

AUTHOR ACCEPTED MANUSCRIPT. © John Benjamins Publishing Company. The copyright holder should be contacted for permission to re-use or reprint the material in any form.

Turner, Rose and Vallée-Tourangeau, Frédéric (2020) Fiction effects on social cognition : varying narrative engagement with cognitive load. *Scientific Study of Literature*, 10(1), pp. 94-127
<https://doi.org/10.1075/ssol.19008.tur>

**Fiction Effects on Social Cognition:
Varying Narrative Engagement with Cognitive Load**

Rose Turner and Frédéric Vallée-Tourangeau

Author note

Rose Turner, Department of Psychology, Kingston University; Science Programme, London College of Fashion, UAL; Frédéric Vallée-Tourangeau, Department of Psychology, Kingston University. Correspondence concerning this article should be addressed to Rose Turner, Science Programme, London College of Fashion, 20 John Prince's Street, London, UK, W1G 0BJ. E-mail: R.turner@fashion.arts.ac.uk.

Abstract

Social cognition, the skillset involved in interpreting the cognitive and affective states of others, is essential for navigating the social world. Research has indicated that reading about fictional social content may support social cognitive abilities, however the processes underpinning these effects remain unidentified. This study aimed to examine the effect of narrative engagement on social cognition. A text pretest ($N = 11$), a manipulation pilot ($N = 29$) and full experiment ($N = 93$) were conducted. In the full experiment, the manipulation failed to vary levels of narrative engagement (transportation, identification and affective empathy) with a passage from a popular fiction text. A correlation analysis revealed positive associations between narrative engagement dimensions and social cognition. An exploratory between-groups analysis comparing reading to no-reading found a significant gain in explicit mental state attribution in the reading group, when controlling for demographic and dispositional differences.

Key words: NARRATIVE ENGAGEMENT, FICTION ENGAGEMENT, SOCIAL COGNITION, TRANSPORTATION, CHARACTER IDENTIFICATION, EMPATHY

Fiction Effects on Social Cognition: Varying Narrative Engagement with Cognitive Load

Social cognitive skills enable perceivers to decode and interpret others' mental state content and to respond appropriately (Fiske & Taylor, 2013). They are essential to the formation and maintenance of successful interpersonal relationships and can support prosocial behaviour (Castano, 2012; Paal & Bereczkei, 2007). Social cognition is multidimensional and involves cognitive (thinking) and affective (feeling) components (e.g., Shamay-Tsoory & Aharon-Peretz, 2007), and a range of processes can be recruited to the goal of interpreting another's thoughts and feelings. These tend to be measured using emotion recognition tests (static or dynamic faces), and tests of the ability to attribute emotions, beliefs and intentions to characters in vignettes or stories, or to confederates in interactive tasks. Skills in one area do not amount to skills across all and so performance between measures can dissociate (Oakley, Brewer, Bird & Catmur, 2016). Therefore, testing social cognition using simpler and more complex measures concomitantly (e.g., vignettes and narratives) can support the detection of variability across social cognitive skillsets (Turner & Felisberti, 2017).

Social cognitive skills typically emerge in childhood but vary through the lifespan (Duval, Piolino, Bejanin, Eustache & Desgranges, 2010), and can be trained in adults (Teding van Berkhout & Malouff, 2016). One activity that may support adults' social cognitive skills development is fiction leisure-reading. The same cognitive and neural mechanisms appear to be involved in the processing of both real and fictional events (e.g., Speer, Reynolds, Swallow & Zacks, 2009; Wallentin, Nielsen, Vuust, Dohn, Roepstorff & Lund, 2011), suggesting that fictional narratives are valid representations of the social world (Oatley, 2012; see also Gerrig, 1993). Oatley and Mar have argued that fiction constitutes a simulation of the

social world that functions to develop readers' social cognitive skills (Mar & Oatley, 2008; Oatley, 1999).

The assumption that narratives have social benefits (cf. Keen, 2007), has received support from several studies. Reading a passage of fiction has been shown to have an immediate, positive effect on social cognition task performance (for a meta-analysis, see Dodell-Feder & Tamir, 2018), and lifetime exposure to fiction, assessed using tools that measure familiarity with author names (Stanovich & West, 1989), is positively associated with social cognitive skills (for a meta-analysis, see Mumper & Gerrig, 2017). These associations appear to sustain when controlling for individual differences in general intelligence, age, and English fluency (e.g., Mar, Oatley, Hirsh, dela Paz & Peterson, 2006), openness to experience, and the trait tendency to become absorbed in stories (Mar, Oatley & Peterson, 2009). Although social experiences are depicted in nonfiction narratives too, expository nonfiction is primarily concerned with the provision of information. Fiction, on the other hand, is concerned with emotion (Oatley, 1999) and invites a uniquely open-minded style of engagement (Keen, 2007). It represents a "safe zone" in which readers can experience, infer and explore characters' internal states and circumstances without the real-world obligations that may be implicated in nonfiction (Keen, 2007, p.4). While lifetime exposure to nonfiction is also associated with higher performance on measures of social cognition, correlations tend to be stronger for fiction (in their meta-analysis, Mumper & Gerrig, 2017, reported aggregate correlations of $r = .07-.09$ for fiction reading with trait empathy, and $r = .21$ with mental state attribution, compared to $.06$ and $.09$ respectively for nonfiction, $N = 30$). Therefore, some variability in social cognitive skills appears to be uniquely associated with the features of fiction.

Literary and Popular Fiction

Literary fiction tends to depict complex, unpredictable characters, which require readers to imaginatively fill in gaps in the narrative (Hakemulder, 2000). This entails an active, “writerly” approach to characters’ inner experiences, which may recruit, and consequently strengthen, the social cognitive skills of readers (De Mulder, Hakemulder, van den Berghe, Klassen & Van Berkum, 2017; Kidd & Castano, 2013; Zunshine, 2006). In contrast, popular fiction contains consistent and predictable characters, and so less work in decoding their mental states is required to make sense of the narrative. While research evidence has supported the claim that canonical or award-winning literature can uniquely enhance social cognitive skills compared to popular fiction (e.g., Kidd & Castano, 2013; Kidd & Castano, 2017a; Djikic & Oatley, 2014; Pino & Mazza, 2016; van Kujik, Verkoeijen, Dijkstra & Zwaan 2018), other studies have failed to reproduce these effects (Camerer et al., 2018; Panero, Weisberg, Black, Goldstein, Barnes, Brownell & Winner, 2016; Samur, Tops & Koole 2018; see also Panero et al., 2017; Kidd & Castano, 2017b; Kidd & Castano, 2018a, 2018b). These findings may reflect heterogeneity across stimulus texts (e.g., texts of different lengths, containing a range of themes and characters) grouped within “literary” and “popular” experimental conditions (Panero et al., 2016).

Specific aspects of style can be used to distinguish “literary” from “popular” texts. For example, reflective markers accompanying mental state terms (e.g., “I felt really angry and then it changed to sadness” as opposed to non-reflective mental state descriptions, “I was angry, now I am sad”) tend to appear in texts classified as literary (due to being part of the canon or having won literary awards; Kidd & Castano, 2013; Kidd, Ongis & Castano, 2016). Kidd et al. (2016) showed that participants who read literary fiction with more reflective markers scored higher on a test of the ability to attribute mental states to photographs of the eye regions of faces (the Reading the Mind in the Eyes Test [RMET; Baron-Cohen,

Wheelwright, Hill, Raste & Plumb, 2001]) compared to those who read popular fiction with fewer reflective markers, or those who did not read.

“Foregrounding” refers to striking literary features that depart from everyday language use and are subjectively experienced as making a text seem more original (Koopman 2016; for examples of text with and without foregrounding, see Kuzmičová, Mangen, Støle & Begnum, 2017). Koopman (2016) found that participants who read a literary story with foregrounding, compared to those who read a version without, scored higher on self-reported understanding of the experiences of people in similar situations to the protagonists. This indicated that literary foregrounding may support comprehension and appreciation of people’s experiences when characters’ and real-world targets’ circumstances are matched (see also Hakemulder, 2004). In contrast, Kuzmičová et al. (2017) did not find a link between foregrounding and social cognitive processes. They asked participants to identify passages that they found striking in a text and, subsequently, to elaborate on their chosen sections. In their study, the version of the text lower in foregrounding led to more references to characters’ cognitive or affective mental states compared to the original text with foregrounding.

Popular fiction tends to contain fewer literary features and is less ambiguous than literary fiction. Its more predictable characters may evoke deeper engagement compared to literary fiction’s “complicated, changeable, and category-resistant characters” (Keen, 2007, p. 303). Several studies have indicated that popular genre-fiction may be positively associated with social cognitive outcomes. For example, research has shown positive associations between exposure to popular romance and suspense/thriller genres and performance on the RMET, not accounted for by demographic differences or exposure to nonfiction (Fong, Mullin & Mar, 2013). Self-reported enjoyment of popular genres, including comedy and romance, have found to positively correlate with the self-reported tendencies to take others’

perspectives and to feel concern for others, whereas other genres (e.g., crime/thriller) were not associated with these abilities (Turner & Felisberti, 2018). Relationships between fiction-exposure and social cognitive outcomes appears to vary at the level of thematic genre (see also, Black, Capps & Barnes, 2018, who examined relationships between genre-exposure and moral judgments). Therefore, the processes that mediate fiction effects may transcend broad literary versus popular classifications.

Narrative Engagement Processes

Studying the processes that may mediate fiction effects circumvents the problems associated with manipulating specific textual features, where other variables, such as text length and complexity of language, can result in mixed effects (e.g., Koopman & Hakemulder, 2015). Research in the field of narrative persuasion has examined the role of such processes. Here, studies have shown that fictional stories can alter people's beliefs and attitudes in predetermined directions (Slater, 2002). This effect can arise from the reader's analysis of explicit messages (analytic persuasion; Chaiken 1987; Petty & Cacioppo, 1986) or via non-critical, experiential "narrative engagement" (Busselle & Bilandzic, 2009) processes (narrative persuasion; Green, Garst & Brock, 2004; Green & Brock, 2000). Narrative engagement involves several dimensions. A reader may feel "lost" (Nell, 1988, p. 8) or transported into a storyworld and vividly imagine the story environment ("transportation"; Gerrig, 1993; Green & Brock, 2000). He or she may feel warmth or compassion towards characters' circumstances ("affective empathy"; Batson, et al, 1997), or identify with the story's characters by taking their perspectives and assuming their goals and emotions ("identification"; Busselle & Bilandzic, 2008; Cohen, 2001). Research has indicated that these processes may play a role in the persuasive effects of narratives on attitudes and beliefs.

