Media dreaming and media consumption – An online study

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Summary. A thematic continuity between waking and dreaming has been replicated for various waking activities. Today media consumption plays an important role in waking life and, thus, one would expect a fair amount of media dreams. This online included 1966 participants with a wide age range. The questionnaires elicited media consumption, the perceived involvement during media consumption and percentage of media dreams. Eight media types were analyzed: non-fiction books, fictional books, news programs, entertainment programs, action programs, action games, entertainment games and social media. Ordinal regression analyses indicated that within all eight categories the amount of waking activity correlated significantly with corresponding media dream percentage. Additionally, the factor involvement while using the media type in waking life had a significant impact on the percentage of media dreams. To conclude, media consumption and media involvement influence one's dreams and, thus, the continuity hypothesis was confirmed. Future studies should examine the correlation in a longitudinal design in order to investigate the relationship between waking and dreaming over a longer time span and with more variables included, such as daily media consumption and personality.

Keywords: Media consumption, dreaming, continuity hypothesis

1. Introduction

Dreams have been defined as a reminiscence of the subjective experiences whilst sleeping (Schredl, 2018); their contents are influenced by waking life – the so-called continuity hypothesis of dreaming (Schredl, 2003). This hypothesis has so far been confirmed for various activities, such as sports and reading (Schredl & Erlacher, 2008), driving (Schredl & Hofmann, 2003), music (Vogelsang, Anold, Schormann, Wübbelmann, & Schredl, 2016) and politics (Kern et al., 2014). Today media consumption plays an important role in waking life: 3 hrs and 3 min. per day, these are representative data for all age groups from 10 to over 65 years in Germany (Statistisches Bundesamt, 2015). Therefore, one would expect media contents would also be featured in media consumers' dreams.

Empirical studies looking at the effects of media on dreams in a laboratory setting did not find marked effects of presleep films on dream content (Cartwright, Bernick, Borowitz, & Kling, 1969; Foulkes & Rechtschaffen, 1964; Lauer, Riemann, Lund, & Berger, 1987). Thus, home studies may yield more ecologically valid findings and will be reviewed briefly. A study with children showed that the self-rated influence of TV viewing on dream content was nearly 75% whereas only about 45% of the children believed that reading influenced their dreams (Stephan, Schredl, Henley-Einion, & Blagrove, 2012). In the second sample of the UK library study, the findings of the previous study were confirmed: the self-rated impact of TV on dreams is high and higher than that of reading (Lambrecht, Schredl, Henley-Einion, & Blagrove, 2013). In both samples, the more time spent dealing with the activity the more likely the participants indicated that the activity influenced their dreaming (Lambrecht et al., 2013; Stephan et al., 2012). About 57% of the participants stated that they had already once dreamed of media figures (Alperstein & Vann, 1997). A group of undergraduate students referring to the attacks of 09/11 reported a direct association between TV exposure and subsequent increase in stress and trauma, leading to more threatening dreams with specific features of the events (Propper, Stickgold, Keeley, & Christman, 2007). A regression analysis based on regular media exposure led to a correlation of r = 0.31 between violent media use (measured as time spent watching this media type) and the percentage of violent dreams and a correlation of r = 0.45 between sexual media use and the percentage of sexual dreams, both were statistically significant (Van den Bulck, Çetin, Terzi, & Bushman, 2016). Van den Bulck (2004) also demonstrated that children reported more nightmares affected by TV than by computer games (26% versus 7.60%); at the same time, 54.70% reported having pleasant dreams related to TV and 24.50% reported pleasant dreams with regard to computer games. Gackenbach and Boyes (2014) found that the dreams of high-end gamers contained more dead and imaginary characters in their dreams than in the dreams of non-gamers. This can be attributed to the generational shifts in the media portrayals and, thus, the increased exposure of these characters in video games. Another study by Gackenbach, Rosie, Bown, and Sample (2011) showed that the highest incorporation of the previously played or watched video game into a subsequent dream was paired with high immersion as well as high interactivity (playing the

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game), hence reflecting the intensity of the activity necessary in order that it appears in a dream. A study based on a long term diary and daily blogs of an avid video game player with obsessive compulsive disorder reflected the continuity between waking and dreaming in several ways, for instance the absence of friends and social interaction in dreams, the fewer familiar settings and especially the significant correlation between the blog mentions of gaming and its occurrence in the subject's dreams (Gackenbach, Sample, Mandel, & Tomashewsky, 2011).

