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The influence of mindfulness on young adolescents' eyewitness memory and suggestibility

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Abstract

Recent research has linked mindfulness to adults' false memory formation. This study investigated the effects of mindfulness on adolescents' event memory and suggestibility by using an "extensive" 8-week mindfulness program, an active control group, and a participatory to-be-remembered event. Students aged 13 to 14 were randomly assigned to a mindfulness or active control condition (socioemotional learning). After the seventh week, students participated in a target event and were immediately interviewed during which misleading information was presented. A week later, those in the mindfulness condition incorrectly reported more false information compared with those in the control group. Mindful practice did not affect memory encoding but had a negative effect during retention and retrieval. These findings suggest that adolescents who are exposed to mindfulness exercises may be susceptible to memory intrusions. Professionals should therefore be especially careful to avoid using suggestive and leading questions during investigative interviews with mindful adolescents.

KEYWORDS

event memory, false memories, mindfulness, source monitoring, suggestibility

1 | INTRODUCTION

Over the last couple of decades, there has been burgeoning interest on identifying the various benefits of mindfulness practice in areas such as psychology, healthcare, neuroscience, business, the military, and education (Meiklejohn et al., 2012). Kabat-Zinn (2003) defined mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (p.144). As such, attention (which requires monitoring both inner and outer environments) and awareness (being cognizant to sensory experiences) are key features of mindfulness (Brown & Ryan, 2003). Mindfulness has been shown to be beneficial for adolescents in health, academic, social, cognitive, and emotional aspects, including self-regulation, coping abilities, frustration tolerance, and self-control (e.g., Britton et al., 2014; Wisner, Jones, & Gwin, 2010). Results from other studies show the benefits of

mindfulness on memory (e.g., Lloyd, Szani, Rubenstein, Colgary, & Pereira-Pasarin, 2016). Participants who completed a 12-min mindful meditation more accurately distinguished information from a target video and a text message, compared with those in a control group (Alberts, Otgaar, & Kalagi, 2017).

In contrast, other researchers reported that mindfulness increased participants' susceptibility to "false" memory (Rosenstreich, 2016; Wilson, Mickes, Stolarz-Fantino, Evrard, & Fantino, 2015). Using the Deese–Roediger–McDermott paradigm, Wilson et al. (2015) found that a 15-min mindfulness induction increased participants' false recollection of the critical lure that was associated with the studied word list but not presented. The increase in false memory is alarming, as it shows potentially negative side effects of mindfulness despite its popularity. In the forensic context, the accuracy of eyewitness accounts is critical to investigations. In this study, we assessed whether an extended period of mindfulness practice increased adolescents' susceptibility to false suggestions of an experienced event.

2 | FALSE MEMORY RESEARCH WITH ADOLESCENTS

The concept of suggestibility refers to the extent that memory and reports about witnessed events can be influenced by social and cognitive factors (Ceci & Bruck, 1993). False information may contaminate testimony by altering memories of the original event, thereby impeding the investigative process (Loftus & Hoffman, 1989; London, Bruck, & Melnyk, 2009).

Due to a number of high-profile child sexual abuse cases in the 1990s (see Ceci & Bruck, 1993), most research on children's suggestibility has focused primarily on preschoolers and children under 12-years-old (e.g., Powell, Roberts, Ceci, & Hembrooke, 1999). Literature on adolescent suggestibility remains scarce (McGuire, London, & Wright, 2011) and has focused largely on interrogative suggestibility. The evidence shows that this age group is at risk for involuntary and false confessions in interrogations (Kassin, Appleby, & Perillo, 2010). For example, adolescent boys were more likely to change their responses when given negative feedback in an interrogative situation compared with adults (Singh & Gudjonsson, 1992).