Transportation

Gerrig (1993) suggested that the process of becoming transported into a storyworld may return readers to their original world in some way altered, and Green and Brock (2000) posited transportation as the process through which narrative persuasion occurs. They developed a measure of transportation comprising 11 primary questions about quality of engagement, such as, “when I was reading the narrative, I could easily picture the events in it taking place”, and four additional questions relating to story-specific characters, for example, “while reading the narrative, I had a vivid image of Katie” (Green & Brock, 2000, p. 704). Results showed that higher transportation led to more story-consistent beliefs. For example, after reading a narrative about the murder of a young girl by a psychiatric patient in an Ohio shopping mall, highly transported readers were more likely to agree with story-consistent items such as there being a high prevalence of violence in the USA and in shopping malls.

Affective Empathy

Batson et al.’s (1997) participants received instructions designed to vary the extent to which they empathised with, or remained objective to, the experiences of a character depicted in a radio broadcast interview. Across three experiments, participants in low empathy groups were asked to take an objective perspective, and those in the high empathy groups were asked to imagine how the woman/man feels. Affective empathy during reading was measured using the Empathy Index, for which participants indicated how far they felt six feelings during listening (e.g., “compassionate”, “sympathetic”). Results showed that higher affective empathy was associated with more positive attitudes towards the character in the interview (Experiments 1-3) and the effect was visible 1-2 weeks after reading (Experiment 3).

Identification

De Graaf, Hoeken, Sanders and Beentjes (2012) examined the effects of identification with characters on attitudes after reading measured using eight rating items such as, “During

reading, I imagined what it would be like to be in the position of [the character]”. Participants read a story that was told from the perspective of one of two characters with opposing points of view. Results showed that the extent to which participants identified with the characters mediated the impact of the character perspective manipulation on attitudes: participants tended to identify with the character from whose perspective the story was told, and, subsequently, to assume attitudes consistent with the goals of that character.

Narrative Engagement and Social Cognition

If narrative engagement processes can facilitate the persuasive impact of messages embedded in stories, they may also facilitate social cognition, and research has indicated some overlap between these concepts. The Interpersonal Reactivity Index (IRI; Davis, 1980) is a widely used multidimensional measure of empathy which comprises four scales pertaining to the ability to take others’ perspectives (perspective-taking), feelings of concern towards others (empathic concern), feelings of distress at others’ suffering (personal distress) and the tendency to become absorbed in stories (fantasy). The latter scale tends to be treated as a measure of trait transportability (e.g., Mar et al., 2006; see also Hall & Bracken, 2011) as all but one item refers to absorption in stories and feelings for fictional characters, and the scale positively correlates with transportation (e.g. Mazzocco, Green, Sasota & Jones, 2010). Fantasy scores are positively associated with the self-report perspective-taking and empathic concern dimensions of the IRI (e.g., Davis, 1983; Mar et al., 2006) as well as Interpersonal Perception Task-15 scores (Constanzo & Archer, 1993), a behavioural social cognition measure which entails interpretation of filmed interactions between people (Mar et al., 2006). The dispositional tendency to become absorbed appears to relate to social cognitive dimensions as diverse as the self-reported tendencies to see things from other people’s points of view and feel concern for others, and the ability to accurately interpret facial expressions.

Neuroscientific research has indicated that engagement with suspenseful narratives is associated with activation of the brain's social cognition network (Lehne, Engel, Rohrmeier, Menninghaus, Jacobs & Koelsch, 2015). Furthermore, the areas of the brain associated with sharing in the emotional experiences of others (the anterior and mid-cingulate cortex; Walter, 2012) appear to be activated during engagement with fiction (Hsu, Conrad & Jacobs, 2014) and remain active after reading (Cadwell, 2015). In a behavioural study, Bal and Veltkamp (2013) measured emotional engagement during reading either a fictional story or a news story using a three-item response scale: "The story affected me emotionally", "During reading the text, when the main character succeeded, felt happy, and when they suffered in some way, I felt sad", and "I felt sorry for some of the characters in the text"; Busselle & Bilandzic, 2009). Participants who read and became emotionally engaged with the fictional story reported higher empathic concern a week after reading (Study 1), whereas fiction-readers that were not emotionally engaged reported lower levels of concern after a week in both studies. However, other variables, such as text length and the number of texts in each group varied between conditions and this may have impacted the results (the fiction condition contained a single narrative, whereas the nonfiction condition contained two or more discrete stories).

In contrast, other studies have not found any association between narrative engagement and social cognition. For example, Kidd and Castano (2013) observed no correlation between transportation and social cognition task performance (a false-belief task in Experiments 1-2; the RMET in Experiments 1, 3-5; the Diagnostic Analysis of Nonverbal Accuracy Test, Nowicki, 2010, in Experiment 2). However, transportation was not the focus of this study and so it was not experimentally manipulated. A comprehensive investigation of the causal effects of narrative engagement processes on social cognition would require a between-groups manipulation (see also de Graaf et al., 2012). Bormann and Greitemeyer (2015) conducted such a study using narrative video games as stimuli. Two groups of participants

were required to take on the role of a character whose quest was to resolve the mystery of her missing family. Participants either engaged with or ignored (via a distraction task) the narrative features of the game. A third group of participants played a different game that involved climbing a virtual wall. This version did not involve other characters, explicitly or implicitly. Narrative engagement was measured using nine questionnaire items which probed physical (e.g., “When moving through the game world I feel as if I am actually there”), emotional (e.g., “I experience feelings as deeply in the game as I have in real life”), and imaginative engagement (e.g., “When playing the game I feel as if I was part of the story”). Results showed that participants who played the narrative video game attained higher scores on the RMET, but scores on the narrative engagement scale, which was a composite measure comprising the physical, emotional and imagination questions, did not account for the effect.

Multidimensionality

While there are overlaps between narrative engagement dimensions, there are also important differences such as in the orientation of readers’ emotions: identification involves emotions consonant with those of the story characters, affective empathy involves feeling *for* but not *with* characters, and transportation involves emotions generated by the narrative that may not be focused on character (Busselle & Bilandzic, 2009; de Graaf et al., 2012).

However, these narrative engagement dimensions are rarely studied simultaneously. Social cognition is also multidimensional, involving cognitive and affective dimensions. Because performance on social cognitive tasks can dissociate (e.g., Oakley et al., 2016), finding that narrative engagement does not enhance performance on a specific social cognition task does not preclude the possibility that it enhances performance on others.

The Present Study

Research has illustrated that fiction can have transformative effects on social cognitive skills, though the processes responsible for these effects have not been identified. Features

associated with literary fiction may particularly enhance social cognitive skills, however popular fiction narratives have also been associated with improved social cognition. The present study aimed to contribute to the literature on the causal effects of fiction on social cognition by examining the role of narrative engagement, which has been shown to factor in the persuasive effects of fiction on attitudes and beliefs. In order that causal effects could be studied, a manipulation of narrative engagement was required. As narrative engagement dimensions reflect overlapping but distinct processes, the effect of the manipulation would be tested across three dimensions that have been shown to facilitate persuasion: transportation, identification, and affective empathy. It is unclear how far literary versus popular narratives would induce narrative engagement, and so the first aim of the study was to establish an engaging stimulus text. Second, a method for manipulating narrative engagement was tested based on the dual-task paradigm which has successfully been employed in previous research (e.g., Bormann & Greitemeyer, 2015; Green & Brock, 2000). Finally, a full experiment was conducted which aimed to test the hypothesis that high levels of narrative engagement would lead to stronger social cognitive task performance compared to low levels of narrative engagement. Anonymised datasets are available via the Open Science Framework: osf.io/ca5b9

Text Selection Pretest

A pretest was conducted to identify an engaging text by comparing levels of narrative engagement across three stories.

Participants

Fourteen participants (10 females, 4 males) completed the study online via a participant recruitment website (Call for Participants) in return for a £10 online shopping voucher. The study was presented using Qualtrics. One participant was withdrawn due to incomplete data and two were excluded for reporting having read one or more of the texts prior to

participating, resulting in $N = 11$ (8 females) aged 25-58 ($M = 33.45$, $SD = 8.40$). All participants spoke English as their main language.

Materials

Fictional Stories

Three fictional texts were chosen for the study: a literary text, a passage from a popular fiction novel, and a short story written by the first author. The literary text was Ernest Hemingway's (1988) *The End of Something* (1433 words), which forms the stimulus text for the Short Story Task (SST; Dodell-Feder, Lincoln, Coulson & Hooker, 2013), a narrative-based test of social cognition. The story depicts the breakdown of a couple's romantic relationship during a fishing trip. Original character names were modernised for the present study ("Marjorie" was renamed "Mandy" and "Bill" was renamed "Will"). The popular fiction text was a section of *The Unlikely Pilgrimage of Harold Fry*, a bestseller by Rachel Joyce (2012), in which the central character, retired man, decides to journey across England on foot in order to visit an old acquaintance whom he learns is dying. In the selected segment, (pp. 22-29, 2006 words), Harold spontaneously decides to begin his journey. He visits a local petrol station where he purchases food and interacts with a sales assistant. Like *The End of Something*, the focalisation is third-person ("Harold went...", rather than "I went..."). This section was selected as it is a similar length to *The End of Something*, appears early in the novel and so does not require additional, contextual knowledge of the story, and because it contains descriptions of the environment and of the protagonist's inner thoughts, which may support narrative engagement. The final text, *The Wallet* (1788 words), is a short story written for the study (available on request from the first author). The first-person perspective was used as this focalisation has been shown to enhance identification with character (de Graaf et al., 2012). The narrative follows a protagonist's journey to work during a cold morning. On the way, the protagonist finds a wallet and makes efforts to return it to its owner

despite the consequence that they will be late for an important work meeting. Ultimately, the outcome is positive: the wallet is returned to a thankful owner and the protagonist's employer hints at promotion. In order to invite engagement, the text contains descriptive passages depicting the environment, and detail about the protagonist's inner states from a first-person perspective. The protagonist remains unnamed throughout the text, and descriptions were constructed so as to avoid signalling a specific gender or cultural identity.

