

**Moved by Film: Exploring the Relationship Between Narrative Complexity, Immersion,
and Extraversion While Watching Short Films**

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Abstract

This bachelor thesis explores the relationship between Narrative Complexity, self-reported Immersion, and Extraversion in the context of short films. Narrative Complexity is an important feature of storytelling in films which influences how audiences engage and potentially immerse themselves while watching. However, individual factors e.g., personality could have an influence on the immersive experience while watching films. This research aims to determine how two levels of narrative complexity impact viewer immersion and how differences in extraversion could affect this relationship. To investigate this, 34 students had to watch six short films that were either complex or linear in narrative. Following each short film, they completed a questionnaire about their level of immersion and their personality traits, specifically extraversion. Statistical analyses were conducted to identify significant differences between narrative complexity, immersion, and extraversion. The results indicate that participants' immersion levels do not differ between complex and linear narrative short films, nor between participants with low or high extraversion. These findings suggest that narrative complexity does not play a crucial role in engaging audiences, and that personality traits like extraversion might not cause a difference in the degree of immersion experienced while watching short films. This study contributes to the understanding of how narrative elements and personality traits interact to shape viewer experiences during film-watching, offering directions for future research on advancing our knowledge on film engagement processes.

Keywords: Narrative Complexity, Film, Immersion, Extraversion, Personality.

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One of the remarkable features of impossible puzzle films is that they seem to walk a tightrope in balancing their viewers' fascination and frustration. That is, these films aim to be challenging, perplexing or even overwhelming in terms of their complexity, while they must also simultaneously prevent viewers from losing interest in their stories or faith in the possibility that they might solve the puzzle presented to them.

(Kiss & Willemsen, 2017, p. 142)

Kiss and Willemsen (2017) perfectly describe here what is intriguing about narrative complexity and the influence of these mind-bending films on viewers. *Narrative complexity* is a term used to describe the level of complexity felt in films, i.e., how much the narrative confronts us with puzzling plots and confusing storylines (Kiss & Willemsen, 2017; Ros & Kiss, 2018). The higher the narrative complexity in the film, the greater the disruption of the viewer's embodiment. Consequently, in order to create meaning and make sense of the film, a significantly greater number of cognitive resources are required (Grodal, 2009; Ros & Kiss, 2018). In this thesis we will divide Narrative Complexity as stylistic film feature into two levels namely, complex narrative and linear narrative.

Complex narrative can be defined as a complex storyline which can consist of multiple storylines, puzzles, deception, loops, or other unconventional ways of conveying the narrative (Buckland, 2022; Elsaesser, 2008; Kiss & Willemsen, 2017). The goal of a complex narrative film is to cognitively challenge the viewers with its puzzling and deceptive storyline and therefore, making it difficult for the viewer to comprehend the story. The plot remains unsolved (Buckland, 2022) and as Buckland (2008) describes it, entangled. This makes a complex narrative film an incoherent and mind-bending film that does not adhere to the features of a traditional linear narrative film (Kiss & Willemsen, 2017).

On the other hand, *linear narrative* is characterised by features such as a chronological storyline, character integrity, straightforward causality, and a continuous and coherent narrative (Kiss & Willemsen, 2017). Next to that, the plot is deemed as simple and extremely obvious to the viewer (Buckland, 2008; Kiss & Willemsen, 2017) and if there is any imbalance in the storyline which could be seen as puzzling, it will be resolved and explained in the end (Buckland, 2022).

Film has a good reputation for having immersive capabilities (Visch et al., 2010). Therefore, this thesis aims to examine the effect of narrative complexity on immersion through film. *Immersion* has been defined in multiple ways with terms such as Presence (Visch et al., 2010), Spatial presence (Gysbers et al., 2004), and Transportation (Green & Brock, 2000). Common ground in these definitions is that the individual is completely absorbed and experiences a lack of awareness in how they are merely watching a film, causing the individual to feel like they are located in the fictional reality of the film (Bilandzic & Busselle, 2017; Fitzgerald & Green, 2017; Green & Brock, 2000; Gysbers et al., 2004; Hartmann et al., 2015; Lombard & Jones, 2015; Sacau et al., 2005). In this bachelor thesis we define immersion as a profound mental state in which a person's cognitive processes, accompanied with or without sensory stimulation, cause a shift in their attentional state that might cause them to become dissociated from the outside world (Agrawal et al., 2020).

In general, the common thought could be that linear narrative films are more appealing to the public because they are predictable, provide closure (Shaul, 2012), and facilitate meaning-making. This is in contrast to complex narrative films (Kiss & Willemsen, 2017). However, Huang and Grizzard (2022) researched whether participants' level of appreciation and psychological perceptions differed between achronological film narratives and chronological film narratives. They found that achronological narratives showed greater

positive evaluations of the participants in enjoyment, suspense, transportation, and appreciation compared to chronological narratives. They argue that this effect could be because of the films' uniqueness and the cognitive skills required to understand the puzzling stimuli (Huang & Grizzard, 2022). Continuing on to the relationship between narrative complexity and immersion, there are dividing findings on whether complex narratives or linear narratives lead to more immersion. As previously discussed, complex narratives and linear narratives both have the capability of entertaining and engaging with the viewer. However, how does this relate to feeling immersed while watching films?