Other suggestibility studies with adolescents have shown that they are as, or more, resistant to suggestions than adults. For example, using a postevent misinformation paradigm, 16- to 18-year-olds reported fewer misled details than 7- to 9-year-olds but were as accurate as older adults (60- to 85-year-olds; Coxon & Valentine, 1997). Also, McGuire et al. (2011) found peer influence affects 11- to 25-year-olds' memory reports because they were less accurate when cowitnesses provided false (versus true) suggestions, regardless of age. Other studies using semantic association tasks (e.g., Deese–Roediger–McDermott) with 11- to 25-year-olds showed that false memory actually increased with age (McGuire, London, & Wright, 2015). In sum, the small number of studies on adolescents' suggestibility, and the mixed findings regarding how their suggestibility compares with that of young children and adults, indicates that that there is a high need for further research to understand the circumstances that might be affecting adolescents' suggestibility.

3 | MINDFULNESS AND MEMORY PROCESSES

Some researchers suggest that mindfulness exercises could increase individuals' awareness of what they have experienced, thereby enhancing their memory (e.g., Alberts et al., 2017). However, mindfulness practices also de-emphasize rumination and promote a nonjudgmental attitude (Hanh, 1976; Marlatt & Kristeller, 1999; Shelov, Suchday, & Friedberg, 2009), which could discourage individuals from engaging in elaborate memory rehearsal and other cognitive operations, thereby weakening memory traces and increasing their susceptibility to false information (Wilson et al., 2015).

This is relevant to one major source of suggestibility seen when individuals struggle to attribute the origins of their memories, a process known as "source monitoring" (Johnson, Hashtroudi, & Lindsay, 1993). Specifically, source-monitoring errors occur when individuals are unable to accurately decide from which event (i.e., the source) the remembered details were derived. In a postevent misinformation paradigm, participants would be asked to report information that only came from their own experience (e.g., what they saw and what they did) rather than false information derived from a suggestive interview. Source decisions involve a qualitative evaluation of encoded details (e.g., temporal, spatial, and semantic information) as well as the ability to engage in effortful and elaborate cognitive processing during source judgment (Johnson, Raye, Foley, & Foley, 1981). For example, remembering and recollecting information that is associated with the context under which the event took place (e.g., when it occurred and who was the informant) could help individuals make accurate source decisions. Researchers have found that the more individuals can accurately monitor memory sources, the less likely they are to be susceptible to suggestive information (Leichtman, Morse, Dixon, & Spiegel, 2000; Lindsay & Johnson, 1989). Therefore, individuals who practice mindfulness may be more susceptible to false information because mindful practice emphasizes being nonjudgmental and accepting of incoming information. This could reduce attention to information that could later help discriminate true and false sources and prevent elaborative processing that could otherwise help discrimination between events originating from different sources.

Although there is evidence supporting a relationship between mindfulness and memory, few studies have systematically examined how the timing of mindfulness training affects memory (Lloyd et al., 2016). In most studies described above, the mindfulness induction took place *before* participants studied the to-be-remembered stimuli and completed a memory test (see Figure 1a; Alberts et al., 2017; Brown, Goodman, Ryan, & Anālayo, 2016, studies 2 and 3; Lloyd et al., 2016, studies 3 and 4; Rosenstreich, 2016; Wilson et al., 2015). Results from these studies are mixed, with some showing that mindfulness induction increased memory errors at immediate retrieval (Wilson et al., 2015) and others finding that mindfulness practice was not associated with false memories at the immediate interview (e.g., Alberts et al., 2017; Lloyd et al., 2016, studies 3 and 4). Lloyd et al. (2016, studies 1 and 2) used a different design, in which the mindfulness exercise was presented *after* the presentation of the to-be-remembered word list and before the recognition test (see Figure 1b) and found that memory errors decreased. Overall, it appears that prior work has yielded inconsistent findings in whether mindfulness (a) increases or decreases false memories with adolescents and (b) whether this relationship is dependent on whether mindful practice is introduced before (see Figure 1a) or after (see Figure 1b) the presentation of the to-be-remembered stimuli.

