé(e) sur le but que je veux atteindre que je perds de vue ce que je suis en train de faire pour y parvenir.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q8 Je fais des travaux ou des tâches de manière automatique, sans me rendre compte de ce que je suis en train de faire.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q9 Je me surprends à écouter quelqu'un d'une oreille tout en faisant autre chose.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q10 Je me surprends à être préoccupé(e) par l'avenir ou le passé.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q11 Je me surprends à effectuer des choses sans y prêter attention.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

Q12 Je grignote sans réaliser que je suis en train de manger.

Presque jamais (1)

Très peu fréquemment (2)

Assez peu fréquemment (3)

Assez fréquemment (4)

Très fréquemment (5)

Presque toujours (6)

End of Block: MAAS-LO

Start of Block: PANAS (trait)

Ce questionnaire contient des adjectifs qui décrivent des sentiments et des émotions. Pour chacun de ces adjectifs, veuillez indiquer à quel point il décrit votre ressenti habituel, c'est-à-dire comment vous vous sentez en moyenne.

Q1 Intéressé(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q2 Angoissé(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q3 Excité(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q4 Fâché(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q5 Fort(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q6 Coupable:

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q7 Peureux(se):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q8 Hostile:

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q9 Enthousiaste:

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q10 Fier(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q11 Irrité(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q12 Alerte:

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q13 Honteux(se):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q14 Inspiré(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q15 Nerveux(se):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q16 Déterminé(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q17 Attentif(ve):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q18 Agité(e)

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q19 Actif(ve):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

Q20 Effrayé(e):

Très peu ou pas du tout (1)

Un peu (2)

Modérément (3)

Beaucoup (4)

Enormément (5)

End of Block: PANAS (trait)

Start of Block: Med, yoga

Q Pratiquez-vous ou avez-vous pratiqué le yoga?

Oui (1) Non (2)

Skip To: Q If Pratiquez-vous ou avez-vous pratiqué le yoga? = Oui

Skip To: Q If Pratiquez-vous ou avez-vous pratiqué le yoga? = Non

Q Quel type de yoga pratiquez-vous?

Q Quelle est la durée moyenne de vos sessions?

entre 5 et 15 min (1) entre 15 et 30 min (2) entre 30 et 45 min (3) entre 45 et 60 min (4)
plus de 1 h (5)

Q A quel rythme pratiquez-vous?

moins de 1 fois par semaine (1) 1 fois par semaine (2) 2 fois par semaine (3) 3 fois par
semaine (4) 4 fois par semaine (5) 5 fois par semaine (6) 6 fois par semaine (7) 7 fois par
semaine (8) plus de 7 fois par semaine (9)

Q Depuis combien de temps pratiquez vous?

Moins de 1 mois (1) Entre 1 et 3 mois (2) Entre 3 et 6 mois (3) Entre 6 et 9 mois (4)
Entre 9 et 12 mois (5) Entre 1 et 2 ans (6) Entre 2 et 3 ans (7) Entre 3 et 4 ans (8) Entre 4 et 5
ans (9) Plus de 5 ans (10)

Q Pratiquez-vous ou avez-vous pratiqué la méditation?

Oui (1) Non (2)

Skip To: Q If Pratiquez-vous ou avez-vous pratiqué la méditation? = Oui

Skip To: End of Block If Pratiquez-vous ou avez-vous pratiqué la méditation? = Non

Q Quelle type de méditation pratiquez-vous?

Q Quelle est la durée moyenne de votre session?

entre 5 et 15 min (1) entre 15 et 30 min (2) entre 30 et 45 min (3) entre 45 et 60 min (4)
plus de 1 h (5)

Q A quel rythme pratiquez-vous?

Plus de 2 à 3 fois par jour (1) 2 à 3 fois par jour (2) 1 à 2 fois par jour (3) 1 fois par jour
(4) 5 à 6 fois par semaine (5) 4 à 5 fois par semaine (6) 3 à 4 fois par semaine (7) 1 à 3 fois par
semaine (8) 1 fois par semaine (9) Moins de 1 fois par semaine (10)

Q Depuis combien de temps pratiquez vous?

Moins de 1 mois (1) Entre 1 et 3 mois (2) Entre 3 et 6 mois (3) Entre 6 et 9 mois (4)
Entre 9 et 12 mois (5) Entre 1 et 2 ans (6) Entre 2 et 3 ans (7) Entre 3 et 4 ans (8) Entre 4 et 5
ans (9) Plus de 5 ans (10)

End of Block: Med, yoga

Start of Block: Demographics (Base/langues)

Q Veuillez indiquer votre année de naissance:

Q Veuillez indiquer votre sexe :

Masculin (1) Féminin (2)

Q Quelle est votre langue principale, c'est-à-dire la langue dans laquelle vous pensez et que vous connaissez le mieux? Si vous pratiquez plusieurs langues que vous maîtrisez très bien, indiquez ces langues.

Allemand (ou suisse-allemand) (1)

Français (2)

Italien (3)

Romanche (4)

Serbe/croate (5)

Albanais (6)

Portugais (7)

Espagnol (8)

Anglais (9)

Autre (10)

Skip To: End of Block If Quelle est votre langue principale, c'est-à-dire la langue dans laquelle vous pensez et que vous... = Français

Q Quelle connaissance avez-vous du français pour:

Pas du tout (1) Un peu (2) Bien (3) Très bien (4)

Comprendre (1)

Lire (2)

Ecrire (3)

Parler (4)

Q Quel est votre niveau de français, selon le cadre européen de référence pour les langues (CECRL) ?

Je ne sais pas (1)

A1 - niveau élémentaire (2)

A2 - niveau élémentaire (3)

B1 - niveau indépendant (4)

B2 - niveau indépendant (5)

C1 - niveau expérimenté (6)

C2 - niveau expérimenté (7)

End of Block: Demographics (Base/langues)

Start of Block: Mob, check

Q Quel outil technologique avez vous utilisé pour répondre a ce questionnaire?

Ordinateur (1)

Tablette (2)

Téléphone portable (3)

Q Si vous voulez participer au tirage au sort pour gagner un bon d'achat de 20CHF à la FNAC veuillez laisser votre adresse mail:

Q Merci de répéter votre adresse mail:

Q Afin que ce questionnaire puisse être utilisé à des fins statistiques fiables, je certifie avoir répondu de mon mieux, le plus sincèrement à celui-ci.

Oui (1) Non (2)

End of Block: Mob, check

End of Survey Message