A perspective to consider is the mental model approach. Mental models are described as cognitive structures used to represent aspects of our external world, closely related to schemas (Johnson-Laird, 1983). To comprehend and interpret the storyline of a film, viewers have to construct multiple mental models (Bordwell, 1989), with the situational model as the primary model (Busselle & Bilandzic, 2008). This mechanism integrates old and new information (e.g., character representations, events, actions, goals described in the story) into a coherent representation or mental model of the narrative's world (Zwaan et al., 1995). Viewers use this model to answer questions and resolve uncertainties while watching (Busselle & Bilandzic, 2008). Therefore, if viewers have difficulties incorporating new information into the existing models, occurring often in complex narratives, their story comprehension could suffer (Busselle & Bilandzic, 2008). In order for people to be immersed in the narrative, the process of focused attention on constructing mental models for comprehending the story needs to take place (Bilandzic & Busselle, 2011; Busselle & Bilandzic, 2008). Therefore, it is important to take distracting factors into account that could draw the attention away while watching a film and hamper feeling immersed. Firstly, immersion could be vulnerable to distraction from external factors, such as when the viewer is distracted from the film because someone enters the room or because the viewer feels

hungry or thirsty (Bilandzic & Busselle, 2011). Secondly, stylistic factors such as the narrative itself could be distracting because of two violations. The first violation is of ‘external realism’, meaning inconsistency between the fictional narrative and the actual world or experiences. Next to that, the second violation of ‘narrative realism’, meaning that the narrative is internally inconsistent and unexplainable (Bilandzic & Busselle, 2011; Busselle & Bilandzic, 2008). Therefore, the complex narrative itself could interfere with the viewer's engagement in the film (Yaros, 2006). In turn, this may lead to interference with processing the narrative and making the viewer feel lost while watching (Busselle & Bilandzic, 2008). Nevertheless, people are often more immersed in complex narratives because of their attention-grabbing and confusing stimuli (Huang & Grizzard, 2022). Adding on, a common feature in the popularity surrounding complex films is that viewers are not bothered by being misled while film-watching and conversely, enjoy taking on the challenge of interpreting the story through various theories and character backgrounds (Elsaesser, 2008). In summary, research is divided on whether complex or linear narratives yield more immersion in their audiences.

Subsequently, the question could lay on how other elements influence or confound this relationship, for example, personality. One way of looking at personality is through the Big Five Personality Dimensions. The Big Five, based on the Five Factor Model, categorises personality traits into Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness, which each consist of several narrower traits (Costa & McCrae, 1992; Costa & Widiger, 2002; Matthews et al., 2003; Wilt & Revelle, 2016). In this study, the interest lays in the extraversion dimension. *Extraversion* can be defined as the tendency to desire social interactions, need for stimulation, and having high spirits (Costa & Widiger, 2002). People high in extraversion tend to experience more positive emotions and a need of social attention next to showing more assertive behaviour (Wilt & Revelle, 2016). On the

other hand, people who are low in extraversion tend to be more reserved with social interactions, and are more reflective, quiet, and independent (Costa & Widiger, 2002; Wilt & Revelle, 2016). As mentioned before by Bilandzic and Busselle (2011), attention is an important component of immersion while watching films. People high in extraversion show better skills in dividing attention and restricting distractions, whereas people lower in extraversion show better skills in sustained attention and solving complex problems (Wilt & Revelle, 2016). Next to that, Willemsen et al. (2022) found a small significant correlation between extraversion and both ‘tolerance of ambiguity’ (ToA) and ‘need for cognition’ (NFC) on the Cognitive Challenge subscale within the Preference for Narrative Complexity scale. This could mean that highly extraverted people have a preference for cognitively challenging storylines, which is a component of films with complex narratives (Willemsen et al., 2022). Lastly, the study done by Weibel et al., (2010) researched the role of personality traits with immersion in mediated environments. They found that extraversion is positively associated with immersive tendency. However, when dividing immersive tendency into two subdimensions, being emotional involvement and absorption, they found different results in their analysis (Weibel et al., 2010). Consequently, they found a positive significant relationship between extraversion and emotional involvement, yet absorption is only significantly associated with openness to experience (Weibel et al., 2010).

Having reviewed the existing literature on narrative complexity, immersion, and extraversion, it becomes evident that research is divided on whether complex narrative or linear narrative creates more immersion while film-watching. Next to that, research relating extraversion with narrative complexity or immersion is sparse. Finally, even though significant progress has been made in research on these variables themselves and on relationships between two of the three variables mentioned, there remains a notable gap in relating these three variables together in general and how this relates to film. Therefore, this

bachelor thesis aims to investigate how extraversion influences the relationship between narrative complexity and self-reported immersion. Building upon the insights from prior research, the following hypotheses are proposed: (1) There is a difference in immersion between complex and linear narrative short films, (2) There is a difference in immersion between high extraversion and low extraversion, (3) There is a difference in immersion between high and low extraversion when controlled for narrative complexity, with a) a difference in immersion between high and low extraversion for complex narrative films, and b) no difference in immersion between high and low extraversion for linear narrative films. By addressing these hypotheses, this bachelor thesis aims to contribute to the knowledge in the field of narrative complexity and immersion related to film watching.

Method

Participants

Participants were recruited through personal networks and advertisements on the SONA website. Inclusion criteria were participants being enrolled in Bachelors (BA) or Masters (MA) at the University of Groningen or the Hanze University of Applied Sciences. The original sample consisted of 35 participants, from which one participant's data was discarded for not satisfying the inclusion criteria of being an enrolled student. Consequently, the study included a number of 34 students (13 males and 21 females; $M = 1.6$, $SD = 0.5$). The programmes followed by the student were BAs (91.2%) in Psychology (87.1%), Arts, Culture, and Media (3.2%) or other (9.7%) and MAs (8.8%) in Psychology (66.7%), or other (33.3%), with 32 (94.2%) participants attending the University of Groningen and two (5.8%) attending the Hanze University of Applied Sciences. The age of the participants ranged from 18 to above 25 years old ($M = 21.2$, $SD = 2.2$).

Design

This study uses a factorial repeated-measures design. The factor has two levels based on *narrative complexity* (linear and complex). With this design we explore how these two levels of narrative complexity interact with different outcome variables on a single person. The outcome variable researched in this study is *immersion* as a specific aesthetic experience. Next to that, *extraversion* was studied as a moderating variable. To see the other variables researched in this bachelor thesis group, please refer to Appendix A. Depending on the variables measured, it will be a between-subject or a within-subject design. Extraversion is a between-subject factor and immersion is a within-subject factor.