4 | CURRENT STUDY

The current research primarily focused on examining the effects of mindfulness training on adolescents' memory retrieval, although encoding was also measured. Specifically, as shown in Figure 1c, we staged an *interactive* event in the penultimate week of the program after the mindful (or socioemotional learning) session. A biasing interview took place immediately after the target event, which served two purposes: (a) to present false information about the staged event and (b) to assess participants' immediate memory encoding. A week later, we interviewed participants again to examine delayed memory
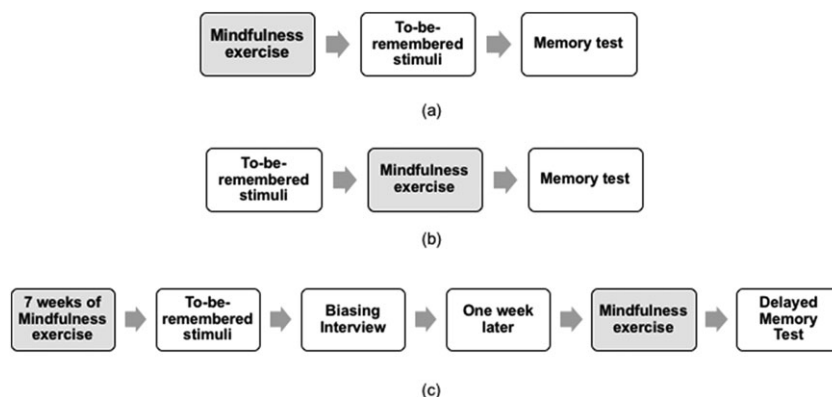
FIGURE 1 Mindfulness and memory experimental procedures

retrieval. To the authors' knowledge, no studies have examined the direct link between mindfulness and adolescents' event memory and suggestibility. Understanding this link is especially important as mixed findings have been found in studies that examined the relationship between "components" of mindfulness (e.g., meditation) and memory with adult participants. In addition, over the past 30 years, school-aged children have been the major focus of eyewitness testimony research leading to reduced understanding of these processes in adolescents, compared with children between ages 5 and 10.

Wilson et al. (2015) posited that mindfulness training may weaken memory traces, attenuate elaborate processing, and lead to source-monitoring errors at retrieval. We built our hypothesis on the findings from Wilson et al.'s (2015) study. Specifically, we expected that the experimental group (mindfulness program) would report more false details than would the control group (socioemotional learning program) at a delayed interview. Compared with designs that used a brief mindfulness exercise, the design in this study is more ecologically valid for two reasons. First, we used an extensive 8-week mindfulness training program that better resembles a typical mindfulness program. Second, we measured participants' memory after a delay, which is more applicable to the forensic area, given that investigative interviews often take place after delays (Roberts, 2002).

5 | METHOD

5.1 | Participants

Forty-eight Grades 7 and 8 students were recruited from a public school in a midsize North American city. Parents gave informed consent; the participants gave verbal assent. Ethical procedures related to human participation were vigorously maintained. Eight children missed the final interview. Thus, the final sample included 40 students (Mean$_{age}$ = 13.05 years, SD = .65). Of these, 21 were randomly assigned to the Mindful Me! Program (the mindfulness group; 52% male), and 19 to the Social Skills Program (the active control group; 55% male).

5.2 | Materials and procedure

Each session was conducted by two trained research assistants. There was a maximum class size of 10, and sessions took approximately 30 min. On the seventh week, a target event led by an unfamiliar research assistant was conducted immediately after the session. Children were interviewed about the target event immediately after to check encoding and introduce suggested items. One week later, the delayed interview was conducted to assess delayed memory retrieval.

5.2.1 | Mindful Me! Program

The Mindful Me! Program was implemented from previous empirically based mindfulness programs for students (e.g., MindUp Curriculum, Hawn, 2011) and focused on facilitating the development of students' emotional competence and behavioral self-regulation. The program comprised meditation practices (e.g., deep breathing and body scans) designed for children to focus on "staying in the present moment." Each week had a new theme: relaxation, mindful movements, self-compassion or "letting go of anger," gratitude or thankfulness, mindful listening, worry, mindful eating, and a Spider Man activity aimed at focusing on activating the senses.