Narrative Engagement

The Transportation Scale (Green & Brock, 2000, 2002) comprises eleven general questions about vividness of imagery and attention, including one question about emotional impact. Additional questions ask about story-specific character and plot details. For the present study, five story-specific items were included (e.g., "I had a vivid mental image of Nick"). Participants indicated agreement with statements from "not at all" to "very much" on 7-point Likert-style scales ($\alpha = .84$). Affective empathy (feelings during reading) was gauged using the Empathy Index (Batson et al., 1997) which measures story-induced affective empathy. Participants indicated how far six words, "soft-hearted", "compassionate", "moved", "tender", "warm" and "sympathetic" reflect how they felt while reading, on 5-point Likert scales from "not at all" to "extremely". Six irrelevant items (e.g., "intelligent") were included to mask the study's aims ($\alpha = .96$). The Identification with Character scale (Iguarta, 2010) is a 14-item scale consisting of questions about cognitive and affective empathic reactions to characters (e.g., "I was worried about what was going to happen to the characters"), and the experience of becoming a character and losing of self-awareness (e.g., "I had the impression I was really experiencing the story of the characters"). Agreement with statements is indicated on a 5-point Likert scale from "not at all" to "very much" ($\alpha = .94$).

Dispositional Fantasy

The fantasy subscale of the IRI (Davis, 1980) consists of six items that relate to narrative engagement (e.g., “After seeing a play or movie, I have felt as though I were one of the characters”), and one item relating to the general tendency toward imaginative fantasy (“I daydream and fantasize, with some regularity, about things that might happen to me”).

Participants indicate agreement with statements on 5-point Likert scales ($\alpha = .83$).

Procedure

After entering their demographic details, participants were asked to complete the fantasy subscale of the IRI and to read the three fictional passages which were presented in a random order. After reading each story, participants were asked to complete the three narrative engagement measures which were internally randomised and presented in a random order.

Results

Descriptive statistics using scores averaged across items are presented to facilitate interpretation of the scales in relation to their scale labels (Table 1). The effects of story on the three narrative engagement scales were examined using repeated measures analyses of covariance (ANCOVAs), controlling for dispositional fantasy. Due to anticipated low power, pairwise comparisons were examined for non-significant main effects (Bonferroni adjusted values are reported, however the same pattern of results emerged with no adjustment for multiple comparisons). Controlling for trait fantasy, all omnibus tests of the difference between the stories for each of the narrative engagement scales were non-significant (smallest non-significant $p = .159$ for identification). However, pairwise comparisons revealed that identification was lower for the Hemingway text compared to *The Wallet*, $p = .002$, and the Joyce text, $p = .047$, and affective empathy and transportation were both lower for the Hemingway text compared to the Joyce text, $p = .008$, and $p < .001$, respectively. No

other comparisons were statistically significant. The popular fiction passage from the Joyce story was found to have the most impact on the narrative engagement scales overall and so it was selected as the stimulus text for the full experiment.

Table 1

Overall Means (and Standard Deviations) of Scale Scores Averaged Across Items for Immersion Measures Presented by Story.

Story	Identification	Affective Empathy	Transportation
Hemingway	2.22 (0.88)	2.11 (0.28)	3.39 (0.24)
Joyce	3.01 (0.83)	3.20 (1.19)	4.52 (0.75)
<i>The Wallet</i>	3.08 (0.94)	2.61 (1.00)	3.95 (0.99)

Note. Affective empathy and character identification were measured using 5-point Likert scales, and transportation was measured using a 7-point Likert-style scale. Values greater than 3 are on the positive side of the scale for affective empathy and character identification, but values greater than 4 are on the positive side of the scale for transportation.

Cognitive Load Manipulation Pilot

The manipulation pilot was designed to test a cognitive load manipulation which has previously been employed in narrative persuasion research e.g., Rocklage, Rucker & Nordgren, 2018; Tormala & Petty, 2004; Zemborain & Johar, 2007; see also Gilbert, 1991; Gilbert & Hixon, 1991). Based on Green and Brock's (2000) finding that completing an additional task while reading successfully reduced transportation (dual task paradigm), it was predicted that cognitive load would interfere with narrative engagement.

Participants

Fifty participants were recruited via the same participant recruitment website as the text pretest, and links to the site were posted on university social media pages. Participants were given the option to be entered into a prize draw to win a £10 online shopping voucher. Fourteen participants were excluded either for failing attention checks ($n = 10$) or ballot box stuffing (i.e., completing the study multiple times, $n = 4$), and seven participants were excluded for having read the stimulus story prior to participating in the study. This resulted in

total $N = 29$ (27 females) aged 18-66 ($M = 36.76$, $SD = 12.57$). All participants in the final sample completed the study within 3 standard deviations of the mean duration.

Materials and Procedure

Materials were presented using Qualtrics. The passage by Rachel Joyce established in the text pretest formed the stimulus story. The same three narrative engagement scales were used (Transportation Scale, $\alpha = .76$; Empathy Index, $\alpha = .93$; Identification with Character Scale, $\alpha = .95$), and dispositional fantasy was again measured using the IRI fantasy subscale ($\alpha = .77$). Attention check questions were included with the narrative engagement scales, which required participants to select a specific option (e.g., “If you are paying attention, please select scale point 3”). Participants were excluded from the analysis if they entered incorrect answers to any of these checks. Following the story, participants were asked two basic multiple-choice comprehension questions: “Where did Harold buy a cheeseburger from?” (correct answer: a petrol station), and “Who was Harold trying to contact?” (correct answer: Queenie). Participants were excluded if they failed to answer either of these questions correctly.

Participants completed the demographic questions (age, gender and English fluency) and the fantasy subscale of the IRI (internally randomised). They were then assigned to either a high or low cognitive load condition and asked to remember an ostensibly random number (a standard cognitive load manipulation; Rocklage et al., 2018; Tormala & Petty, 2004). Participants in the high cognitive load condition were asked to keep in mind an eight-digit number (31875649), and participants in the low cognitive load condition were asked to keep in mind a two-digit number (27) while reading the stimulus text. Instructions were the same for participants in both groups:

On the next page, you will be presented with a number. It will appear for 20 seconds before the page moves on. Your task is to remember that number, as you will be asked to recall it

later. It's really important for the study that you don't write the number down or copy and paste it, just try to keep it in mind.

After reading the story, all participants were asked to enter the number that they had been asked to keep in mind, and then to complete the three narrative engagement measures (internally randomised and presented in a random order).

Results and Discussion

Group differences were examined using *t*-tests, and ANCOVA when controlling for fantasy. Confidence intervals were bias-corrected and accelerated using bootstrapping ($N = 1000$). The high cognitive load group showed higher levels of trait fantasy (averaged across the scale, $M = 3.66$, $SD = 0.42$) compared to the low cognitive load group ($M = 3.11$, $SD = 0.87$), $t(26.92) = -2.26$, $p = .032$, 95% CI [-7.27, -0.35]. Examination of these data revealed a greater spread in the low cognitive load group, where total scores ranged from 11-31 ($M = 21.79$, $SD = 6.12$), compared to the high cognitive load group where total scores ranged from 21-31 ($M = 25.60$, $SD = 2.95$). Therefore, analysis of the manipulation effect was conducted both with and without the fantasy covariate. Mean narrative engagement scores for each cognitive load group are presented in Figure 1. Without the inclusion of the covariate fantasy, *t*-tests revealed that there were no significant differences between the high and low cognitive load conditions on any of the three scales, all $ps > .20$. However, inclusion of the fantasy covariate revealed significant effects of condition across all scales: identification with character was higher in the low cognitive load condition ($M = 2.91$, $SD = 1.04$) compared to the high cognitive load condition ($M = 2.81$, $SD = 0.83$), $F(1, 26) = 4.40$, $p = .046$, $\eta p^2 = .145$; affective empathy was also higher in the low cognitive load ($M = 3.26$, $SD = 1.05$) compared to the high cognitive load condition ($M = 2.80$, $SD = 0.95$), $F(1, 26) = 7.21$, $p = .012$, $\eta p^2 = .217$; and transportation was higher in the low cognitive load ($M = 3.95$, $SD =$

0.92) compared to the high cognitive load condition ($M = 3.57$, $SD = 0.73$), $F(1, 26) = 8.95$, $p = .006$, $\eta^2 = .256$.

Moving Forward

This experiment examined the effects of a cognitive load manipulation on narrative engagement in the selected text. The results showed that the low cognitive load condition (retaining a two-digit number) led to higher levels of engagement across all three measures compared to the high cognitive load condition (retaining an eight-digit number) when variance caused by dispositional fantasy, which was not matched across the groups, was partialled out. Additionally, the high and low cognitive load group sizes were unequal ($n = 10$ and $n = 19$, respectively), and the sample size was small. Taking these factors into account, and considering that the pattern of the data was in the expected direction, the cognitive load manipulation appeared an appropriate strategy for varying narrative engagement during reading with a larger sample.

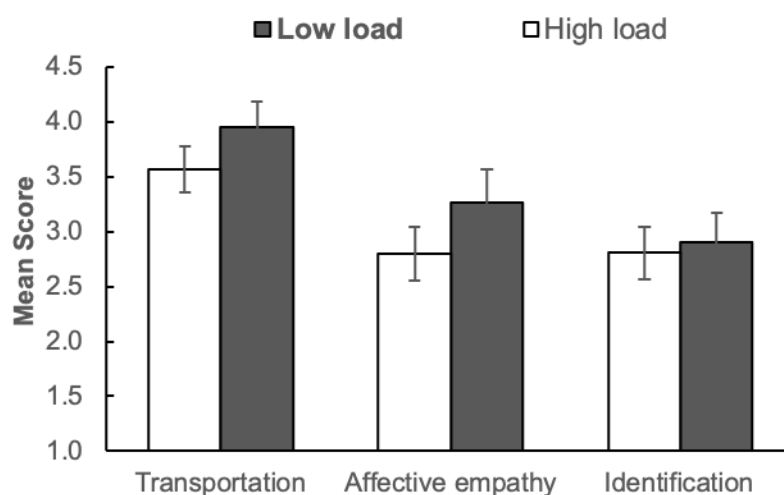


Figure 1. Mean transportation, affective empathy and identification scores presented for high and low cognitive load conditions. Affective empathy and character identification were measured on 5-point Likert scales, and transportation was measured on a 7-point Likert-style scale. Error bars are standard errors of the mean.

Full Experiment: Effects of Narrative Engagement on Social Cognition

The full experiment aimed to test the effect of narrative engagement on social cognition. The passage from the popular fiction story established in the pretest (Joyce, 2012) was used as the stimulus text, and narrative engagement was varied using the cognitive load manipulation established in the pilot experiment.

Method

Participants

A power analysis was conducted in G* Power (Faul, Erdfelder, Lang & Buchner, 2007). The smallest effect of cognitive load on identification with character, established in the manipulation pilot ($\eta p^2 = .145$), was used in the computation. This indicated that a total sample of 49 (24-25 participants per group) would be required to detect the effect of the manipulation on narrative engagement at 80% power, when controlling for dispositional fantasy. However, computations using the small effect of fiction on social cognition (from Dodell-Feder et al.'s meta-analysis, 2018) and of emotional engagement with fiction on empathic concern (from Bal & Veltkamp, 2013) indicated that a much larger sample ($N > 193$) would be required to achieve 80% power to detect the effects of reading and narrative engagement. As this sample size was unattainable due to resource constraints, data were gathered from 100 participants who were all undergraduate and postgraduate students of Psychology in the UK. Participants received course credit and were invited to enter a prize draw to win a £10 online shopping voucher.

