3.2
The Relationship between General Intelligence and Media Use among University Students

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Abstract

Students' information selection process might be influenced by their choice of media sources, their learning contexts and motivation to use certain media as well as their general intelligence, which is crucial for information processing. This study examines the relationship between the general fluid intelligence and the media use of 709 first-year business & economics students from 44 universities in Germany for two different learning purposes: informing oneself about B&E topics and preparing for lectures and exams. Accordingly, the motivator *information seeking* is divided into *curiosity driven* and *goal driven* information seeking. Three types of media sources were included: common news sources, specialized economics sources and university sources. Results from regression analyses and group comparisons indicate that the frequency of media use correlates with general fluid intelligence for some common news sources and specialized economics sources, for example, tabloids and economic newspapers, even after controlling for several sociodemographic variables including gender, age, and parents' educational background.

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Keywords

Media use, general fluid intelligence, general intelligence, cognitive ability, higher education, uses and gratifications theory, knowledge acquisition, business and economics

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1 Introduction and Research Objectives

Recent years have ushered in the "post-truth era"[1] across all media. The media landscape has shifted accordingly. Especially online, the exponential growth of information sources requires internet users to select their sources critically (Ciampaglia 2018). Information on any website can be presented as authentic regardless of its actual authenticity, causing uncertainty in internet users whether it is genuine. Properly evaluating information has become more challenging and more necessary at the same time (Wineburg et al. 2018; Zlatkin-Troitschanskaia et al. 2019c). Students need appropriate strategies for selecting relevant and reliable information as part of the broader skill of online reasoning and critical thinking – a significant aim of higher education (Gojkov et al. 2015). However, recent studies reveal significant deficits in higher education students' ability to critically evaluate online media sources (Münchow et al. 2019; Wineburg et al. 2018; Zlatkin-Troitschanskaia et al. 2019c).

The decision which media source students select to consume may be influenced by both their *general intelligence* as well as their underlying *motivation*. Entertainment, social utility, and information seeking are all motivators that affect one's overall media use (Go et al. 2016; You, Lee et al. 2013). Students' *information seeking* in particular can be driven by the need to address both personal and study-related inquiries. Students' media use and how their information seeking

1 *Post-truth* is defined as "relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief" (Oxford English Dictionary 2019).

differs depending on whether it is purely out of curiosity or with a certain goal in mind is of increasing importance due to its potential for informal and formal learning, especially in higher education (for on overview, see Zlatkin-Troitschanskaia et al. 2020).

Students' selection and use of media sources depends on both content and representation of information. Different media sources require different cognitive abilities to process the information they convey, depending on content, language and other characteristics. This leads to the question how students' use of certain sources differs depending on their general intelligence.

This paper focuses on media use of students in *business and economics* (B&E), as this study subject is especially prevalent in the media. B&E topics in general are strongly represented in both mass and social media and are part of the political and societal discourse.[2] B&E is also one of the biggest study domains worldwide (OECD 2017). Due to the relevance of B&E topics in the media as well as the high study rate, we assessed beginning students from this domain. For B&E students, it is essential to stay informed about current news as well as to read lecture notes and academic literature to acquire study-related content knowledge.

In higher education (including both formal or informal learning), especially the B&E study domain lends itself to gathering data on this topic due to its popularity among students and prevalence in the news cycle (Maurer et al. 2018). As Maurer and colleagues show (2020), in higher education economics, students use certain media to *inform* themselves about B&E topics in general, as well as to *prepare* for their lectures or exams. Based on a theoretical framework described in Section 2, the study investigates B&E students' media use *to inform themselves about B&E topics* as well as *to prepare for lectures and exams*. We focus on the question *to what extent the use of certain media sources differs depending on students' information seeking* behavior and their general intelligence.

2 State of Research in Higher Education and Research Questions

Research literature is ambiguous on the relationship between students' media use and learning in higher education. The displacement hypothesis (Huston et al. 1999) states that using certain media can replace other activities (Blom et al. 2016; Cain and Gradisar 2010; Poulain et al. 2018). For instance, students' media

2 Trade tariffs, the financial crisis, and sanctions against countries are just a few examples of news topics widely discussed in the media today.

use has often been negatively associated with academic performance due to the time spent on consuming media instead of doing homework or paying attention in class (Jacobsen and Forste 2011; Le Roux and Parry 2017; Walsh et al. 2013). This view disregards the numerous possibilities for informal learning through a variety of media sources, especially from media content that relates to the study domain (Maurer et al. 2018). Journalistic news media (newspapers, TV news, magazines) are a potential learning source from which students could benefit (Dalton and Crosby 2013; Kimmerle et al. 2015). Furthermore, using social media such as social networking sites specifically for academic purposes is positively associated with academic achievement (Marker et al. 2018).