5.2.2 | Active control group

The development of the social emotional learning program was guided by existing social and emotional skill training programs supported by theoretical models (e.g., Social Emotional Learning, Merrell & Gueldner, 2010; Phillips & Shonkoff, 2000). Socioemotional interventions are implemented in various schools aimed at bullying prevention, conflict resolution, and social skills training (Wood, 2015). The social skills program focused on emotional processes, social/interpersonal skills, and cognitive regulation. The sessions were identical in length to those in the mindfulness group and also introduced a new theme each week (e.g., teamwork), independent from those in the mindfulness group. There was minimal overlap in the activities between the two groups, and mindfulness practices were not introduced to the control group. The activities were focused on compassion toward others, not the self (as is the case in a mindfulness approach).

5.2.3 | Target event

At the beginning of the 8-min target event (titled the "[name] Activities"), as a ruse, the program leader excused herself after receiving a Facebook message, and another research assistant entered, who was then known as the "new leader." After introducing herself, the new leader conducted two activities with the group as a way of "filling in for the program leader until her return": a 12-piece animal puzzle and a hangman game. The structure, items, actions, and verbiage of

the target event were identical for both programs. A total of 16 target items were included with each item presented two times (e.g., theme of the puzzle and color of the new leader's bag; see Table 1 for the full list). For example, "hand sanitizer" (Item 11 in Table 1) was pointed out by the new leader as follows:

"Hmm ... Since [name of original leader] isn't back yet. Let's do another activity. But before we do that, let's get refreshed with this aloe-scented hand sanitizer ... Let's each get some aloe scented hand sanitizer."

5.2.4 | Biasing interview

Children were interviewed individually by a third research assistant immediately following the target event. Prior to the start of the questions, the interviewer confirmed that children understood references to the "[name] Activities" and the "new leader" and all did. After a brief rapport-building session, a series of forced-choice questions were presented in random order, one question for each target item in the event.

Each question contained a *check* and a *target question* (see Figure 2). First, a yes/no question probed whether a detail was present during the target event. No misleading information was presented here. For the target item "hand sanitizer," for example, the *check* was "Did the new leader give you hand sanitizer before the [Activities] started?". The purpose of this *check* was to make sure that any responses to the subsequent questions were not due to forgetting of the target event items. As all participants did remember, results from the *check* questions were not included in the main analyses below. The participant was then asked the main question regarding the target details. In half of these *target questions*, a "non-misleading" detail was suggested (e.g., "Was the hand sanitizer aloe scented?"; correct response is yes); in the other half, a "misleading" detail was suggested (e.g., "Was the hand sanitizer cucumber scented?"; correct
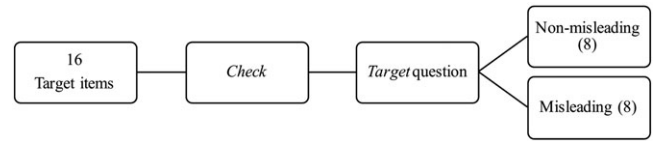

FIGURE 2 The encoding and suggestibility procedure

response is no). Four counterbalanced versions of these questions were created to account for any potential item effects. Refer to Table 1 for the full list of suggestions.

Participants' responses to the non-misleading questions were simply coded as *correct* (i.e., a hit); an *incorrect rejection* (i.e., a miss); or *other* (i.e., "don't know" and irrelevant responses). Responses to the misleading questions were coded as *misled* (i.e., a "false alarm") if the participant accepted the interviewer's false suggestion or *correct rejection* if the participant rejected the interviewer's false suggestion. "Don't know" responses were coded as *other*.

5.2.5 | Delayed interview

All participants were interviewed individually by an unfamiliar research assistant 1 week after the biasing interview and immediately after the eighth session. After rapport building, the participants were asked to recall everything they remembered about the target event, and all students did so. A series of cued-recall questions regarding each target item was then administered (e.g., for the item *puzzle*, "What was the picture of the puzzle?").