It was a requirement of the study that participants spoke English as their main language. Four participants were excluded for reporting other main languages and one for reporting four main languages including English. Two participants were excluded for failing one or more attention check questions. This resulted in a total sample size of 93 participants (75 females) aged 18-54 ($M = 24.73$, $SD = 7.62$). Most participants had completed A-levels

or equivalent (54%), 37% had completed a graduate degree, and 9% a postgraduate degree. Participants were assigned to either the high cognitive load ($n = 28$), low cognitive load ($n = 35$), or no-reading ($n = 30$) conditions.

Materials

Fictional Story. The passage from *The Unlikely Pilgrimage of Harold Fry* (Joyce, 2012) formed the stimulus text. No participants reported having previously read or heard of the story.

Narrative Engagement. The Identification with Character Scale ($\alpha = .94$), Empathy Index ($\alpha = .90$) and Transportation Scale ($\alpha = .80$) were used, in line with the pretest and pilot.

Social Cognition. The SST (Dodell-Feder et al., 2013) is a narrative-based test of explicit and spontaneous first- and second-order mental state attribution. As part of the test, participants are asked to read a short story (*The End of Something*, one of the texts used in the pretest). The story contains descriptions of the environmental setting, the characters' physical behaviours, and dialogue. As the characters' inner thoughts and feelings are not made explicit, high scores on the SST reflect the ability to synthesise contextual, verbal and physical information. Participants are asked to provide a summary of the story and to answer questions about the characters and plot. Spontaneous mental state attribution is measured as the presence or absence of a mental state inference in participants' summaries of the story. Eight questions probe explicit mental state attribution, for example, "Why is Nick afraid to look at Marjorie", and five non-mental state (control) questions probe story comprehension (e.g., "Nick and Marjorie have a pail of perch for what purpose?") The data were scored using the simple rubric by Dodell-Feder et al.: spontaneous mental state attribution was scored as a dichotomous yes/no variable, and all other responses on a scale of 0-2, which takes accuracy and complexity into account. Inter-rater reliability was assessed using 10% of

transcripts rated by the experimenter and two independent coders, with Fleiss's kappa calculated for the spontaneous question, and Kendall's coefficient of concordance for the comprehension and explicit mental state attribution questions. Inter-rater reliability was good for the spontaneous item, $\kappa = .72$, $p < .001$, 95% CI [0.36, 1.08]), for the explicit mental state attribution items, $W = .77$, $p = .013$, and very good for the comprehension items, $W = .94$, $p = .003$. Internal consistency was adequate overall ($\alpha = .75$), and Cronbach's alpha was .70 for explicit mental state attribution and .53 for comprehension individually. These values were above the values of .54 and .31 reported by Dodell-Feder et al., who anticipated that alpha would be negatively impacted by the range of first- and second-order questions. No participants reported having previously read or heard of the SST stimulus text.

The Yoni test (Shamay-Tsoory & Aharon-Peretz, 2007) measures cognitive (24 trials) and affective (24 trials) first- and second-order mental state attribution. It is sensitive to variation in healthy adults, and has been used in fiction effects studies (e.g., De Mulder et al., 2017; Kidd & Castano, 2013). The test features a central character, Yoni, depicted as a simple schematic face, surrounded by four other images from a single category (e.g., fruit, animals, transport, faces). Sentences appear at the top of the screen, and participants are asked to select the appropriate image to fill in blanks in the sentences (e.g., "Yoni loves BLANK"). In the first-order condition, participants are required to interpret Yoni's eye gaze and facial expression, and in the second-order condition, they must additionally interpret the gaze and expressions of surrounding characters (schematic faces or greyscale photographs of faces). Sixteen control trials require the interpretation of spatial relationships between Yoni and surrounding objects (e.g., "Yoni is close to BLANK"). Thus, the task yields six within-subject conditions: 3(trial type: cognitive, affective, control) \times 2(order: first order, second order).

Demographic and Control Questions. Participants were asked to indicate age, gender, main language and highest level of education attained. Fantasy, as used in the pilot, measured the tendency to become absorbed in narratives ($\alpha = .70$). Two other scales from the IRI (Davis, 1980) were used to measure dispositional empathy: empathic concern measures the trait tendency to feel concern and compassion for others ($\alpha = .76$), and perspective-taking measures the tendency to reason about others' mental states ($\alpha = .71$).¹ Fourteen irrelevant items (e.g., "I have no difficulty in cooking a complicated meal") were included to mask the aims of the study.

Fiction-exposure. The Author Recognition Test paradigm (ART; Stanovich & West, 1989) uses author name recognition as a proxy measure of lifetime print-exposure. Participants are asked to select names of authors that they recognise from a list containing foils to deter guessing. A revised version (ART-R, Mar et al., 2006) was used in this study to measure both fiction- and nonfiction-exposure. The test comprises ten genres (five fiction, e.g., romance, thriller; and five nonfiction, e.g., science, business) across mutually exclusive fiction and nonfiction categories.² A further 5 names (10%) were added to each of the fiction and nonfiction categories and evenly spread across the 10 genres to ensure that recent works were incorporated (each of the additions had been published in the last 5 years). The foils section remained unedited. The updated version of the ART-R used for this study contained 55 fiction names, 55 nonfiction names, and 40 foils ($\alpha = .87$).

Procedure

The experimental procedure is illustrated in Figure 2. Participants were randomly assigned to one of the three story conditions: high cognitive load during reading, low

¹ The fourth IRI scale, personal distress, reflects self-oriented responses to others which distinguishes it from the other subscales (Baron-Cohen & Wheelwright, 2004; Batson & Shaw, 1991; Davis, Mitchell, Hall, Lothert, Snapp & Meyer, 1999; Penner, Fritzsche, Craiger & Freifeld, 1995; Singer & Lamm, 2009) and so it was not used in this study.

² One original name from the nonfiction category, "Norman Mailer," was replaced, due to his profile as an author of both fiction and of nonfiction (Mailer has won the Pulitzer Prize in both categories).

cognitive load during reading, or no-reading. First, the demographic questions and control measures (randomised within and between scales) were administered. Participants in the no-reading group then proceeded to the next section of the experiment, and participants in the reading groups were asked to read the story text while keeping in mind an eight-digit number (high cognitive load) or a two-digit number (low cognitive load). After reading, the story participants were asked to report the number that they had been given, to answer basic questions about the story (attention check), and to complete the narrative engagement scales (internally randomised and presented in a random order). Participants were then asked to complete the Yoni test, followed by the SST, always in this order to temporally separate the two reading sessions (the critical Joyce text and the Hemingway text which forms the stimulus for the SST).

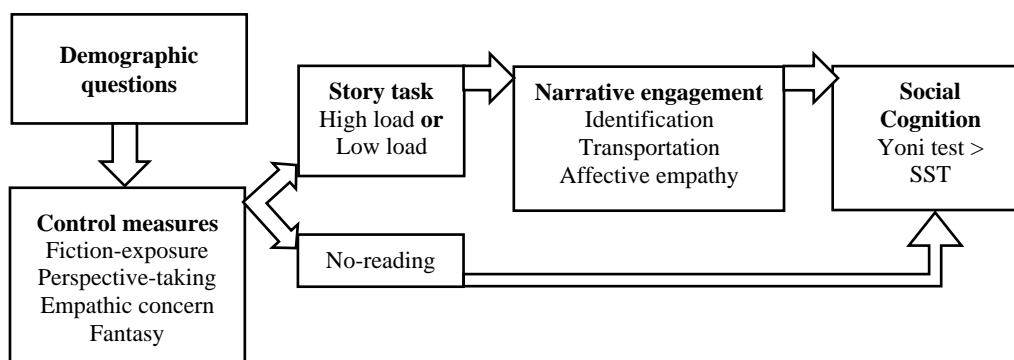


Figure 2. Flow diagram illustrating the experimental procedure. Participants in the reading groups read two stories (the Joyce stimulus text and the Hemingway text used in the SST) and participants in the no-reading group read only the Hemingway story as part of the SST measure.

Data Analysis. In line with the pretest and pilot, scale scores were averaged across items in order to facilitate interpretation of relationships between scores and scale labels. Correlations among variables were examined, and the effect of the cognitive load manipulation was assessed using independent *t*-tests and ANCOVAs when covariates were included. Effects of story task condition on Yoni test and SST explicit scores were examined

with and without the inclusion of covariates (using ANOVAs and ANCOVAs, respectively). The effect of condition on SST spontaneous scores was assessed using binary logistic regression. Due to the non-significant effect of the manipulation (reported below), an exploratory analysis compared reading versus no-reading with the high and low load groups combined. Confidence intervals were bias-corrected and accelerated using bootstrapping ($N = 1000$).

Results and Discussion

Group and Gender Differences

Fantasy, empathic concern and perspective-taking did not differ significantly between the story task conditions, all $F_s < 1.10$, all $p_s > .33$, and neither did fiction-exposure or nonfiction-exposure, both Welch's $F_s < 3.00$, both $p_s > .05$. There were no gender differences in scores on any the SST explicit or spontaneous dimensions, or on the Yoni test cognitive, affective or physical trials, all $p_s > .54$. Females showed higher empathic concern, $t(91) = -.28$, $p = .007$ [-3.67, -3.93], and lower nonfiction-exposure, $t(91) = 3.25$, $p = .002$ [0.54, 4.08], compared to males.

Data Distribution

Data were non-normally distributed across several scales (SST, ART and Yoni test dimensions, identification with character and empathic concern). This appeared to result from the presence of outliers across all of these scales, which were retained in the analysis. Robust (Spearman) correlations were conducted, and confidence intervals were bias-corrected and accelerated using bootstrapping ($N = 1000$).

Inter-scale Correlations

Raw correlations are presented in the appendix. Inter-scale correlations were in line with previous research showing correlations among the subscales of the IRI (Davis, 1983), explicit and implicit mental state attribution abilities in neurologically typical adults (Kanske,

Böckler, Trautwein & Singer, 2015), as well as fiction- and nonfiction-exposure (Fong et al., 2013; Mar et al., 2006). Fantasy positively correlated with transportation and character identification but not with affective empathy. All three narrative engagement scales positively correlated with perspective-taking and empathic concern. Yoni test cognitive and affective trials were associated with SST explicit scores, and Yoni test cognitive trials with SST spontaneous scores. Neither measure was associated with the self-report IRI subscales, highlighting the lack of correlation commonly observed between measures of social cognition (e.g., Ickes, 1997; Mar et al., 2006).