Procedure

As previously mentioned, participants were recruited through personal networks and targeted advertisements on the SONA website. As compensation, participants could choose between SONA credits or 10€ PIM-vouchers. The data was collected at the Heymans building, Groningen, from 22nd of April to 13th of May, 2024. Every session lasted approximately 90 minutes. The participants were given the option to select one of the available time slots after registering for the study. Group members were present in the room for guidance throughout the whole experiment.

Upon their arrival at the laboratory, participants were asked to give written consent for participation in the study. Afterwards, they were asked to sit in front of a large screen and were handed over a tablet. During film-watching, the participants' body movement was recorded using a camera for Movement Energy-analysis. The participants had to watch a selection of six short films (see Table 1), with the opportunity to take a five-minute intermission break halfway through. The order in which the short films were presented was randomised for each iteration of the experiment. Subsequently, after each short film the participants filled out a Qualtrics questionnaire (see Appendix B1), with the questionnaire after the final short film containing additional items about their background and personality

(see Appendix B2). Upon successful completion of the experiment, the tablets were collected by the team members and the participants were rewarded either SONA credits or the PIM-vouchers. This study was conducted with approval of the Ethics Committee of the Faculty of Behavioural and Social Sciences at the University of Groningen (EC-BSS), subcommittee Psychology (PSY-2324-S-0336).

Instruments

For this bachelor thesis, multiple questionnaires were used to answer the research questions of each group member. In this section, the questionnaires relevant merely to this research will be discussed. For a complete list of all the questionnaires, please refer to Appendix A.

Narrative Complexity

To operationalise *narrative complexity* as independent variable in this study, we selected six short films for the participants to watch, including three with a complex narrative and three with a linear narrative (See table 1). In order to obtain our short film selection, we started with selecting short films with merely the bachelor thesis group members. Afterwards, the preliminary selection was tested with a group consisting of experts and non-experts ($N = 11$). Based on the discussion, we reclassified *The Ballerina* from the complex narrative category to the linear narrative category. Furthermore, we aimed to balance language-based and non-language-based films, alongside other established control factors. Additionally, we removed short films deemed as disturbing and replaced them with less frightening alternatives.

In our short film selection, we controlled for the duration of the short film (five to fifteen minutes) and the genre (Horror, Thriller, Mystery/Sci-Fi). Besides that, we balanced the number of animation and live-action films by using two animation short films and four live-action short films. Lastly, we balanced language-based and non-language-based short

films and chose short films that focused on one main character.

Next to using a test audience to determine whether the films would be considered as complex or linear, we added a Perceived Complexity rating question. Participants were asked “How complex would you rate the narrative of this short film” and rated the narrative complexity on a scale from zero to 100 after finishing each short film. To keep the categorisation of the short films, the participants were expected to rate the complex films on average above 50% and the linear films on average below 50%.

Table 1

Short Film Selection

Title	Narrative Type	Film Style	Genre	Language- / Non-language- based	Length (min)	Year
The Interview	Complex	Live-action	Thriller	Language-based	09:34	2020
OPAL	Complex	Animation	Horror	Language-based	12:30	2020
Mouse X	Complex	Live-action	Mystery/Sci-Fi	Non-language	15:05	2014
Alma	Linear	Animation	Horror	Non-language	5:30	2009
The Ballerina	Linear	Live-action	Thriller	Non-language	7:45	2021
Dirty Machines - “The End of History”	Linear	Live-action	Mystery/Sci-Fi	Language-based	13:33	2020

Immersion

To measure *immersion*, our dependent variable, we used two items adapted from the Narrative Engagement Scale by Busselle and Bilandzic (2009). The scale measures the dimensions which are fundamental for the experience of engagement through narrative. Four dimensions of engagement were identified being, Narrative Understanding, Attentional Focus, Emotional Engagement, and Narrative Presence. To fit our research which focused on film-watching and movie narrative, we had to change the items slightly. The first item is from the Narrative Presence dimension. We adapted the original item NI3 “While viewing I was completely immersed in the story” to “While viewing I was completely immersed in the world created by the film”. The second item is reversed coded and is from the Attentional Focus dimension. We adapted the original item D2 “While the program was on I found myself thinking about other things” to “While viewing I found myself thinking about other things”. Participants answered these items on a 7-Likert scale ranging from disagree strongly (1) to agree strongly (7). The reliability of these two items in our study was low ($\alpha = .53$). In addition, the participants had to fill in a control question after each short film being, “Have you seen this short film before?”. We decided on this because it could confound their immersion while film-watching. The participants had four answer options to this question namely, 1) not sure, 2) no, 3) partly, and 4) yes.

Extraversion

To measure the variable *extraversion*, the Ten-Item Personality Inventory (TIPI) by Gosling et al., (2003) was used. The TIPI is a very brief questionnaire based on the Big Five personality domains with good psychometric properties. The TIPI was designed to measure personality domains broadly for studies that are not primarily interested in personality, which is the case for this study. The participants filled in the entire TIPI, however, for this study we

focused on the two items regarding the personality dimension Extraversion ($\alpha = .87$), being “I see myself as: 1. _____ Extraverted, enthusiastic” and “I see myself as: 6. _____ Reserved, quiet.” (See Appendix B2). The participants filled in based on a 7-Likert scale whether they disagree strongly (1) until agree strongly (7) with the statements.

Demographics

After finishing watching the six short films, the participants filled in a questionnaire with eight items about their background information (Appendix B2). The background information was collected through one item each for age, study background, sex assigned at birth (male/female/prefer to specify), and gender identity (female/male/prefer not to say/prefer to specify). Next to that, two items were used each to collect information about gender expression (femininity, masculinity) and two control questions about film-viewing behaviour (frequency and preferences).