Participants' responses were coded as *correct*, *incorrect*, or *other*. Errors were further coded as *misled* (reporting the misled version of the item), *external* (intruding information that was never experienced or mentioned in the target event or biasing interview), or *non-specific* (generic responses that were ambiguous in meaning). An example of

TABLE 1 List of target items and suggestions

	Target item	Description	Non-misleading suggestion	Misleading suggestion Set 1	Misleading suggestion Set 2
1	Message source	Why did <leader of the program> leave the room?	Facebook	Text	Instagram
2	Feeling	New leader's feeling	Happy	Wonderful	Grateful
3	Reasoning	New leader's reasoning for feeling such way	New car	New bike	New scooter
4	Accessory	A piece of accessory the new leader put on	Tuque	Ball cap	Bandana
5	Bag color	What color was the bag the new leader carried to the classroom?	Purple	Blue	Red
6	Activity #1	What activity did the new leader do with the group first?	Puzzle	Word search	Maze
7	Blue sheet	What did the new leader lay on the desk for an activity?	Blue sheet	Blue rug	Blue plastic bag
8	Number of missing piece (s)	How many puzzle piece (s) was the new leader missing?	1	2	0
9	Tool box	Where was the missing puzzle piece found?	Tool box	Purse	Purple bag
10	Puzzle picture	What was the puzzle picture?	Tiger	Lion	Cheetah
11	Hand sanitizer	Scent of the hand sanitizer?	Aloe	Cucumber	Mint
12	Whiteboard	What did we do the hangman activity on?	Whiteboard	Blank piece of paper	Notebook
13	Hangman theme	Hangman game	Star Wars	Batman	Superman
14	Letter	What letter was already filled in?	Letter A	Letter R	Letter S
15	Something to sit on	What did you sit on?	Number mat	Alphabet mat	Word mat
16	Number of puzzle pieces	How many puzzle pieces were there?	12	11	13

a *non-specific* error was when participants reported "message" instead of "Facebook message" for the reason why the leader left the room (Item 1 in Table 1).

5.2.6 | Inter-rater reliability

All questionnaires were coded by the fourth author, and another research assistant coded 20% of the encoding and delayed interviews. Coders agreed on 97% (κ = 0.95) and 98% (κ = 0.91) of the encoding and target details, respectively. All disagreements were resolved.

6 | RESULTS

There were no outliers according to the ±3 *SD* exclusion criterion. Between-group differences were examined using independent samples *t* tests. The degrees of freedom varied because the corrected values were used when Levene's test showed that equal variances were not assumed.

6.1 | Biasing (immediate) interview

6.1.1 | Accuracy rate

There were no effects of group on the number of *hits* (experimental: *M* = 6.76; *SD* = 0.83; control: *M* = 6.90; *SD* = 0.72), *t*(39) = .57, *p* = 0.573, Cohen's *d* = 0.18, 95% CI [−0.35, 0.63], nor *incorrect rejections* (experimental: *M* = 0.52; *SD* = 0.75; control: *M* = 0.60; *SD* = 0.68), *t*(39) = 0.34, *p* = 0.736, Cohen's *d* = 0.11, 95% CI [−0.38, 0.53]. Findings from the independent samples *t* tests did not reveal any significant differences between the two conditions for *misled* (experimental: *M* = 1.24; *SD* = 1.36; control: *M* = 0.90; *SD* = 0.91), *t*(39) = −1.05, *p* = 0.301, Cohen's *d* = 0.33, 95% CI [−0.99, 0.31], and *correct rejection* responses (experimental: *M* = 6.24; *SD* = 1.26; control: *M* = 6.45; *SD* = 0.89), *t*(39) = 0.62, *p* = 0.539, Cohen's *d* = 0.19, 95% CI [−0.48, 0.90].