Manipulation Check

Average narrative engagement scores are presented in Figure 3. Average transportation, identification and affective empathy scores were low compared to the text pretest in the high cognitive load group ($M = 3.70$, $SD = 0.83$; $M = 2.60$, $SD = 0.96$; and $M = 2.87$, $SD = 0.89$, respectively) and in the low cognitive load group ($M = 3.53$, $SD = 0.95$; $M = 2.54$, $SD = 0.90$; and $M = 3.01$, $SD = 0.92$, respectively). Mean differences were non-significant for all of the three dimensions (smallest non-significant $p = .457$ for transportation). Fantasy did not differ between the high and low cognitive load groups, $t(61) = -.61$, $p = .546$, 95% CI [-2.94, 1.57], and the effects of condition remained non-significant when fantasy was included as a covariate, all F s < 1.

The extent to which participants made an effort to retain the number in the high load condition may have attenuated the association between reading condition and engagement levels. To assess this, accuracy of recall was correlated with the narrative engagement scores. All participants in both cognitive load conditions attempted to report the number that they were asked to keep in mind. In the low load condition all responses were accurate. In the high load condition, correct digits were given a score of 1, resulting in scores between 0 (0% accuracy) and 8 (100% accuracy). In cases where participants reported fewer than eight

digits, individual values were coded from left to-right until a value was inaccurate and then from right-left in order to establish the location of the missing values (e.g., a recalled number of 318649 would receive a score of 6 against the true value of 31875649). There were no associations between recall and transportation, $r(26) = -.20, p = .32, 95\% \text{ CI} [-.54, .15]$, character identification, $r(26) = -.14, p = .49, 95\% \text{ CI} [-.47, .20]$, or affective empathy, $r(26) = -.09, p = .67, 95\% \text{ CI} [-.37, .18]$. This pattern held when fantasy was controlled, all r s $< .07$, all p s $> .748$.

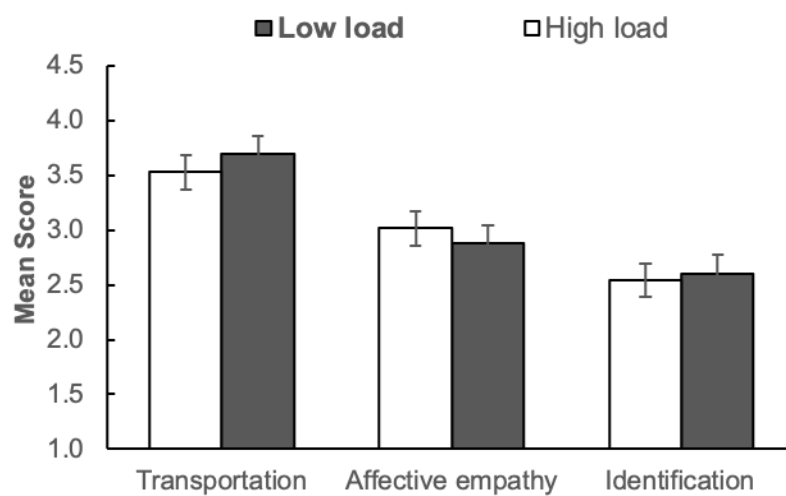


Figure 3. Raw transportation, affective empathy and identification scores presented for high and low cognitive load conditions. Affective empathy and character identification were measured on 5-point Likert scales, and transportation was measured on a 7-point Likert-style scale. Error bars are standard errors of the mean.

Exploratory Analysis: Effect of Fiction-reading on Social Cognition

As no differences in narrative engagement were detected between the two reading (high and low load) groups, they were combined in order to enable comparison between participants that read the stimulus story and those that did not. Consequently, the independent variable for the following tests was reading ($n = 63$) versus no-reading ($n = 30$). Nonfiction-exposure was higher in the reading group, $t(91) = -2.35, p = .024, 95\% \text{ CI} = [-1.38, 1.19]$, but

there were no group differences for fiction-exposure or the IRI subscales, all $t_s < \pm .675$, all $p_s > .514$.

Yoni test. Average Yoni test scores for participants who read and those who did not read are presented in Table 2. A mixed ANCOVA with reading condition as the between-participants variable, order (first, second) and Yoni test trial type (cognitive, affective) as within-participants variables, and first and second order physical (control) scores as covariates was used to assess the effect of reading. Only two-way interactions between second order physical trials (covariate) \times trial type, $F(1, 89) = 7.15, p = .009, \eta_{p^2} = .074$, second order physical trials \times order, $F(1, 89) = 35.65, p < .001, \eta_{p^2} = .286$, and trial type \times order, $F(1, 89) = 4.75, p = .032, \eta_{p^2} = .051$, and the three-way interaction between these variables, $F(1, 89) = 8.67, p = .004, \eta_{p^2} = .089$, were statistically significant. The main effect of reading and two-way interactions involving the reading condition were non-significant, all $p_s > .10$, as was the three-way interaction, $F < 1.3$. Controlling for age, gender, fiction-exposure, and the IRI subscales revealed the same pattern of results (and this was the same when nonfiction-exposure, which had been found to differ between groups, was included), all $F_s < 1.11$. These same tests were run with the high and low cognitive load conditions separated out as originally planned. The same pattern of results emerged with no significant effects of story task condition (for main and interaction effects involving story task condition, all $F_s < 1$).

SST. There was no effect of reading on SST explicit scores, $t(91) = .19, p = .851, 95\%$ CI [-1.19, 1.44], however controlling for IRI scores, age, gender, fiction-exposure and comprehension of the SST text, the effect reached statistical significance, $F(1, 84) = 4.00, p = .049, \eta_{p^2} = .045$. Comprehension of the SST, the only other significant predictor, accounted

³ The data for the order 1 cognitive trials were negatively skewed, and this was not improved using square root or log transformations. Covariance matrices were unequal (Box's test, $p = .011$) and there was heterogeneity of variances in the cognitive order 1 data (Levene's test, $p = .001$). However, ANOVA tends to be robust to such deviations (Norman, 2010) and so this was unlikely to substantially alter the result.

for the majority of variance, $F(1, 84) = 25.87, p < .001, \eta_p^2 = .235$. The inclusion of nonfiction-exposure, which was found to differ between the reading groups (as reported above), did not alter the effect of reading condition, $F(1, 83) = 4.34, p = .040, \eta_p^2 = .050$. However, when the three story task conditions were separated out (high cognitive load, low cognitive load and no-reading) the effect of condition was no longer statistically significant, $F(2, 83) = 2.77, p = .069, \eta_p^2 = .062$. This result was the same when nonfiction-exposure was included in the model, $F(2, 82) = 2.71, p = .073, \eta_p^2 = .062$, and was likely due to the reduction in power associated with the decomposition of the reading group.

Binary logistic regression was used to predict the likelihood of making a spontaneous mental state inference on the SST using the same variables (reading versus no-reading, age, gender, the three IRI subscales, and fiction-exposure). The model was significant, $\chi^2(8) = 16.63, p = .034$, and prediction success was 63% (71% for those who did not make a spontaneous empathic inference and 55% for those that did), which was an improvement compared to the baseline model (55%). Nagelkerke's R^2 of .22 indicated a moderately weak prediction. Only story comprehension, $p = .006$, and fiction-exposure, $p = .018$, significantly contributed to the prediction such that a one-point increase in story comprehension was associated with an increase in the odds of making a spontaneous mental state inference of 1.34, and a one-point increase in fiction-exposure was associated with a decrease in odds (0.83). Reading was not associated with any change in the odds of making a spontaneous mental state attribution, $p = .119$.

When nonfiction-exposure was included in the model, fiction-exposure no longer accounted for a change in odds, $p = .116$. In this model, $\chi^2(9) = 17.54, p = .041$, Nagelkerke's $R^2 = .23$, comprehension of the SST story was the only significant predictor, $p = .006$, and accounted for an increase in the odds of making a spontaneous mental state inference of 1.34 for each one-point increase in comprehension. Using the same variables and separating out

the story task conditions (high load, low load and no-reading), revealed the same pattern of results.

Table 2

Mean Yoni Test Scores (with Standard Deviations) for Reading and No-reading Groups.

Trial Type	Order	Reading	No-reading	Total
Cognitive	1	11.49 (0.91)	11.80 (0.48)	11.59 (0.81)
	2	19.51 (3.90)	18.80 (4.24)	19.27 (4.00)
Affective	1	11.25 (1.26)	11.43 (0.90)	11.31 (1.15)
	2	29.54 (4.99)	29.57 (4.68)	29.55 (4.87)
Physical	1	7.43 (1.30)	7.43 (1.33)	7.43 (1.35)
	2	5.03 (1.51)	5.33 (1.45)	5.13 (0.15)

General Discussion

Fiction represents a simulation of the social world and may function to support social cognition. The more engaged with a story's characters and events a reader becomes, the more likely they are to take those experiences with them to the outside world (Mar & Oatley, 2008; Oatley, 1999, 2012). The aim of the present study was to examine the impact of narrative engagement on social cognitive task performance. A pretest identified an engaging stimulus text, and a pilot established an approach to varying narrative engagement through the manipulation of cognitive load. In the full experiment, however, the cognitive load manipulation failed to impact levels of engagement: transportation, affective empathy and identification did not differ across the high and low cognitive load conditions. This may have been due to generally low levels of narrative engagement and low statistical power. Consequently, the hypothesis that narrative engagement would impact social cognition was untested. Instead, correlations between the narrative engagement dimensions, social cognition, dispositional empathy, and fiction- and nonfiction-exposure were identified. Additionally, an exploratory analysis lent support to the general hypothesis that fiction-reading can enhance social cognition.

Narrative Engagement and Social Cognition

Similar processes may underpin the ways that people think about fictional characters and other people in their daily lives; indeed, the correlation analysis revealed positive associations between the narrative engagement scales (transportation, identification and affective empathy) and perspective-taking and empathic concern. Transportation and identification were also positively associated with fantasy, the trait tendency to become absorbed in stories, however affective empathy was not. The Empathy Index, which measured affective empathy, contains items such as “sympathetic” and “warm”, and reflects emotional engagement rather than the imaginative abilities probed by items in the transportation and identification scales. This highlights the multidimensionality of narrative engagement (de Graaf et al., 2012), and the possibility that its dimensions impact different social cognitive outcomes.