Analysis

To answer our three hypotheses, we analysed three relationships (See figure 1). If the assumptions were not met for parametric testing, non-parametric tests were used as a substitute. For the first hypothesis, we expect to see a difference between Linear Narrative and Complex Narrative (*narrative complexity*) their effect on *immersion* (A, Figure 1). Therefore, to analyse this difference we want to conduct a paired t-test. A paired t-test is used to examine the mean difference between two sets of examination where each participant is measured twice (Complex and Linear). In order to do this analysis, we created a new average immersion score for the three complex films and for the three linear films separately. To create two average scores, one for immersion felt while watching complex short films (Immersion_Complex), and one for immersion felt while watching linear short films (Immersion_Linear), we recoded the reverse coded item. Afterwards, both immersion items were transformed into a mean score variable, with one representing the three complex short

films and one representing the three linear short films. Therefore, we analysed two scores instead of six for each short film separately.

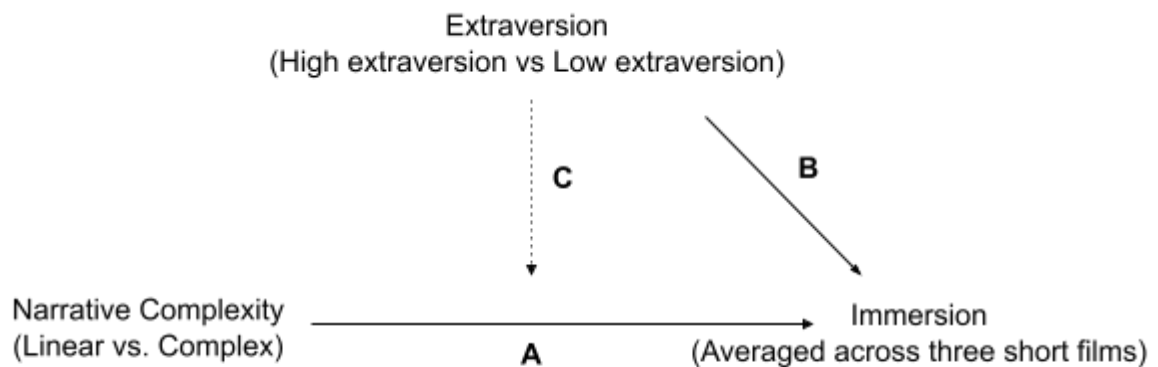
For the second hypothesis, we expect a difference between High Extraversion and Low Extraversion (*extraversion*) their effect on *immersion* (B, Figure 1). For our analysis, the split-half method was utilised to split the sample into two equal groups being high and low extraversion. This was done with a median split based on the sample their extraversion scores to ensure we had similar sized groups. Next to this, we merged all of the immersion scores together to create a total immersion score mean. For the analysis, we want to conduct an independent t-test. An independent t-test is used to see whether there is a significant difference between the means in two independent groups, i.e., whether there is a significant difference in immersion when being either high or low in extraversion.

For the third hypothesis, we looked at the influence of *extraversion* on the relationship between *narrative complexity* and *immersion* (C, Figure 1). Our expectation for this relationship is that there is a difference in immersion between complex films and linear films when comparing a low extraversion group to a high extraversion group. Therefore, we expect to see a difference in immersion between high and low extraversion with the complex narrative films and, on the contrary, no difference with the linear narrative films. For this hypothesis we want to conduct two independent t-tests because we want to calculate the difference between the effect of high or low extraversion on immersion felt during the three complex narrative films (Hypothesis 3a), and the effect of high or low extraversion on immersion felt during the three linear narrative films separately (Hypothesis 3b). Similarly, to the analysis for the first hypothesis, an average immersion score for the three complex films and an average immersion score for the three linear films was utilised. In addition, the aforementioned high and low extraversion groups were analysed. Afterwards, the differences

between the outcomes of the two independent t-tests will be discussed to compare the differences based on narrative complexity.