6.1.2 | Sensitivity index and response bias

According to signal detection theory (Stanislaw & Todorov, 1999), the sensitivity index (*d′*) measures participants' discriminability of target stimuli and distractors, and the response bias (criterion *C*) measures how conservative participants are when making their decisions in yes/no tasks. A higher *d′* score indicates that participants can accurately differentiate between presented and nonpresented items. A positive criterion *C* score indicates liberal response bias (i.e., tendency to respond *yes*); a negative criterion *C* score denotes a conservative response bias (i.e., tendency to respond *no*). Each student's *d′* and criterion *C* scores were calculated using the hit and false alarm rates. To prevent the effects of perfect hit rate and zero false alarm rate, we corrected the hit and false alarm rates by adding 0.5 to each frequency and adding 1 to the divisor (Gee & Pipe, 1995; Snodgrass & Corwin, 1988; Stanislaw & Todorov, 1999). Independent samples *t* tests revealed no significant difference between the control (*M* = 2.09, *SD* = 0.53) and experimental groups (*M* = 1.89, *SD* = 0.69) in *d′* scores, *t*(39) = 1.01, *p* = 0.321, Cohen's *d* = 0.33, 95% CI = [−0.20, 0.58], or *C* scores (*M* = .06, *SD* = 0.31; *M* = 0.03, *SD* = 0.28, respectively), *t*(39) = 0.41, *p* = 0.683, Cohen's *d* = 0.10, 95% CI [−0.15, 0.22]. In sum, these results suggest that initial encoding of the event did not vary between the mindful and control groups.

6.1.3 | Delayed interview

The independent-samples *t* test on the *correct* responses revealed a significant between-group difference, *t*(38) = 2.11, *p* = 0.041, Cohen's *d* = 0.68, 95% CI [0.05, 2.36]. Students in the control group (*M* = 13.16, *SD* = 1.54) correctly answered more of the cued-recall questions compared with those in the mindfulness group (*M* = 11.95, *SD* = 2.01).

Similarly, those who were assigned to the control condition provided fewer *incorrect* responses (*M* = 1.37, *SD* = 1.07) than students in the mindfulness condition (*M* = 2.48, *SD* = 1.60), *t*(35) = −2.60, *p* = 0.014, Cohen's *d* = 0.82, 95% CI [−1.97, −0.24]. *Incorrect responses* comprised *non-specific* (generic), *external* (new information), and *misled* (the misled version of an item) errors. Regarding the *non-specific* errors, we found that students in the mindful condition (*M* = 0.76, *SD* = 0.62) reported more than those in the control condition (*M* = 0.26, *SD* = 0.45), *t*(38) = −2.86, *p* = 0.007, Cohen's *d* = 0.92, 95% CI [−0.85, 0.15]. However, there were no group differences for *external* (mindfulness: *M* = 1.10, *SD* = 1.22; control: *M* = 0.58, *SD* = 0.84), *t*(38) = −1.54, *p* = 0.131, Cohen's *d* = 0.50, 95% CI [−1.19, 0.16], or *misled* errors (mindfulness: *M* = 0.62, *SD* = 0.77; control: *M* = 0.53, *SD* = 0.77), *t*(38) = −0.34, *p* = 0.733, Cohen's *d* = 0.11, 95% CI [−0.64, 0.45].

7 | DISCUSSION

This study examined the effects of mindfulness on young adolescents' false memory susceptibility. Source identification (or source monitoring, Johnson et al., 1993) is a skill that plays an important role in providing accurate testimony in forensic interview-like situations (Roberts, 2002). Few prior studies have made a connection between mindfulness practice and eyewitness memories (e.g., Albert et al. 2017). The results of the current study were clear: Mindfulness reduced accuracy after false information was introduced compared with the active control group at memory *retrieval*. This is the first study to examine the link between *extensive* mindfulness practice and false memories using a *participatory* event with *adolescents* and an *active* control group.

Further analyses of the *incorrect responses* at the delayed interview revealed those who received mindfulness training provided more *non-specific* errors than did those in the control group. It appears that mindful practice led students to process the incoming information in the absence of effortful elaborations, which consequently gave rise to source-monitoring failures at *retrieval*. In other words, participants might have failed to engage in in-depth processing that could otherwise help them retrieve details to identify the source of the activated information (e.g., "the Facebook message was what I heard during the target event" and "the text message was what I heard during the interview") and instead provided more generic (e.g., "message") than specific responses (e.g., "Facebook message").