According to the Uses and Gratification approach (U&G), every decision to consume media derives from the expectation that a certain need (e.g., knowledge acquisition) will be fulfilled (Saini and Abraham 2019). Based on the U&G theory, there are multiple motivators to consume media (Katz et al. 1974). Many studies have focused on three main ones: information seeking, social utility, and entertainment (Go et al. 2016; You et al. 2013). In particular, different (formal and informal) learning situations and purposes in higher education studies may require different information seeking approaches. University students' behavior may differ depending on the purpose of why they are consuming media content for formal or informal learning.

When asked to rank formal and informal learning situations by their subjective importance, students ranked "reading something" as the most important informal learning situation, while "preparation for an exam" was ranked as the most important formal learning situation (Jadin et al. 2008). Based on these results, this study focuses on two possible learning purposes and corresponding media use motives: to *inform* themselves about B&E topics in general, which in our study is considered an indicator of *curiosity driven* information seeking and students' media use to *prepare* for their lectures or exams, which we consider *goal driven* information seeking.

The frequency of media use allows for inferences about information seeking behavior with regard to *different media sources* (e.g., Schulmeister 2010). In our study, we investigate a relationship between frequency of use of various different media sources and the two different media use motives: curiosity driven and goal driven information seeking. We considered all main types of information sources that university students commonly use according to recent surveys (Maurer et al. 2020; Medienpädagogischer Forschungsverbund Südwest 2017, 2018; Zawacki-Richter 2015). Media sources were divided into three types: common news sources (e.g., local magazines), specialized economics sources (e.g., economic newspapers), and university sources from the formal learning environment (e.g.,

lecture notes and course scripts) (Maurer et al. 2018; Zawacki-Richter 2015). A total of 14 media sources across the three types cover the range students seek information from *to inform themselves* and/or *to prepare for lectures or exams* over their course of study.

Engaging with any type of media poses cognitive demands (Heidi 2018) and requires an adjusted set of *general intellectual abilities* like fluid intelligence, which includes reasoning (Naglieri and Das 2002). (Online) reasoning has been identified as a key ability for processing information from different media sources (Wineburg et al. 2018; Zlatkin-Troitschanskaia et al. 2019). *Reasoning* is considered a proxy for general fluid intelligence as it is especially associated with academic performance (Deary et al. 2007; Rohde and Thompson 2007; te Nijenhuis et al. 2007).

Although many studies found a positive relationship between media use and general intelligence (Beier and Ackerman 2001; Hambrick et al. 2007; Hambrick et al. 2008), the findings do not cover all facets of this multi-dimensional construct. Intelligence can be divided into the facets of fluid and crystallized intelligence (Cattell 1941). Fluid intelligence is the ability to reason and tackle unfamiliar problems (Harrison et al. 2013). A completely novel problem is theoretically solved by reasoning alone, not utilizing previously learned behavior (algorithms, strategies, knowledge, skills etc.) in the process of problem solving. *General crystallized intelligence* involves drawing from long-term memory for information and skills acquired in the past (Jensen 2002).

A relationship between media use and general crystallized intelligence has already been established (Hambrick et al. 2008), while the same authors suggest that general fluid intelligence might also be important for solving novel problems and acquiring new information. The investment hypothesis (Cattell 1963) emphasizes that learners use their general fluid intelligence to invest into the growth of crystallized knowledge, which ultimately promotes the acquisition of knowledge. Although empirically disputed, researchers found a relationship between general fluid intelligence and learning (Schweizer and Koch 2002). Based on this research, this study focuses on students' selection of media and frequency of use, differentiating between two learning purposes (informing oneself about B&E topics, and preparing for lectures or exams), and a relationship to their general fluid intelligence (as a proxy of reasoning). This leads to the following research questions (RQ):

(1) To what extent does general fluid intelligence contribute to explaining the variance in students' media use when *(i) informing themselves* as well as when *(ii) preparing for lectures and/or exams?* (RQ1)