In this study, the narrative engagement scales were all positively associated with explicit mental state reasoning on the SST (effects were small-medium; see Cohen, 1988), but not with the Yoni test. In other words, engagement with the stimulus story appeared to relate to the ability to accurately interpret the mental states of characters in another story. It may be that narrative engagement supports the more complex social cognitive processes probed by the SST (where targets are naturalistic story characters embedded in a narrative) but not those probed by the Yoni test (where targets are schematic faces within vignettes). Due to the failure of the manipulation, the direction of cause remains uncertain, however these findings lend support to the proposition that dimensions of narrative engagement are related to social cognitive processes.

Fiction-reading and Social Cognition

Fiction-exposure

As anticipated based on prior research (Mar et al., 2006, 2009), fiction-exposure positively correlated with nonfiction-exposure in the present study, and with story comprehension on the SST. Unexpectedly, fiction-exposure was not associated with IRI scores in this sample, though the size of the correlation between fiction-exposure and self-report empathy is small in magnitude (where the IRI has been the predominant measure of self-report empathy; Mumper & Gerrig, 2017), and the present study may have lacked sufficient power to detect it. The positive correlation with transportation indicated that people who tended to read more fiction also became more transported into the stimulus story. Repeated exposure to fiction may support engagement with narratives, though the extent that this would hold across other narrative engagement dimensions represents a question for further research. Fiction-exposure increased the odds of making a spontaneous mental state attribution on the SST, but not when nonfiction-exposure was included in the model. Nonfiction-exposure may also increase the tendency to spontaneously reason about mental state content, and the non-significant results for each dimension likely reflect the reduction in precision associated with the increase in model parameters.

Fiction-reading versus no-reading

Recent research has cast doubt on the hypothesis that fiction-reading, compared to nonfiction-reading or no-reading, enhances social cognitive skills (e.g., Camerer et al., 2018; Panero et al., 2016, Samur et al., 2018). The exploratory analysis provided some support, showing that fiction-reading led to higher explicit SST scores compared to no-reading when IRI, age, gender, comprehension of the SST text and fiction-exposure were controlled, $p = .049$ ($p = .040$ when nonfiction-exposure was controlled). Recall the proposal that literary texts contain the necessary complexities required to activate the mechanisms associated with

social cognition (e.g., Hakemulder, 2000; Kidd & Castano, 2013), whereas other lines of enquiry (e.g., studies examining popular fiction; Black et al., 2018; Fong et al., 2013; Koopman, 2015; Turner & Felisberti, 2018) have indicated that such effects are not contingent on literariness. The present findings suggest that reading popular fiction may also support social cognition post-reading, and the mechanisms involved in the effects of popular narratives represent an area for further enquiry.

Limitations and Future Directions

The central limitation of this study was that the manipulation failed in the full experiment and so the hypothesis that high engagement would lead to higher social cognition scores compared to low engagement could not be tested. It is possible that the present study failed to detect a true effect of the manipulation. Despite a pretest establishing a relatively engaging text (albeit with low power), and a pilot study identifying a procedure for manipulating narrative engagement levels, engagement was low across the sample in both the pretest and in the final experiment. The stimulus text passage may not have sufficiently induced narrative engagement, and this may have attenuated the effect of external cognitive load instructions (see Green & Brock, 2000, Experiment 4). The absence of a no-load control condition (rather, there was a low-load condition and a no-reading control condition) means that these possibilities could not be explored using the present dataset, and future research may usefully address this limitation.

The sample was predominantly female which limits the generalisability of the results. Women tend to report higher levels of dispositional empathy (e.g., Davis, 1980), and to score higher on social cognition tasks compared to men, and this is particularly true when the target is female (Richter, Dietzel & Kunzmann, 2010; Wacker, Bölte & Dziobek, 2017). However, gender was not found to be a moderator in the two meta-analyses of relationships between fiction and social cognition (Dodell-Feder & Tamir, 2018; Mumper & Gerrig, 2017). There is

some evidence that women become more emotionally engaged in narratives, but only for certain stories (Green & Brock, 2000). Therefore, it is not clear that the inclusion of more males would have substantially impacted the results. The pretest and pilot study were conducted online, whereas participants in the full experiment were recruited via a university research participation scheme and took part in a lab setting. Research has indicated that online participants may pay closer attention to manipulation instructions than traditional subject pool participants (Hauser & Schwarz, 2016), and this could partly explain the instability of the manipulation effect.

The exploratory analysis lent some support to the general causal hypothesis that fiction-reading immediately enhances social cognition: participants who read the popular fiction passage compared to those who did not, scored higher on the SST when individual differences in trait empathy, reading habits, story comprehension and demographic differences were controlled. However, this test measured social cognition for characters in a narrative and so it is unclear whether the effect would generalise to other targets (there was no effect on Yoni test scores). As statistical significance was attained at just below the alpha threshold with the inclusion of control variables, and in view of the mixed results reported using similar designs (e.g., Camerer et al., 2018; Panero et al., 2016; Samur et al., 2018; van Kujik et al., 2018), the stability of this effect and impact of individual differences warrants further attention (see also Mar, 2018a; Mar, Oatley, Djikic & Mullin, 2011; Mazzocco et al., 2010). The immediate effect of fiction-reading on social cognition appears to be small (Dodell-Feder & Tamir, 2018) and may necessitate high-powered studies (see Black & Barnes, 2015, for an example using a within-subjects design). Effects are likely to be stronger for full stories rather than short passages (Mar, 2018a), or they may develop over time (e.g., “sleeper effect” in narrative persuasion; Appel & Richter, 2007; Kumkale & Albarracín, 2004) and require a longitudinal approach to measurement (e.g., Pino & Mazza, 2016).

Future research exploring these avenues could facilitate the development of a comprehensive model of fiction effects on social cognition, which accounts for the influence of narrative engagement, dispositional differences, and situational factors (e.g., Mar 2018b).

Summary and Conclusion

Fiction readers “not only enter a narrative world, they may also become highly involved with the people they find there” (Green & Brock, 2000, p. 702). Fiction enables readers to experience a range of events in the lives of human or humanlike characters (Mar & Oatley, 2008) and may benefit real-world social cognition. Several studies have reported relationships between lifetime exposure to fiction and social cognitive skills, and others have indicated small, positive effects of fiction on social cognition after reading. However, the mechanisms associated with such effects remain unidentified. The present study aimed to contribute to the causal literature through an investigation of the effects of narrative engagement on social cognition. A procedure for manipulating levels of narrative engagement in a passage of popular fiction was established. In the final experiment, the manipulation failed to distinguish between narrative engagement levels and so causal inferences about the impact of narrative engagement could not be made. A correlation analysis showed positive associations between narrative engagement dimensions and both self-report empathy (perspective-taking, empathic concern and fantasy) and a behavioural social cognition measure (interpreting the mental states of story characters), providing evidence of associations between narrative engagement and social cognitive skills. An exploratory analysis revealed a positive effect of reading a popular fiction text on social cognition compared to no-reading. The findings suggest that the impact of fiction on social cognition is not limited to literary texts, however further research is required to establish the stability of the effect and mechanisms involved. Future research employing high-powered

and longitudinal designs may help elucidate the role of narrative engagement in fiction effects on social cognition.

References

- Appel, M., & Richter, T. (2007). Persuasive effects of fictional narratives increase over time. *Media Psychology, 10*, 113-134.
<https://www.tandfonline.com/doi/abs/10.1080/15213260701301194>
- Bal, P. M. & Veltkamp, M. (2013). How does fiction reading influence empathy? An experimental investigation of the role of emotional transportation. *PLOS ONE, 8*, 1-12.
<http://doi.org/10.1371/journal.pone.0055341>
- Baron-Cohen, S. & Wheelwright, S. (2004). The empathy quotient. An investigation of adults with Asperger Syndrome or high functioning autism, and normal sex differences. *Autism and Developmental Disorders, 34*, 163-175.
<https://doi.org/10.1023/B:JADD.0000022607.19833.00>
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The “Reading the Mind in the Eyes” test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Child Psychology and Psychiatry, and Allied Disciplines, 42*, 241-251. <http://doi.org/10.1111/1469-7610.00715>
- Batson, C. D., Polycarpou, M. P., Harmon-Jones, E., Imhoff, H. J., Mitchener, E. C., Bednar, L. L., Klein, T. R., & Highberger, L. (1997). Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group? *Journal of Personality and Social Psychology, 7*, 105-118. <https://doi.org/10.1037//0022-3514.72.1.105>
- Batson, C. D., & Shaw, L. (1991). Evidence for altruism: Toward a pluralism of prosocial motives. *Psychological Inquiry, 2*, 107-122.
https://doi.org/10.1207/s15327965pli0202_1
- Black, J. E., & Barnes, J. L. (2015). The effects of reading material on social and non-social cognition. *Poetics, 52*, 32-43. <http://doi.org/10.1016/j.poetic.2015.07.001>

- Black, J. E., Capps, S. C., & Barnes, J. L. (2018). Fiction, genre exposure and moral reality. *Psychology of Aesthetics, Creativity and the Arts, 12*, 328-340.
<http://doi.org/10.1037/aca0000116>
- Bormann, D., & Greitemeyer, T. (2015). Immersed in virtual worlds and minds: Effects of in-game storytelling on immersion, need satisfaction, and affective theory of mind. *Social Psychological and Personality Science, 6*, 646–652.
<http://doi.org/10.1177/1948550615578177>
- Busselle, R., & Bilandzic, H. (2008). Fictionality and perceived realism in experiencing stories: A model of narrative comprehension and engagement. *Communication Theory, 18*, 255-280. <http://doi.org/10.1111/j.1468-2885.2008.00322.x>
- Busselle, R., & Bilandzic, H. (2009). Measuring narrative engagement. *Media Psychology, 12*, 321–347. <http://doi.org/10.1080/15213260903287259>
- Cadwell, O. G. (2015). Literary fiction's influence on social cognitive brain activity. *Proceedings of the National Conference on Undergraduate Research* (pp. 570-574). Cheney, WA: Eastern Washington University.
- Camerer, C. F. Dreber, A., Holzmeister, F., Ho, T-H., Huber, J., Johannesson, M., Kirchler, M., Navé, M., Nosek, B., Pfeiffer, T., Altmejd, A., Buttrick, N., Chan, T., Chen, Y., Forsell, E., Gampa, A., Heikensten, E., Hummer, L., Imai, T., ... Wu, H. (2018). Evaluating the replicability of social science experiments in *Nature* and *Science* between 2010 and 2015. *Nature Human Behaviour, 2*, 637-644.
<http://doi.org/10.1038/s41562-018-0399-z>
- Castano, E. (2012). Anti-social behavior in individuals and groups: An empathy-focused approach. In K. Deaux & M. Snyder (Eds.), *The Oxford handbook of personality and social psychology* (pp. 419-445). New York, NY: Oxford University Press.