These studies demonstrated that media contents often appear in dreams, correlating with consumption and also with emotional involvement. Therefore dreams are reflective of the social and cultural structure of a dreamer's waking world (Alperstein & Vann, 1997). Thus far, only the categories TV, reading, and video games have been studied in such investigations.

The following study was designed to expand these findings by integrating several different media types since the media world is becoming more diverse every day and, for this reason, it is of great significance to be familiar with the varying impacts of media consumption. Based on the continuity hypothesis of dreaming (Schredl, 2003), we hypothesized that more media consumption in waking would lead to more media dreams. In addition, we expected that the related higher emotional involvement would also result in more media dreams due to the fact that involvement is a supplementary factor in the continuity hypothesis.

2. Method

2.1. Participants

Overall, 1966 participants (1141 women and 825 men) completed the online survey between April 8, 2016 and April 18, 2016. The sample had a mean age of 47.68 ± 14.46 years (range: 15 to 91 years). The distribution concerning education was the following: not finished school (N = 15), 9 years of school ("Hauptschule"; N = 212), O-level ("Mittlere Reife"; N = 586), A-levels ("Fach-/Hochschulreife"; N = 475), university (N = 617), doctorate (N = 61).

2.2. Research Instruments

The following question of the Mannheim Dream questionnaire (MADRE) that is available in German and English (Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014) was used in the present study: The dream recall frequency was measured by a 7-point-scale (0 = never, 1 = less than once a month, 2 = about once a month, 3 = 2 to 3 times a month, 4 = once a week, 5 = several times a week, 6 = almost every morning). The retest reliability of the dream recall frequency scale is high with r = .756 (Schredl et al., 2014). The variety of media types elicited included nonfiction books, fictional books, TV news, entertainment programs on TV, TV action shows, action games, entertainment games and social media (see Appendix). The participants were specifically asked about the percentage of the varying media categories of all remembered dreams, the hours spent with this activity during waking hours per week and, finally, there were different question items referring to the perceived involvement whilst using these media. Concerning the fictional and nonfiction books categories the question was: "How touched are you while reading the following genres?" As for the diverse TV programs the question was as follows: "How interested are you while watching the following genres?" With respect to the games categories the subjects were asked how involved they are during these games. In terms of the social media item they were requested to state how involved they are throughout this activity. The involvement scale for each category was coded from not at all = 0 to very much = 4, with missing if the participant did not engage in that particular activity.

2.3. Procedure

The study link was posted on the online panel www.wisopanel.net, where those interested in online studies are registered and have heterogenic demographic backgrounds. For some surveys, prizes or money are given for participation, but this study was voluntary and unpaid. Some participants (about 300) misunderstood the questions regarding the percentage of media dreams, resulting in a smaller sample size. Values of 50 hours per week or more for each type of media consumption were excluded from analysis because they are implausible. Statistical procedures were carried out using SAS for Windows 9.4. As the data was not normally distributed and in order to compute non-parametrical statistics, media percentages were grouped into several categories. We carried out eight ordinal regression analyses in order to test the magnitude between exerting the specific occupation in waking and the percentage of dreams with the same media type, controlled for potentially confounding variables like age, gender and dream recall frequency. A second set of ordinal regression analyses was performed for those participants who carried out these media type ac-