Figure 1

Relationships Analysed



Results

Descriptives

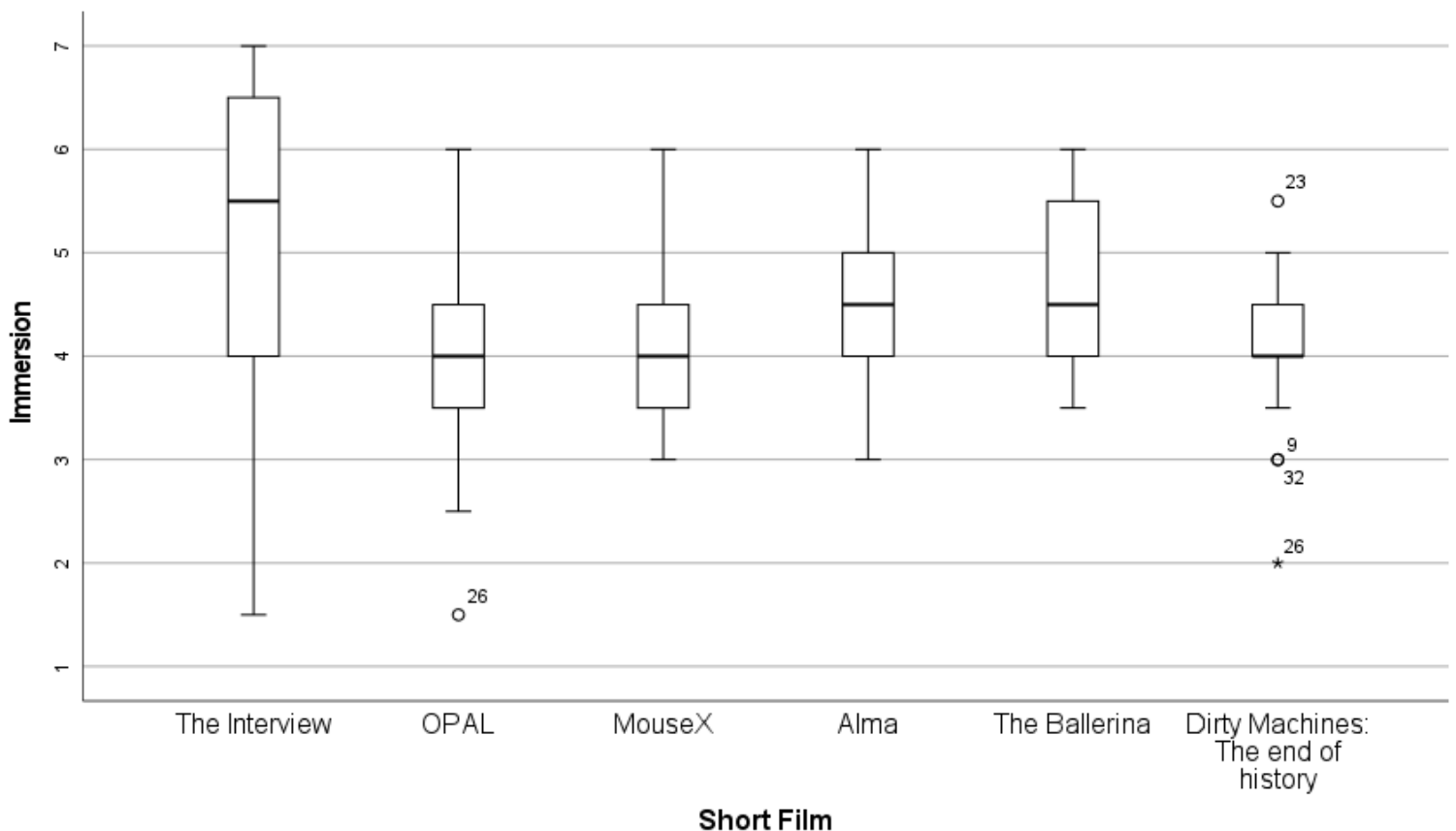
To begin with, our control questions for *narrative complexity* and *immersion*. See Table C1 for the descriptives for each short film separately. Results showed a perceived complexity rating for complex narrative films with an average minimum score of 18.3 and an average maximum score of 94.0 ($M = 62.4$, $SD = 16.2$). For the perceived complexity rating of the linear narrative films, we saw an average minimum score of 5.0 and an average maximum score of 74.3 ($M = 40.0$, $SD = 21.3$). Even though the short film ‘Dirty Machines: The end of history’ was rated slightly above the cut-off mark for linear ($M = 50.3$, see Table C1), the perceived complexity ratings of the participants confirm our categorisation of the linear and complex narrative short films when looking at the average scores. Therefore, we kept the current categorisation of the six short films. Next to that, we were interested in whether the participant had seen the short film before or not. Please refer to Table C1 to see

the results for each short film. Since the majority of participants had not previously viewed the six short films, we determined that this factor would not be considered a confounding variable in our study.

Furthermore, the results for *immersion*. With immersion during complex short films, we found a minimum score of 2.8 and a maximum score of 5.7 ($M = 4.4$, $SD = 0.7$). With immersion for linear short films, we found a minimum score of 3.7 and a maximum score of 5.5 ($M = 4.4$, $SD = 0.5$). For our second hypothesis, we calculated the total immersion score for all six short films combined, which had a similar average mean of 4.4 ($SD = 0.5$). See figure 2 for the data distribution of the immersion scores for each short film separately. The outliers were not removed because immersion is measured as a within-subject variable and we wanted to keep the data for each immersion condition similar.

Figure 2

Immersion Scores for Each Short Film



Note. The data for The Interview, MouseX, The Ballerina, and Dirty Machines: The end of history were not normally distributed.

^aValues more than 1.5 standard deviations from the mean are marked with a small circle (°).

^bValues more than 3 standard deviations from the mean are marked with an asterisk (*).

To analyse *extraversion*, the sample was divided into a high or a low extraversion group based on the median extraversion score on the TIPI. The median extraversion score was 4.0 (*IQR* = 2.1). Participants with a score lower than the median were the low extraversion group and participants with a score higher than the median were the high extraversion group. In our study, 18 participants made up the low extraversion group (52.9%) and 16 participants (47.1%) made up the high extraversion group. Our data showed a minimum extraversion score of 1.5 and a maximum extraversion score of 6.5. The mean total extraversion score was 4.2 (*SD* = 1.5) respectively.

Assumption Check

After running a preliminary analysis in which the assumptions of each analysis were tested with different plots, we found the following results. For the assumption of having a continuous dependent variable, even though immersion is measured as an ordinal variable (7-point Likert scale), we could assume it as a continuous variable because the Likert scale consisted of more than five categories and we combined multiple items (Sullivan & Artino, 2013). Next to that, the normality assumption was met for the low extraversion group, the high extraversion group, and for the immersion data with the complex films, however, could not be met for the immersion data with the linear films after conducting a Shapiro-Wilk test. Therefore, for our first hypothesis, we conducted a Wilcoxon-signed Rank test instead of a paired t-test. Our data met all assumptions. For our second hypothesis, we conducted the independent t-test as our data met the assumption of variance ($F(1, 32) = 0.07, p = .79$). In

order to test the third hypothesis, we continued with the independent t-test for the difference between high and low extraversion on immersion during complex films. The homogeneity of variances assumption is met ($F(1, 32) = 0.32, p = .58.$). However, because the normality assumption was not met for the linear narrative immersion data, we conducted a Mann-Whitney U test. Our data did not meet the similar distributions assumptions; therefore, the mean ranks of high and low extraversion were analysed to come to a conclusion.

Data Analyses

Differences in Narrative Complexity and Immersion

To answer our first hypothesis, there is a difference in immersion between complex and linear narrative short films, we conducted a Wilcoxon signed-rank test. The Wilcoxon signed-rank test indicated that there was no significant difference between self-reported immersion while watching complex narrative short films and while watching linear narrative short films, $z = -0.26, p = .79$. The median score on two 7-point Likert scale items was 4.5 ($IQR = 0.9$) for complex narrative compared with 4.2 ($IQR = 0.7$) for linear narrative. Therefore, we failed to reject the null hypothesis because there was no significant difference in immersion with narrative complexity.