Wilson et al. (2015) found that participants in the mindfulness group were less sensitive when differentiating between target and

lure items in a word-association task. They suggested that mindfulness training could negatively influence participants' source-monitoring abilities by reducing trace records and elaborate cognitive operations. The current results regarding event memory are in concert with those of Wilson et al. (2015) who used a word-association task. Thus, across different paradigms and distinct age groups (adolescence vs. adults), the presence or absence of mindful practice can influence the accuracy of individuals' memories.

Using measures of encoding, participants' memories did not differ as a function of condition at the immediate biasing interview, suggesting that the effect of mindfulness did not play a significant role in memory encoding. This result is in line with Rosenstreich and Ruderman (2016)'s proposition that mindfulness practice is more likely to affect memory in the decision-making process at retrieval instead of encoding. From a cognitive perspective, memories are derived from various sources, such as imagination, TV, other people's suggestions, and real-life experiences. Witnesses need to accurately differentiate these sources in order to provide credible and incriminating testimony (Roberts, 2002). According to the source-monitoring framework (Johnson et al., 1993), distinctive characteristics of memory records (e.g., perceptual information and records of cognitive operations) can help individuals to accurately specify memory sources (Johnson et al., 1981). Mindfulness practices emphasize the importance of acceptance, judgment-free awareness, and openness (Hanh, 1976; Marlatt & Kristeller, 1999; Shelov et al., 2009). As these ideas encourage individuals to observe the present moment without judgment but with acceptance, the conscious mental effort of cognitive operations is minimized, and, instead, thoughts are accepted and acknowledged. As a result, at the time of retrieval, individuals who practice mindfulness may not activate sufficient and specific information to help them make source decisions (Wilson et al., 2015).

The findings of the current research lend support to the proposition that the mindful group did not retain or retrieve source-specifying information over this relatively short delay. Although the amount of *misled* and *external* errors did not differ across conditions in this study, it is still possible that adolescents who practice mindfulness are more open to memory intrusions and suggestive information in the absence of details that are associated with memory sources. One reviewer raised the possibility that mindfulness training may decrease participants' expectations about what they ought to remember, which could lead to lower scrutiny of incoming information (i.e., a lowered expectation to remember increases the acceptance of new information). Overall, findings from the literature are mixed, so more research is needed to further investigate the role of mindfulness practice in adolescents' suggestibility.

The current study brings vital information to our understanding of the effect of mindfulness practice on young adolescents' suggestibility using novel design decisions. First, existing literature on the effect of mindfulness on memory has focused on using brief meditations (e.g., Wilson et al., 2015), whereas here, participants engaged in an 8-week mindfulness program. Second, the selected sample (i.e., young adolescents) is rare in eyewitness studies. Third, to provide a strong test of potential effects of mindfulness on false memories, the current study included an active control group in a program equal in length and desirable behavior ideals. Differences between the mindfulness

and socioemotional control groups may indeed have been larger if typical control conditions in the literature were employed (e.g., wait lists or no-treatment controls). Even though the suggestive procedure in this study was fairly mild, we found effects of mindfulness on false memories. Finally, a participatory event contained the context, wealth of details, and social interactions that a "real-life" event resembles. Future studies could increase the intensity of the suggestibility manipulation and employ more complex staged events (e.g., repeated events) to establish a clearer connection between mindfulness and false memory. However, it still remains unclear whether mindfulness training programs have long-term effects on adolescents' false memory. A promising line of research would be using a longitudinal design to examine this issue.

Generally speaking, findings from this study suggest that eyewitness memory is more likely to be inaccurate for those who have recently received mindfulness training. However, the benefits of mindfulness on adolescents' mental health, social, and academic success are clear and should not be discouraged (e.g., Wisner et al., 2010). Rather, we suggest that the onus is on professionals to avoid asking suggestive and misleading questions especially when interviewing adolescents who are exposed to mindfulness-based therapy or have high levels of dispositional mindfulness.

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