Table 1. Preferred media categories in waking and its occurrence in dreams

Genre	Dream experience		Wakefulness time (h/week)		Wakefulness involvement	
	Mean ± SD	Frequency	Mean ± SD	Frequency	Mean ± SD	Frequency
Nonfiction Books	3.19 ± 9.48%	1644	4.44 ± 6.43	1767	1.60 ± 1.12	1422
Fiction Books	5.53 ± 13.79%	1645	4.02 ± 5.73	1756	2.19 ± 0.95	1423
News (TV)	2.68 ± 6.21%	1608	3.74 ± 4.36	1799	2.83 ± 0.98	1700
Entertainment (TV)	5.28 ± 10.50%	1606	7.75 ± 7.73	1795	2.32 ± 0.95	1716
Action (TV)	5.00 ± 10.31%	1608	3.52 ± 5.72	1801	2.29 ± 1.02	1263
Action Games	1.09 ± 4.94%	1810	0.81 ± 3.49	1879	2.41 ± 1.06	333
Entertainment Games	1.73 ± 6.29%	1808	2.74 ± 6.05	1878	2.09 ± 1.05	853
Social Media	2.25 ± 7.31%	1929	4.37 ± 7.21	1930	1.96 ± 0.97	1241

Table 2. Participants' reported percentage of dreams within a specific media category grouped into six categories

Percentage of media dreams	Nonfiction Books	Fiction Books	News (TV)	Entertainment (TV)	Action (TV)	Action Games	Entertainment Games	Social Media
0%	1263	1128	1105	939	959	1627	1519	1550
0.01% to 5.00%	161	181	274	273	297	88	148	185
5.01% to 10.00%	103	126	144	189	153	46	68	99
10.01% to 20.00%	54	90	60	119	111	29	37	45
20.01% to 40.00%	40	68	21	55	60	15	24	34
40.01% to 100%	23	52	4	31	28	5	11	15

tivities during waking hours to examine the additional relationship between intensity whilst waking and remembered dream content. Listed sample sizes are sometimes smaller than the original ones as a result of missing values.

3. Results

Overall, the dream recall frequency of the sample amounted to 3.35 ± 1.79, which is between with the categories 'about once a week' and '2-3 times per month'. Table 1 displays the amount of time spent engaging in the specific activity, the experienced involvement with this activity during wakefulness and its occurrence in remembered dreams. The figures indicate that the greater part of participants preferred watching entertainment programs on TV during waking in comparison to the other activities. Action games were the least popular occupation whilst being awake. News broadcasts were rated as the most intense during waking hours. On the subject of dream experience, fictional books were reported as often remembered in dreams whereas action games scarcely appeared. Referring to Table 2, most subjects reported no dreams with media features. Only a minority remembered dreams with contents in line with the different categories. The ordinal regression analyses for the categorized media dream percentage data are depicted in Table 3. For all activities correlations between the time spent pursuing them whilst awake and the frequency with which they appeared in dreams were significant (controlling for the possible confounders age, gender, and dream recall frequency). This was also the case when the confounders were statistically controlled. Age was negatively associated with the percentage of media dreams, independent from possible age-related decline of time spent with these activities as the effect of this variable was partialled out in the regression analyses. Dream recall frequency had a positive effect on the incidence of media dreams, i.e., high recallers reported higher media dream percentages of their remembered dreams. Male participants experienced more media dreams than females in the sections entertainment on TV, action games, entertainment games and social media. Here again, the time spent performing the activities was partialled out for these effects. Table 4 shows the second set regression analyses which included those participants who engaged themselves with specific media activities during waking. Again, time spend with the activity was related significantly with the percentage of dreams about the corresponding media activity. In addition, involvement during wakefulness (measured with slightly different scales) was also related to occurrence of this media type in dreams, except for the "action games" category.

4. Discussion

Media dreams were reported by 10.1% (action games) to 41.5% (entertainment (TV)) of the participants. The main findings of the present study indicate that time spent with a specific media type (reading nonfiction books, fictional books, watching news on TV, entertainment on TV, action on TV, playing action games, entertainment games, and using social media) and emotional involvement associated with these media types both relate to the frequency of the dreams containing references to the corresponding media type and, thus, supporting the continuity hypothesis of dreaming (Schredl, 2003).