Extraversion and Immersion

For our second hypothesis, there is a difference in immersion between high extraversion and low extraversion, we conducted an independent t-test for the mean difference. It was found that there was no significant difference in immersion, $t(32) = 0.18, p = .86$, with low extraversion participants ($M = 4.4, SD = 0.4$) having similar overall immersion scores as high extraversion participants ($M = 4.4, SD = 0.5$). Thus, we failed to reject the null hypothesis.

Differences in Extraversion, Narrative Complexity and Immersion

For our third and final hypothesis, there is a difference in immersion between high

and low extraversion when controlled for narrative complexity, we conducted an independent t-test for the relationship with complex narrative short films (Hypothesis 3a) and a Mann-Whitney U test for the relationship with linear narrative short films (Hypothesis 3b). For complex narrative films, the independent t-test indicated that there was no significant difference between low and high extraversion and their effect on immersion while watching complex narrative short films, $t(32) = 1.56, p = .13$. Low extraversion participants ($M = 4.6, SD = 0.7$) had similar immersion scores as high extraversion participants ($M = 4.2, SD = 0.7$). Consequently, we were not able to reject the null hypothesis in regards to hypothesis 3a. To evaluate the relationship with linear narrative films, a Mann-Whitney U test was performed. The Mann-Whitney U test showed that there was no significant difference between immersion reported during linear narrative films of the low extraversion group and the high extraversion group, $z = -1.71, p = .10$. The mean rank of the low extraversion group was 14.8 and the mean rank of the high extraversion group was 20.6 respectively. Therefore, we were able to reject the null hypothesis for hypothesis 3b. When comparing the results for these two subhypotheses in relation to the main hypothesis, we saw no significant differences in results for either complex or linear narrative films. Therefore, there was no significant difference in immersion between high and low extraversion when controlled for narrative complexity, and we failed to reject the null hypothesis.

Discussion

The purpose of this study was to research the relationships between *narrative complexity, immersion, extraversion*, and how these relate to each other in the context of film. The interest laid in the differences in the effect on immersion by comparing either linear or complex narrative, high or low extraversion, or both. We proposed the following hypotheses:

- (1) There is a difference in immersion between complex and linear narrative short films, (2)

There is a difference in immersion between high extraversion and low extraversion, (3) There is a difference in immersion between high and low extraversion when controlled for narrative complexity, with a) a difference in immersion between high and low extraversion for complex narrative films, and b) no difference in immersion between high and low extraversion for linear narrative films.

Differences in Narrative Complexity and Immersion

For our first hypothesis, there was no evidence to reject the null hypothesis. Therefore, we can conclude based on the results that there is no significant difference between linear narrative and complex narrative films. Both types of narrative complexity yield very similar immersion scores. These results are not consistent with previous research and our expectations, since the literature would often find a preference for one of the two levels of narrative complexity (e.g., Bilandzic & Busselle, 2011; Busselle & Bilandzic, 2008; Elsaesser, 2008; Huang & Grizzard, 2022). Additionally, our results are not in line with the mental model perspective on narrative engagement. From this perspective, it was found that viewers need to focus on constructing mental models for story comprehension in order to experience immersion (Bilandzic & Busselle, 2011; Busselle & Bilandzic, 2008). Bilandzic and Busselle (2008; 2011) discussed how distracting elements such as external factors and stylistic factors could obstruct immersion. Our results indicate that although the external realism and narrative realism of the complex narrative films were violated, it did not cause a difference in immersion in comparison to the linear narrative films where there were no violations in the narrative. This might imply that the mental model perspective is not a suitable approach for explaining the effect of narrative complexity on immersion.

Extraversion and Immersion

With our second hypothesis, our results show no significant difference in immersion when comparing high extraversion participants to low extraversion participants. Weibel et al.

(2010) found a positive association between extraversion and immersive tendency. Interestingly, they found a difference between emotional ambiguity and absorption, where absorption was not associated with immersion. In our study, we focus more on the absorption aspect of immersion. Therefore, our results are in line with this finding because, if extraversion and absorption are not related, it is not unsurprising that two levels of extraversion do not cause a difference in immersion. However, the reliability of the two items that we use in our study was poor, meaning that these results could have been the result of improper operationalisation of immersion as variable. Next to that, Weibel et al., (2010) used a scale for immersive tendency that measures immersion while playing video games (Immersive Tendency Questionnaire, ITQ; Witmer & Singer, 1998), while we adapted two items to film-watching from the Narrative Engagement Scale (Busselle & Bilandzic, 2009). This could indicate that the results regarding extraversion and immersion are different for different mediums (e.g., video gaming and film).

Differences in Extraversion, Narrative Complexity, and Immersion

Regarding our third and final hypothesis, the results for both the subhypotheses show no differences in immersion. Therefore, we could conclude that there is not a difference in immersion between high and low extraversion when controlled for narrative complexity and therefore, extraversion might not influence the relationship between narrative complexity and immersion. Our findings did not align with the sparse literature on these variables together. Willemsen et al. (2022) found a small positive association between extraversion and preference for cognitively challenging narratives. However, our results show no difference in immersion for complex narratives based on extraversion levels. An explanation for the differing results could be that, although extraversion was positively correlated with Preference for Narrative Complexity, this correlation is influenced by both NFC and ToA. Therefore, highly extraverted participants in our sample may not have scored highly on NFC

and ToA, explaining the inconsistent findings. Wilt and Revelle (2016) their study about differences in attention skills between extraverts and introverts was highlighted, as Bilandzic & Busselle (2011) discussed a connection between attention and immersion. Although we couldn't link attention skills to specific narrative types or immersive tendencies, our findings suggest that both introverts and extraverts could achieve a similar level of focus needed for immersion. Taken together, our findings indicate that extraversion might not be a significant external factor regarding the relationship between narrative complexity and immersion in films.