(2) How does the explained variance differ for these two learning purposes and the 14 sources of media – divided into three media types – considered in this study? (RQ2)

(3) Does fluid intelligence remain a significant predictor when including all controlling variables (e.g., gender, age, parents' educational background etc.) considered in this study? (RQ3)

(4) Do groups with the highest and lowest fluid intelligence scores differ systematically in their use of the 14 media sources? (RQ4)

The control variables were chosen based on previous findings and include trust in media, gender, migration background, parental education level, interest in B&E topics and German GPA equivalent. A correlation between trust in media and media use has been found, especially when considering mainstream vs. alternative media (Tsfati and Ariely 2014; Tsfati and Cappella 2003). Gender was controlled for, as previous research has found that males tend to be more interested in B&E topics than females and that interest (in current events) directly affects media use (Hambrick et al. 2008). Therefore, interest in B&E topics was included as a control variable. Moreover, media use has previously been shown to strongly correlate with migration background, and differs greatly between media sources (Bonfadelli et al. 2007; Trebbe 2009). Steiner (2013) has shown that children of parents with a lower level of education consume more media; for instance, they watch more TV. Parental education was measured by asking about the highest level of education within the participants' immediate family. The German GPA equivalent was included as a control variable as a relationship between school grades and general intelligence has been shown in various studies (Colom and Flores-Mendoza 2007; Roth et al. 2015).

3 Method

3.1 Study Design

The data was collected in the WiWiSET study at two measurement points at 44 universities and universities of applied sciences in Germany (Pant et al. 2016). The first measurement took place during the first semester of a bachelor course in B&E studies. A paper-pencil test was distributed to beginning students during introductory classes (Zlatkin-Troitschanskaia et al. 2019b). Under controlled testing conditions, students' general fluid intelligence was assessed using the figural reasoning scale of the Berlin Test for Assessing Crystallized and Fluid Intelligence (BEFKI 11+) (Schipolowski et al. 2020). Additionally, the students provided socio-

demographic and educational information, including their gender, age, migration background, and prior education.

At the end of the first study year, the same students received a link via email to participate in an online questionnaire comprised of multiple validated scales related to their media use (Zlatkin-Troitschanskaia et al. 2019b) that also cover personal and environmental motives of the students' information seeking behavior. Participants received a monetary incentive to participate in the paper-pencil test and the online questionnaire (€5 and €10, respectively).

3.2 Sample

In the large-scale entrance assessment, the total sample of 7,679 first-year students of B&E was collected at the beginning of the winter term of 2016/17 in Germany. 2,584 of these B&E students participated in the first part of the survey at the beginning of their studies. Of these students, 709 participated in both the BEFKI 11+ test and completed the online questionnaire about their media use after one year of studies. The following analysis is based on this subsample collected from 44 universities in Germany.

The participants are between 17 and 37 years old (M = 20.14, SD = 2.40). The majority of test takers are between 18 and 20 years old (73 %), with a median age of 20 years. 96 % of the participants being in their first semester of university at the time of the first measurement. 367 participants are female (52 %). The average grade of the university entrance qualification is 2.16, with 1.0 being the best and 4.0 the worst possible admission grade. Nearly 50 % of the students' parents have a university degree or higher; 179 (25 %) students reported a migration background.

3.3 Instruments

3.3.1 Paper-Pencil Test

The figural reasoning scale of the BEFKI 11+ comprised 16 non-verbal items. Each item consisted of a sequence of geometric shapes whose elements changed according to implicit rules. To solve the items, test takers had to infer these rules and choose the next two shapes in the sequence from a number of given alternatives. The 14-minute reasoning test from BEFKI 11+ was chosen as a measure of general fluid intelligence as it can be assumed to be relatively independent of prior education and experience (Gustafsson 1984) and to minimize language ef-

fects (Ackerman and Beier 2003). Although the non-verbal fluid intelligence scale covers fluid intelligence only partly, it is considered to be a valid indicator and overall a reliable proxy for measuring general fluid intelligence under the given time constraints (Carroll 1994; Kyllonen and Christal 1990). *Cronbach's alpha* for the 16-item reasoning test was .66 (for limitations, see Section 5.2).

The students were asked to provide information on their sociodemographic and educational background. The questionnaire included questions about their gender, age, and degree course. To obtain a proxy for socioeconomic status, questions about parental background, for instance migration background and highest education level achieved by mother or father, were included. The questions about prior education surveyed the place and grade of the obtained German GPA-equivalent school leaving certificate.