Table 3. Ordinal regression analyses for the categorized media dream percentage

Genre	**Age**			**Gender (1=f,0=m)**			**Dream recall frequency**			**Wakefulness time (h/week)**		
	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p
Dream Nonfiction Books (N=1584)	-.1426	16.9	<.0001	-.0474	1.8	.1802	.2821	55.2	<.0001	.3192	123.2	<.0001
Dream Fiction Books (N=1577)	-.1817	32.2	<.0001	-.0267	0.7	.4132	.2905	72.3	<.0001	.3854	168.3	<.0001
Dream News TV (N=1557)	-.1654	26.8	<.0001	-.0292	0.9	.3528	.2295	49.7	<.0001	.2758	91.2	<.0001
Dream Entertainment TV (N=1552)	-.1808	38.5	<.0001	-.0920	10.0	.0015	.2815	85.3	<.0001	.2613	91.5	<.0001
Dream Action TV (N=1559)	-.2688	78.1	<.0001	-.0492	2.8	.0970	.3204	104.8	<.0001	.3247	137.7	<.0001
Dream Action Games (N=1795)	-.2161	20.1	<.0001	-.1528	10.4	.0013	.2072	16.3	<.0001	.3505	122.2	<.0001
Dream Entertainment Games (N=1792)	-.1011	7.1	.0077	-.1121	8.9	.0029	.1924	23.3	<.0001	.3601	170.4	<.0001
Dream Social Media (N=1913)	-.1920	30.3	<.0001	-.1296	14.2	.0002	.2521	45.7	<.0001	.3723	189.7	<.0001

SE = Standardized estimate

Table 4. Ordinal regression analyses for the categorized media dream percentage including intensity during wakefulness

Genre	Age			Gender (1=f,0=m)			Dream recall frequency			Wakefulness time (h/week)			Wakefulness Involvement		
	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p
Dream Nonfiction Books (N=1068)	-.1688	18.5	<.0001	-.0611	2.5	.1117	.2250	32.6	<.0001	.2121	40.7	<.0001	.1534	16.8	<.0001
Dream Fiction Books (N=1059)	-.1729	24.7	<.0001	-.0788	5.0	.0258	.2270	40.2	<.0001	.2175	43.4	<.0001	.1395	15.2	<.0001
Dream News TV (N=1310)	-.1978	33.1	<.0001	-.0267	0.7	.4178	.2110	39.0	<.0001	.2308	55.2	<.0001	.0984	8.4	.0038
Dream Entertainment TV (N=1313)	-.1850	36.4	<.0001	-.1071	12.4	.0004	.2537	65.4	<.0001	.1588	29.1	<.0001	.0995	10.4	.0013
Dream Action TV (N=929)	-.2201	38.8	<.0001	.6267	0.2	.6267	.2921	66.4	<.0001	.1644	22.8	<.0001	.0951	7.5	.0065
Dream Action Games (N=222)	-.0545	0.6	.4454	-.0508	0.5	.4810	.2403	10.2	.0014	.3201	19.5	<.0001	-.0095	0.0	.8959
Dream Entertainment Games (N=707)	-.0942	4.5	.0330	-.1078	6.1	.0134	.1875	16.9	<.0001	.1793	18.9	<.0001	.1404	9.6	.0020
Dream Social Media (N=1192)	-.1386	14.2	.0002	-.1607	19.8	<.0001	.2081	29.6	<.0001	.2335	50.7	<.0001	.1979	27.4	<.0001

SE = Standardized estimate

There are several limitations concerning the methodology of this study. First, the retrospective estimates of the participants might not measure the actual amount of media dreams but reflect the participants' beliefs and expectations regarding the number of these dreams. Nevertheless the figures obtained in another study using a dream diary technique were highly concordant with those obtained by retrospective scales (Erlacher & Schredl, 2004; Schredl & Erlacher, 2008) which makes it very likely that these subjective estimates are quite valid. Interestingly in laboratory studies with presentations of films that were not self-chosen by the participants direct effects of these films on the subsequent dreams were not pronounced (Cartwright et al., 1969; Foulkes & Rechtschaffen, 1964; Lauer et al., 1987). I.e., by carrying out a study in the home setting, the ecological validity might be fulfilled to a greater extent since the present findings eliciting media consumption and dreams in everyday life showed an effect regarding the relationship between waking and dreaming. Thus, laboratory studies in this field should be viewed with caution. The significant correlation between percentage of media dreams and dream recall frequency in our study might implicate that low dream recallers might forget dreams that included media topics and, thus, it would be beneficial to carry out dream diary studies over a longer time period so low dream recallers can also contribute dreams (Schredl, 2002). Another limitation of this study underlies the fact that it was not a representative sample but slightly biased including people who are on average more interested in the dream topic compared to the general population (see: Schredl et al., 2014). Thus the frequencies of the requested media dreams and media activities might have been slightly overestimated; this should not, however, affect the correlation between the waking and dream variables. The eight media categories used in the present study were derived from the authors' experiences of frequent media use in Germany and not based on previous media consumption studies. One might speculate that more sophisticated questionnaires (e.g., Gackenbach & Boyes, 2014) might be helpful in analyzing the effect of the vast and fast increasing variety of media genres on dreaming.