Limitations

Certain limitations of this study should be addressed in future research. Firstly, the reliability of our two items used to measure immersion ($\alpha = .53$) was poor as it had a Cronbach's Alpha slightly above .50. Therefore, the average scores and results have a high probability of being deemed invalid. One possible explanation for this limitation could have been the low number of items. Perhaps to get a better reliability score with this scale we should have used more items to measure Immersion. Next to that, poor interrelatedness between these two items. We selected two items from two different subdimensions. Possibly we should have picked two items from one subdimension e.g., Narrative Presence, i.e., the feeling that they have entered the story and left the actual world (Busselle & Bilandzic, 2009), which seems the most related to our definition of immersion. Our second limitation is the participation sample of our study. Our study has been done on 34 participants, which is not a big sample size. Limited data collection time prohibited us from being able to have a much larger sample size. Next to that, our sample consists of merely students that mainly study psychology. This could affect the generalisability of the results. Thirdly, we have a low number of questions addressing our research question. We included two items for immersion and used a shortened personality questionnaire with two extraversion items. Due to differing

interests within the bachelor thesis group, we had to reduce the number of items for each variable to maintain participant concentration. This limitation might confound our results, as reducing immersion and extraversion to two items might not adequately measure the constructs. Fourthly, our results regarding immersion could have been confounded by external factors, such as noise, light, internal distraction, or interest in the short film. Even though we made sure to create an isolated and distraction free environment to watch the films, these factors could hamper immersion e.g., construction happening during a couple of sessions or the participant feeling tired while participating.

Theoretical Implications

Despite these limitations, these results suggest several theoretical implications. To begin with, our findings add to the existing literature. As discussed in the introduction, the findings could be dividing on whether participants felt more immersed while watching complex films or while watching linear films. Our findings suggest that there might not be a difference in immersion comparing the two, which could mean that other stylistic factors could influence immersion more. Next to that, our findings are interesting regarding personality when looking at the sparse literature on it. The results suggest that extraversion might not affect immersion at all. This thesis gives new insights as well on how the three variables, *narrative complexity*, *immersion*, and *extraversion* relate to each other. We were interested mainly in how extraversion influences the relationship between narrative complexity and immersion. Our results suggest that two levels of extraversion do not cause a difference in immersion in either complex and linear films, which is a new finding to our knowledge. Lastly, our research gives new insights into film as a medium. Most literature regarding this topic focuses on virtual reality, video gaming, and reading.

Future Directions

In terms of future research, it would be useful to extend the current findings by

replicating this study. We believe that this study apart from a bachelor thesis project would give more possibilities, e.g., the ability to choose more items for operationalisation of the variables and to have a larger sample size. Since the reliability of the items used for immersion was low, further research is needed in order to make a better conclusion regarding our hypotheses, since immersion is an important variable analysed for each hypothesis. Additionally, it could be interesting to look at using different instruments for immersion and extraversion to heighten the reliability and validity of the results. Furthermore, it would be interesting to conduct this study with more variability in the film genres. For this study we looked at horror, thriller, and mystery/sci-fi. Perhaps, we would find different results for other genres such as comedy, action, or art house.

Conclusion

While acknowledging the limitations, this research can be seen as a first step towards integrating three lines of research, *narrative complexity*, *immersion*, and *extraversion*, that to our knowledge, have not been directly linked. The aim of this bachelor thesis was to research how extraversion influences the relationship between narrative complexity and self-reported immersion. Our findings show that neither narrative complexity or extraversion cause a difference in immersion while watching short films, showing similar results when they are researched together. However, since one of our most prominent limitations is a low reliability score on the immersion instrument, further research is necessary to establish the current results.

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Appendix A
Materials for Each Variable

Table A1*Measured Variables and Materials*

Variable	Between-subject or Within-subject Factor	Material	Description
Movement Energy (ME)	Within-subject	Movement Energy Analysis (Tschacher et al., 2018, Ramseyer, 2019)	A frame-differentiating method is applied to the raw data to generate a time series for each short film.
Immersion	Within-subject	Narrative Engagement Scale (Busselle & Bilandzic, 2009)	2 adapted items from the Attentional Focus Subscale and the Narrative Presence Subscale rated on a 7-point Likert scale from strongly disagree to strongly agree
Cognitive Stimulation	Within-subject	Scale of Aesthetic Appreciation of Film (Doicaru, 2016)	2 items from the Cognitive Stimulation scale rated on a 7 point Likert scale from strongly disagree to strongly agree
Emotional Resonance	Within-subject	Geneva Emotion Wheel (Tinio & Gartus, 2018)	Participants select from 20 emotion types and rate the

			emotion with regards to five intensity levels.
Bodily Sensations	Within-subject	Bodily Sensation Map (Schino et al., 2021, 2022)	Participants visually identify body areas that are activated during emotional arousal.
Affective and Cognitive Empathy	Within-subject	Empathy State Scale (Shen, 2010)	2 items from the Affective Empathy subscale and 2 items from the Cognitive Empathy subscale rated on a 7 point Likert scale from strongly disagree to strongly agree
Artistic Experience	Within-subject	Thematic Analysis	Participants think aloud about their film watching experience and their words are organised into the clusters of appreciation or enjoyment.
Personality	Between-subject	Ten-Item Personality Inventory (Gosling et al., 2003)	10 items on a 7 point Likert Scale from strongly disagree to strongly agree

Appendix B

Qualtrics Questionnaire

B1 Post-Film Questionnaire

Immersion (Narrative Engagement scale; Busselle & Bilandzic, 2009)

Rate the following items on a scale of 1 to 7 (strongly disagree to strongly agree):

1. While viewing I was completely immersed in the world created by the film
2. While viewing I found myself thinking about other things

Cognitive stimulation (Scale of Aesthetic Appreciation of Film; Doicaru, 2016)