- Chaiken, S. (1987). The heuristic model of persuasion. In M. P. Zanna, J. M. Olson, & C. P. Herman (Eds.), *Social influence: The Ontario symposium*, 5. (pp. 3–39). Hillsdale, NJ: Erlbaum.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication and Society*, 4, 245-264.
https://doi.org/10.1207/S15327825MCS0403_01
- Constanzo, M., & Archer, D. (1993). *The Interpersonal Perception Task-15 (IPT-15): A guide for researchers and teachers*. Unpublished Manual.
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog of Selected Documents in Psychology*, 10, 1-19.
http://www.uv.es/~friasnav/Davis_1980.pdf
- Davis, M. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113-126. <http://doi.org/10.1037/0022-3514.44.1.113>
- Davis, M. H., Mitchell, K. V., Hall, J. A., Lothert, J., Snapp, T. & Meyer, M. (1999). Empathy, expectations, and situational preferences: Personality influences on the decision to participate in volunteer helping behaviors. *Personality*, 67, 469-503.
<http://doi.org/10.1111/1467-6494.00062>
- De Graaf, A., Hoeken, H., Sanders, J., & Beentjes, W. J. (2012). Identification as a mechanism of narrative persuasion. *Communication Research*, 39, 802-823.
<https://doi.org/10.1177/0093650211408594>
- De Mulder, H. N. M., Hakemulder, F., van den Berghe, R., Klassen, F., & van Berkum, J. J. A. (2017). Effects of exposure to literary narrative fiction: From book smart to street

smart? *Scientific Study of Literature*, 7, 129-169.

<https://doi.org/10.1075/ssol.7.1.06dem>

Djikic, M. & Oatley, K. (2014). The art in fiction: From indirect communication to changes in the self. *Psychology of Aesthetics, Creativity and the Arts*, 8, 498-505.

<http://doi.org/10.1037/a0037999>

Dodell-Feder, D., Lincoln, S. H., Coulson, J. P., & Hooker, C. I. (2013). Using fiction to assess mental state understanding: A new task for assessing theory of mind in adults.

PLOS ONE, 8, 1-14. <http://doi.org/10.1371/journal.pone.0081279>

Dodell-Feder, D. & Tamir, D. I. (2018). Fiction reading has a small positive impact on social cognition: A meta-analysis. *Journal of Experimental Psychology: General*, 147, 1713-

1727. <http://doi.org/10.1037/xge0000395>

Duval, C., Piolino, P., Bejanin, A., Eustache, F., & Desgranges, B. (2010). Age effects on different components of theory of mind. *Consciousness and Cognition* 20, 627-642.

<http://doi.org/10.1016/j.concog.2010.10.025>

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191. <https://doi.org/10.3758/bf03193146>

Fiske, S. T., & Taylor, S. E. (2013). *Social cognition: From brains to culture*. Thousand Oaks, CA: Sage publications.

Fong, K., Mullin, J. B., & Mar, R. A. (2013). What you read matters: The role of fiction genre in predicting interpersonal sensitivity. *Psychology of Aesthetics, Creativity and the Arts*, 7, 370-376. <http://doi.org/10.1037/a0034084>

Gerrig, R. (1993). *Experiencing narrative worlds. On the psychological activities of reading*.

New Haven, CT: Yale University Press.

Gilbert, D. T. (1991). How mental systems believe. *American Psychologist*, *46*, 107-119.

<https://doi.org/10.1037/0003-066X.46.2.107>

Gilbert, D. T. & Hixon, J. G. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal of Personality and Social Psychology*, *60*, 509-517.

<http://doi.org/10.1037/0022-3514.60.4.509>

Green, M. C. & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, *79*, 701-721.

<http://doi.org/10.1037//0022-3514.79.5.701>

Green, M. C. & Brock, T. C. (2002). In the mind's eye: Transportation-imagery model of narrative persuasion. In M.C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 315-341). New York, NY: Psychology Press.

Green, M.C., Garst, J. & Brock, T.C. (2004). The power of fiction: Determinants and boundaries. In L. J. Shrum (Ed.) *Blurring the lines between entertainment and persuasion* (pp. 161-176). Mahwah, NJ: Lawrence Earlbaum Associates.

Hakemulder, J. (2000). *The Moral Laboratory: Experiments examining the effects of reading literature on social perception and moral self-concept*. Amsterdam, The Netherlands: John Benjamins.

Hakemulder, J. F. (2004). Foregrounding and its effect on readers' perception. *Discourse Processes*, *38*, 193-218. https://doi.org/10.1207/s15326950dp3802_3

Hall, A. E., & Bracken, C. C. (2011). "I really liked that movie": Testing the relationship between trait empathy, transportation, perceived realism and movie enjoyment. *Media Psychology*, *23*, 90-99. <http://doi.org/10.1027/1864-1105/a000036>

- Hauser, D. J., & Schwarz, N. (2016). Attentive Turkers: MTurk participants perform better on attention checks than do subject pool participants. *Behavior Research Methods*, *48*, 400-407. <http://doi.org/10.3758/s13428-015-0578-z>
- Hemingway, E. (1988). The end of something. In Hemingway, E, *In our time* (pp. 42-46). London, England: Vintage.
- Hsu, C., Conrad, M., & Jacobs, A. M. (2014). Fiction Feelings in Harry Potter: haemodynamic response in the mid-cingulate cortex correlates with immersive reading experience. *Neuroport*, *25*, 1356-1361. <http://doi.org/10.1097/WNR.0000000000000272>
- Ickes, W. (Ed.). (1997). *Empathic accuracy*. New York, NY: Guilford Press.
- Iguarta, J.-J. (2010). Identification with characters and narrative persuasion through fictional feature films. *Communications*, *35*, 347-373. <http://doi.org/10.1515/comm.2010.019>
- Johnson, D. R. (2012). Transportation into a story increases empathy, prosocial behavior, and perceptual bias toward fearful expressions. *Personality and Individual Differences*, *52*, 150-155. <http://doi.org/10.1016/j.paid.2011.10.005>
- Joyce, R. (2012). *The unlikely pilgrimage of Harold Fry*. London, England: Random House.
- Kanske, P., Böckler, A., Trautwein, F., & Singer, T. (2015). Dissecting the social brain: Introducing the EmpaToM to reveal distinct neural networks and brain-behavior relations for empathy and theory of mind. *NeuroImage* *122*, 6-19. <http://doi.org/10.1016/j.neuroimage.2015.07.082>
- Keen, S. (2007). *Empathy and the novel*. Oxford, England: Oxford University Press.
- Kidd, D. C., & Castano, E. (2013). Reading literary fiction improves theory of mind. *Science*, *342*, 377-380. <http://doi.org/10.1126/science.1239918>

- Kidd, D. C., & Castano, E. (2017a). Different stories: How levels of familiarity with literary and genre-fiction relate to mentalizing. *Psychology of Aesthetics, Creativity and the Arts, 11*, 474-486. <http://doi.org/10.1037/aca0000069>
- Kidd, D. C., & Castano, E. (2017b). Panero et al. (2016): Failure to replicate methods caused failure to replicate results. *Journal of Personality and Social Psychology, 112*, 1-4 <http://doi.org/10.1037/pspa0000072>
- Kidd, D. C., & Castano, E. (2018a). Reading literary fiction can improve theory of mind. *Nature Human Behavior, 2*, 604, <https://doi.org/10.1038/s41562-018-0408-2>
- Kidd, D. C., & Castano, E. (2018b). Reading literary fiction and theory of mind: Three preregistered replications and extensions of Kidd and Castano (2013). *Social Psychological and Personality Science, 20*, 1-10. <http://doi.org/10.1177/1948550618775410>
- Kidd, D. C., Ongis, M., & Castano, E. (2016). On literary fiction and its effects on theory of mind. *Scientific Study of Literature, 6*, 42-58. <https://doi.org/10.1075/ssol.6.1.04kid>
- Koopman, E. M. (2015). Empathic reactions after reading: The role of genre, personal factors and affective responses. *Poetics, 50*, 62-79. <http://doi.org/10.1016/j.poetic.2015.02.008>
- Koopman, E. M. (2016). Effects of “literariness” on emotions and on empathy and reflection after reading. *Psychology of Aesthetics, Creativity and the Arts, 10*, 82-98. <http://doi.org/10.1037/aca0000041>
- Koopman, E. M. & Hakemulder, F. (2015). Effects of literature on empathy and self-reflection: A theoretical-empirical framework. *Journal of Literary Theory, 9*, 79-111. <http://doi.org/10.1515/jlt-2015-0005>
- Kumkale, G. T., & Albarracín, D. (2004). The sleeper effect in persuasion: A meta-analytic review. *Psychological Bulletin, 130*, 143-172. <http://doi.org/10.1037/0033-2909.130.1.143>

- Kuzmičová, A., Mangen, A., Støle, H., & Begnum, A. C. (2017). Literature and readers' empathy: A qualitative text manipulation study. *Language and Literature: International Journal of Stylistics*, 2, 137-152.
<https://doi.org/10.1177/0963947017704729>
- Lehne, M., Engel, P., Rohrmeier, M., Menninghaus, M., Jacobs, A. M., & Koelsch, S. (2015). Reading a suspenseful literary text activates brain areas related to social cognition and predictive inference. *PLOS ONE*, 10, 1-18.
<http://doi.org/10.1371/journal.pone.0124550>
- Mar, R. A. (2018a). Stories and the promotion of social cognition. *Current Directions in Psychological Science*, 27, 257-262. <http://doi.org/10.1177/0963721417749654>
- Mar, R. A. (2018b). Evaluating whether stories can promote social cognition: Introducing the Social Processes and Content Entrained by Narrative (SPaCEN) framework. *Discourse Processes*, 55, 454-479. <https://doi.org/10.1080/0163853X.2018.1448209>
- Mar, R. A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on Psychological Science*, 3, 173-192.
<http://doi.org/10.1111/j.1745-6924.2008.00073.x>
- Mar, R. A., Oatley, K., Djikic, M., & Mullin, J. (2011). Emotion and narrative fiction: Interactive influences before, during and after reading. *Cognition and Emotion*, 25, 818-833. <http://doi.org/10.1080/02699931.2010.515151>
- Mar, R. A., Oatley, K., Hirsh, J., dela Paz, J. & Peterson, J.B. (2006). Bookworms versus nerds: Exposure to fiction versus non-fiction, divergent associations with social ability, and the simulation of fictional social worlds. *Research in Personality*, 40, 694-712.
<http://doi.org/10.1016/j.jrp.2005.08.002>