The study indicated that the media type occurring the most often in dreams was entertainment programs on TV, followed by action programs, fictional books and news programs. The percentage of participants reporting TV dreams in our study (55.80% in total for news programs, entertainment programs and action programs) is lower than the self-rated influence of TV of children and adolescents shown in the study by Stephan et al. (2012) in which 75% of the participants reported TV-related dreams. This might be explained by sample characteristics as Stephan et al. sample consisted of children and adolescents whereas the present sample included a wide age range of adults with percentage of media dreams declining with age. The percentage of participants reporting TV dreams in the present study is comparable to the proportion of participants (54.70%) reporting pleasant dreams in connection with TV content in the study by Van den Bulck (2004); Van den Bulck also analyzed the dreams of children. The present findings also replicate the results that news programs are often incorporated into one's dreams and therefore may have a large impact on dream affect (Propper et al., 2007). The previous finding of Van den Bulck (2004) that TV content appeared more frequently in nightmares of children than computer games (26% versus 7.60%) is in accordance with the present data that TV dreams were more often reported than game dreams. However, in this sample the waking time spend with these activities also differ, i.e., the finding of Van den Bulck (2004) might reflect the different amount of media consumption in waking. The majority of the participants reported no dreams with action game content which can possibly be interpreted as there being hardly any high-end gamers in this sample – as high-end gamers report game-related dreams quite often (Gackenbach & Dopko, 2012). Thus, it would be of interest to carry out a study consisting of only high-end gamers to investigate whether not only time spent with gaming but also the emotional involvement correlate with the percentage of action game dreams in this group.

The ordinal regression analyses showed that the correlation between the time spent with the activity during waking and its appearance in dreams was significant for all eight media sectors and were comparable with the coefficients in the media study by Van den Bulck et al. (2016). Thus the present findings support the continuity hypothesis of dreaming (Schredl, 2012) as have been shown for other waking-life activities such as sports and reading (Schredl & Erlacher, 2008), driving (Schredl & Hofmann, 2003), music (Vogelsang

et al., 2016) and politics (Kern et al., 2014). When introducing the factor involvement, the effect of time spent with the activity in waking was still significant and involvement has an additional significant impact on the incorporation of all media types into dreams, except for action games. This effect is in accordance with the findings showing the emotional intensity of waking-life experience (Malinowski & Horton, 2014; Schredl, 2006) affects the incorporation of waking-life experiences into dreams. The findings of Propper et al. (2007) regarding relationship between news programs and news-related dreams in the context of the 09/11 attacks fit within this framework, i.e., that the continuity between waking and dreaming is affected by the emotional intensity of the waking life experience (Schredl, 2018). Nonfiction books were read more regularly than fictional books (52.50% versus 47.50% of the total time of both activities) but fiction books showed up more frequently in dreams (63.40% versus 36.60% of the total percentage of dreams including both genres). This might be a result of the greater subjective intensity of fictional books stimulating the imagination or due to the underrepresentation of cognitive activities in dreams reported by previous studies (Hartmann, 1996; Schredl & Hofmann, 2003).

The correlation between involvement in action games and their occurrence in dreams when immersion and fidelity were involved (Gackenbach, Rosie, et al., 2011), could not be replicated here, possibly due to our relatively small sample size of persons highly involved in action games. It was also shown that age had an effect on media dream percentage. The age effect might explained by the decline in episodic memory during the life span (Friedman, 2013) which leads to the assumption that episodic memory might influence the continuity between waking and dreaming and the reminiscence of one's activities during waking. This is a hypothesis future research still needs to investigate.