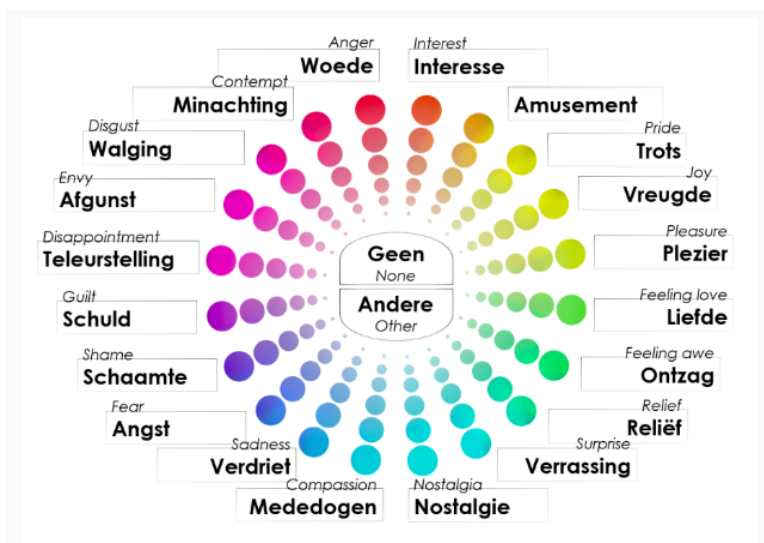
Rate the following items on a scale of 1 to 7 (strongly disagree to strongly agree):

1. It is stimulating to make sense of this film
2. While watching this film, I felt curious at times

Emotional resonance (Geneva Emotion Wheel; Tinio & Gartus, 2018)

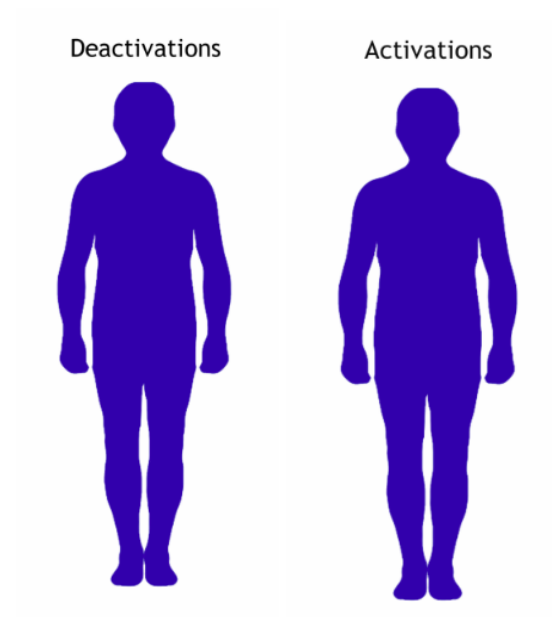
1. Which emotion(s) did you feel while viewing the film clip?

Choose up to two emotions in the wheel that you feel (indicated by a particular spoke) and its intensity (the further away from the centre the more intense the emotion).



Bodily sensations (Bodily Sensation Maps; Schino et al., 2021, 2022)

You will be displayed with two body silhouettes. On the left body silhouette, please, indicate where in the body you feel stronger, that is with more energy (e.g.: muscles tensing, flushed face, pounding heart, etc.) when experiencing the artwork in front of you. On the right body silhouette indicates where in the body you feel weaker, that is with less energy (e.g.: woozy body parts, lightheadedness, numbness in the extremities, etc.) when experiencing the artwork in front of you. For both silhouettes, you can click up to 10 times. Try to be as accurate as possible. If necessary, use more clicks to stress a particular zone where the feeling is more intense. You can point to any region of the body you feel appropriate, from the head to the toes. If you made a mistake, drag the dot to move it somewhere else; or just press on the dot you want to remove.



Affective and Cognitive Empathy (Empathy State Scale; Shen, 2010)

Rate the following items on a scale of 1 to 7 (disagree strongly to agree strongly):

1. I experienced the same emotions as the character when watching this film
2. I can feel the character's emotions
3. I can see the character's point of view

4. The character's reactions to the situation are understandable

B2 Demographic Questionnaire

1. Which film genres do you prefer to watch? You can pick and rank up to 5 genres that you prefer most: Action, adventure, animation, arthouse, comedy, documentary, drama, experimental, fantasy, horror, musical, romance, science fiction, thriller, Western
2. In the past three months, how often have you watched a film?: More than 4 times a week, 2-3 times a week, once a week, 1-2 times a month, less than once a month, I did not watch a film in the past three months
3. How old are you?
4. What is your gender?: Male, female, non-binary/third gender, prefer not to say
5. Once a scale from 0 to 100, how feminine or masculine would you describe yourself?
By masculinity and femininity we refer to the relatively enduring characteristics encompassing traits, appearances, interests, and behaviours that have traditionally been considered relatively more typical of women and men, respectively.
6. What study are you enrolled in?
7. I see myself as Extraverted, enthusiastic: disagree strongly to agree strongly
(Ten-Item Personality Inventory; Gosling et al., 2003)
8. I see myself as Critical, quarrelsome: disagree strongly to agree strongly
(Ten-Item Personality Inventory; Gosling et al., 2003)
9. I see myself as Dependable, self-disciplined: disagree strongly to agree strongly
(Ten-Item Personality Inventory; Gosling et al., 2003)
10. I see myself as Anxious, easily upset: disagree strongly to agree strongly
(Ten-Item Personality Inventory; Gosling et al., 2003)

11. I see myself as Open to new experiences, complex: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)
12. I see myself as Reserved, quiet: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)
13. I see myself as Sympathetic, warm: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)
14. I see myself as Disorganised, careless: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)
15. I see myself as Calm, emotionally stable: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)
16. I see myself as Conventional, uncreative: disagree strongly to agree strongly (Ten-Item Personality Inventory; Gosling et al., 2003)