- Mar, R. A., Oatley, K., & Peterson, J. B. (2009). Exploring the link between reading fiction and empathy: Ruling out individual differences and examining outcomes. *Communications, 34*, 407-428. <http://doi.org/10.1515/COMM.2009.025>
- Mazzocco, P. J., Green, M. C., Sasota, J. A., & Jones, N. W. (2010). This story is not for everyone: Transportability and narrative persuasion. *Social Psychological and Personality Science, 1*, 361-368. <http://doi.org/10.1177/1948550610376600>
- Mumper, M. L., & Gerrig, R. J. (2017). Leisure reading and social cognition: A meta-analysis. *Psychology of Aesthetics, Creativity and the Arts, 11*, 109-120. <http://doi.org/10.1037/aca0000089>
- Nell, V. (1988). The psychology of reading for pleasure: Needs and gratifications. *Reading Research Quarterly, 23*, 6-50. <https://doi.org/10.2307/747903>
- Norman, G. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Advances in Health Sciences Education, 15*, 625-632. <http://doi.org/10.1007/s10459-010-9222-y>
- Nowicki, S. (2010). *A manual for diagnostic analysis of nonverbal accuracy 2*. Unpublished manuscript. Department of Psychology, Emory University.
- Oakley, B. F. M., Brewer, R., Bird, G., & Catmur, C. (2016). Theory of mind is not theory of emotion: A cautionary note on the Reading the Mind in the Eyes Test. *Journal of Abnormal Psychology, 125*, 818-823. <http://doi.org/10.1037/abn0000182>
- Oatley, K. (1999). Why fiction may be twice as true as fact: Fiction as cognitive and emotional simulation. *Review of General Psychology, 3*, 101-117. <http://doi.org/10.1037/1089-2680.3.2.101>
- Oatley, K. (2012). The cognitive science of fiction. *WIREs Cognitive Science, 3*, 425-430. <http://doi.org/10.1002/wcs.1185>

- Paal, T., & Bereczkei, T. (2007). Adult theory of mind, cooperation, Machiavellianism: The effect of mindreading on social relations. *Personality and Individual Differences, 43*, 541-551. <http://doi.org/10.1016/j.paid.2006.12.021>
- Panero, M. E., Weisberg, D. S., Black, J., Goldstein, T. R., Barnes, J. L., Brownell, H., & Winner, E. (2016). Does reading a single passage of literary fiction really improve theory of mind? An attempt at replication. *Journal of Personality and Social Psychology, 111*, 46-54. <http://doi.org/10.1037/pspa0000064>
- Panero, M. E., Weisberg, D. S., Black, J., Goldstein, T. R., Barnes, J. L., Brownell, H., & Winner, E. (2017). No support for the claim that literary fiction uniquely and immediately improves theory of mind: A reply to Kidd and Castano's commentary on Panero et al. (2016). *Journal of Personality and Social Psychology, 112*, 5-8. <http://doi.org/10.1037/pspa0000079>
- Penner, L. A., Fritzsche, B. A., Craiger, J. P., & Freifeld, T. R. (1995). Measuring the prosocial personality. In J. Butcher & C. D. Spielberger (Eds.), *Advances in personality assessment* (Vol 10) (pp. 147-163). Hillsdale, NJ: LEA.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York, NY: Springer.
- Pino, M. C., & Mazza, M. (2016). The use of “literary fiction” to promote mentalizing ability. *PLoS ONE 11*, 1-14. <http://doi.org/10.1371/journal.pone.0160254>
- Richter, D., Dietzel, C., & Kunzmann, U. (2010). Age differences in emotion recognition: The task matters. *The Journals of Gerontology, 66B*, 48-55. <https://doi.org/10.1093/geronb/gbq068>
- Rocklage, M. D., Rucker, D. D., & Nordgren, L. F. (2018). Persuasion, emotion, and language: The intent to persuade transforms language via emotionality. *Psychological Science, 29*, 749–760. <https://doi.org/10.1177/0956797617744797>

- Samur, D., Tops, M., & Koole, S. L. (2018). Does a single session of reading literary fiction prime enhanced mentalising performance? Four replication experiments of Kidd and Castano (2013). *Cognition and Emotion*, *32*, 130-144.
<https://doi.org/10.1080/02699931.2017.1279591>
- Shamay-Tsoory, S.G., & Aharon-Peretz, J. (2007). Dissociable prefrontal networks for cognitive and affective theory of mind: A lesion study. *Neuropsychologia*, *45*, 3054–3067. <http://doi.org/10.1016/j.neuropsychologia.2007.05.021>
- Singer, T., & Lamm, C. (2009). The social neuroscience of empathy. *New York Academy of Sciences*, *1156*, 81-96. <http://doi.org/10.1111/j.1749-6632.2009.04418.x>
- Slater, M. D. (2002). Entertainment education and the persuasive impact of narratives. In M.C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 157-182). New York, NY: Psychology Press.
- Speer, N. K., Reynolds, J. R., Swallow, K. M., & Zacks, J. M. (2009). Reading stories activates neural representations of visual and motor experiences. *Psychological Science*, *20*, 989-999. <http://doi.org/10.1111/j.1467-9280.2009.02397.x>
- Stanovich, K. E., & West, R. F. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly*, *24*, 402-433. <http://doi.org/10.2307/747605>
- Teding van Berkhout, E., & Malouff, J. M. (2016). The efficacy of empathy training: A meta-analysis of randomized controlled trials. *Counselling Psychology*, *63*, 32-41.
<http://doi.org/10.1037/cou0000093>
- Tormala, Z. L., & Petty, R. E. (2004). Source credibility and attitude certainty: A metacognitive analysis of resistance to persuasion. *Consumer Psychology*, *14*, 427–442.
http://doi.org/10.1207/s15327663jcp1404_11
- Turner, R., & Felisberti, F. M. (2017). Measuring mindreading : A review of behavioral approaches to testing cognitive and affective mental state attribution in neurologically

typical adults. *Frontiers in Psychology*, 8, 47.

<https://doi.org/10.3389/fpsyg.2017.00047>

Turner, R., & Felisberti, F. M. (2018). Relationships between fiction media, genre, and empathic abilities. *Scientific Study of Literature*, 8, 261-292.

<https://doi.org/10.1075/ssol.19003.tur>

Van Kujik, I., Verkoeijen, P., Dijkstra, K., & Zwaan, R. A. (2018). The effect of reading a short passage of literary fiction on theory of mind: A replication of Kidd and Castano (2013). *Collabra: Psychology*, 4(1), 2-12. <http://doi.org/10.1525/collabra.117>

Wallentin, M., Nielsen, A. H., Vuust, P., Dohn, A., Roepstorff, A., & Lund, T. E. (2011). BOLD response to motion verbs in left posterior middle temporal gyrus during story comprehension. *Brain & Language*, 119, 221-225.

<http://doi.org/10.1016/j.bandl.2011.04.006>

Wacker, R., Bölte, S., & Dziobek, I. (2017). Women know better what other women think and feel: Gender effects on mindreading across the adult life span. *Frontiers in Psychology*, 8, 1324. <http://doi.org/10.3389/fpsyg.2017.01324>

Walter, H. (2012). Social cognitive neuroscience of empathy: Concepts, circuits and genes. *Emotion Review*, 4, 9-17. <http://doi.org/10.1177/1754073911421379>

Zemboian, M. R., & Johar, G. V. (2007). Attitudinal ambivalence and openness to persuasion: A framework for interpersonal influence. *Journal of Consumer Research*, 33, 506–514. <https://doi.org/10.1086/510224>

Zunshine, L. (2006). *Why we read fiction: Theory of mind and the novel*. Columbus, OH: Ohio State University Press.

Appendix

Correlations between ART-R, IRI scales, Narrative Engagement Dimensions and Post-test Social Cognitive Skills

	2	3	4	5	6	7	8	9	10	11	12	13
1. Fiction-exposure	.64*** [.49, .78]	.013 [-.17, .19]	.045 [-.15, .23]	.038 [-.14, .21]	.330** [.16, .53]	.298* [.07, .49]	.195 [-.08, .44]	.213 [-.003, .43]	.099 [-.09, .23]	.075 [-.14, .28]	.063 [-.14, .25]	-.089 [-.27, .11]
2. Nonfiction-exposure	-	-.03 [-.24, .18]	.03 [-.16, .22]	.02 [-.18, .20]	.19 [-.03, .39]	.13 [-.10, .36]	.17 [-.11, .43]	.12 [-.14, .36]	.17 [.004, .33]	.09 [-.07, .22]	.09 [-.11, .29]	-.11 [-.29, .08]
3. Fantasy		-	.337*** [.13, .54]	.454*** [.17, .67]	.202 [-.03, .40]	.392** [.19, .56]	.217 [-.04, .48]	.474*** [.25, .66]	.082 [-.19, .37]	.119 [-.19, .41]	.061 [-.20, .27]	.137 [-.13, .39]
4. Perspective-taking			-	.582*** [.45, .71]	.091 [-.13, .30]	.488*** [.28, .65]	.539*** [.34, .71]	.455*** [.27, .62]	.076 [-.15, .31]	.060 [-.17, .31]	.211 [-.02, .43]	.115 [-.12, .36]
5. Empathic concern				-	.054 [-.17, .28]	.419*** [.19, .62]	.504*** [.34, .64]	.494*** [.31, .63]	.136 [-.11, .39]	.127 [-.16, .40]	.093 [-.16, .31]	.109 [-.15, .35]
6. SST comprehension					-	.165 [-.10, .38]	.081 [-.16, .32]	.086 [-.19, .33]	.170 [-.13, .47]	.159 [-.14, .44]	.393*** [.17, .57]	.130 [-.11, .40]
7. Transportation						-	.668*** [.49, .81]	.809*** [.71, .99]	.047 [-.19, .30]	.192 [-.08, .46]	.341** [.13, .53]	.160 [-.10, .43]
8. Affective empathy							-	.718*** [.53, .86]	.063 [-.17, .28]	.146 [-.11, .40]	.278* [.05, .47]	.066 [-.20, .32]
9. Identification								-	.024 [-.20, .26]]	.180 [-.06, .40]	.344** [.11, .55]	.162 [-.10, .39]
10. Yoni cognitive									-	.689*** [.53, .80]	.229* [.05, .42]	.222* [.02, .42]
11. Yoni affective										-	.389*** [.24, .55]	.169 [-.02, .36]
12. SST: Explicit											-	.285** [.10, .48]
13. SST: Spontaneous												-

Note. $N = 93$; * $p < .05$, ** $p < .01$, *** $p < .001$; 95% bias corrected and accelerated confidence intervals are presented in brackets