The media dream percentages were positively related with dream recall frequency; this could by a methodological problem of retrospective recall (see above) but also an indication that personality factors like openness for experience might play a role as openness to experience is related to dream recall frequency (Schredl & Göritz, 2017) and thin boundaries highly associated with openness to experience were related to higher incorporation rates of waking life experiences into dreams (Schredl, Kleinferchner, & Gell, 1996). The role of personality dimensions in the context of the continuity between waking and dreaming is not well understood (Schredl, 2003) and needs further research efforts.

To summarize, our study pointed out that media dreams occur in a sample with a wide age range and this is related to media activities during waking. The emotional involvement while awake had also an impact on the frequency of these dreams. For future research it would be of interest to carry out longitudinal studies eliciting daily media consumption and dreams every morning.

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Appendix: Media questionnaire

Books

Definitions:

- Reading of non-fiction serves primarily increasing knowledge (Examples: textbook, scientific literature, newspapers)
- Reading fiction serves primarily entertainment (Examples: novel, poetry, magazines)

Note:

- Please sort the media you consumed into the category that fits best.
- Reading is independent of the purpose (professionally or leisure time).

How many percent of your dreams included the following topic?

Please enter a distinct number. If you dreams do not include the topic, please enter 0.

Non-fiction books ___%

Fiction books ____%

How many hours per week do you spend on average with reading the following genres?

Please enter a distinct number. Please consider the time during the week and at weekends.

Non-fiction books ___ hrs.

Fiction books ____hrs.

How touched are you while reading the following genres?

	I am not doing that	Not at all	Somewhat	Partly	Fairly	Very much
Non-fiction books	O	O	O	O	O	O
Fiction books	O	O	O	O	O	O

TV

Definitions:

- News (Example: “Tagesschau”)
- Entertainment (Examples: documentaries, romantic films, TV series, comedy, shows)
- Action/Horror/Thriller

Note:

- The TV and film contents categories do not depend on the devices that is used (Example: TV, computer, streaming, smartphone, tablet-PC).
- Please sort the media you consumed into the category that fits best.

How many percent of your dreams included the following topic?

Please enter a distinct number. If you dreams do not include the topic, please enter 0.

News ___%

Entertainment ____%

Action/Horror/Thriller ____%

How many hours per week do you spend on average with reading the following genres?

Please enter a distinct number. Please consider the time during the week and at weekends.

News ___ hrs.

Entertainment ____ hrs.

Action/Horror/Thriller ____ hrs.

How interested are you while watching the following genres?

	I am not doing that	Not at all	Somewhat	Partly	Fairly	Very much
News	O	O	O	O	O	O
Entertainment	O	O	O	O	O	O
Action/Horror/Thriller	O	O	O	O	O	O

Games

Definitions:

- Action games include the active participation and fighting with other persons or fictitious figures (Example: Combat games, ego shooter)
- Entertainment games (Examples: Farm Ville, Candy Crash, The Sims, Monopoly, strategy and simulations games like Anno 1404)

Note:

- Game playing includes all possible electronic devices, consoles, computers, smartphones etc.
- Please sort the media you consumed into the category that fits best.

How many percent of your dreams included the following games?

Please enter a distinct number. If you dreams do not include the topic, please enter 0.

Action ___%

Entertainment ____%

How many hours per week do you spend on average with gaming of the following genres?

Please enter a distinct number. Please consider the time during the week and at weekends.

Action ___ hrs.

Entertainment ____hrs.

How involved are you while playing the following genres?

	I am not doing that	Not at all	Somewhat	Partly	Fairly	Very much
Action	O	O	O	O	O	O
Entertainment	O	O	O	O	O	O

Social Media

Definition:

- Social media are all media that enable social interactions (Examples: facebook, whatsapp, Instagram, commenting on youtube)

How many percent of your dreams included the following topic?

Please enter a distinct number. If you dreams do not include the topic, please enter 0.

Social media ___%

How many hours per week do you spend on average with the following activity?

Please enter a distinct number. Please consider the time during the week and at weekends.

Social media ___hrs.

How involved are you while doing this?

	I am not doing that	Not at all	Somewhat	Partly	Fairly	Very much
Social Media	O	O	O	O	O	O