3.3.2 Online Questionnaire

The online questionnaire included two media use frequency questions separated by the two learning purposes and corresponding subcategories of information seeking: to inform themselves (curiosity driven information seeking) and to prepare for lectures and/or exams (goal driven information seeking) (Maurer et al. 2020; 2018): One question assessed how participants use media to stay informed about B&E topics, and the second question asked which media the students use to prepare for classes and/or exams in B&E. In both questions, 14 media sources were listed (Section 4, Table 1) including journalistic media, for example, common news sources such as national and regional newspapers and TV news, and also specialized domain-specific media sources such as scientific journals, as well as university materials (Maurer et al. 2018). Social networking sites were not included, as they relate primarily to the social utility motivator (Arteaga Sánchez et al. 2014; Mazman and Usluel 2010; Saini and Abraham 2019; Sendurur et al. 2015).

To evaluate the frequency of media use in both cases, the participants were asked how often they had used different types of media during their most recent term at university. The students rated the frequency of their media use for each media type using a scale from 0 (never) to 5 (multiple times a day), with the option of naming additional sources.

To control for students' trust in media sources, the students were asked how trustworthy they considered the previously mentioned media to be on a scale from 0 (not trustworthy at all) to 5 (fully trustworthy) (Rössler 2011). All students rated the same 14 media sources to ensure comparability in the analyses. The online tool provided space to enter other media sources where applicable.

3.4 Analysis

Descriptive statistics provided first insights into the data, including the sample composition and self-reported frequency of media use. The BEFKI 11+ score and information on media use from the online questionnaire were combined into one data set. Correlations between the frequencies of use of the fourteen different media sources were examined to confirm the distinctiveness of the three media types considered in our study. Correlations of media sources within each of the three types (i) common news sources, (ii) specialized economic sources, and (iii) university sourses were expected to be higher than correlations between sources from different media types. Correlation analyses also provided information about the distinctiveness of the individual media sources. High correlations between sources (>.8) would imply that the sources are too similar and that their overlap is too big to justify their own category.

Subsequently, regression analyses were carried out to examine the relationships proposed in *RQ 1 & 3*. Simple linear regressions were conducted with the BEFKI 11+ score as the independent variable and the media sources divided into two purposes of media use (informing oneself and preparing for exams) as the dependent variables. For *RQ3,* the regression models were extended to multiple linear regression models to include control variables which may contribute to explaining a possible relationship between the frequency of media use and the BEFKI 11+ score. Although ordered logistic regressions would be more suitable for this data, linear regressions have been considered to be an acceptable first approximation (Long and Freese 2006; Pasta 2009). Due to very low intraclass correlations (ICC) of less than .05 across all media sources, multi-level modelling was not conducted (LeBreton and Senter 2008).

In the next step, the link between media use and general fluid intelligence was compared for the students who scored the highest and lowest on the BEFKI test to answer *RQ4*. The participants were divided into quartiles with higher and lower general fluid intelligence scores. A comparison groups approach was used to consider extreme (highest and lowest) scores of students, in particular when examining potential correlations. Preliminary analyses suggested that adding a comparison group approach as a supplement to the regression analyses related to *RQ1* and *RQ3* could increase the statistical power (Preacher et al. 2005). This approach highlights differences within B&E beginning students (Preacher 2014). Apart from the methodological purpose of *RQ4*, the results have the potential to offer initial insights into specific behavioral patterns and systematic differences between two distinct groups. For instance, the findings could lead to possible implications for learning in higher education through media as an enhancement for the lower-scoring group.

The data was analyzed using Stata/IC 15.1. At first, descriptive statistics were calculated for the entire subsample of 709 participants. Additionally, descriptive statistics were calculated for the two "general fluid intelligence" groups (highest and lowest scoring). In addition to simple linear and multiple regression analyses, t-tests were conducted to investigate the research questions.

4 Results

4.1 General Fluid Intelligence as a Factor in Explaining Students' Media Use

The BEFKI 11+ scores ranged from a minimum of 0 to a maximum of 16. The sample of 709 beginning B&E students achieved a mean score of 9.27 with a standard deviation of 2.75.

To investigate *RQ1 (i)*, we calculated simple linear regressions to predict the frequency of use of different media to *inform* oneself about B&E topics. In nine out of the 14 listed media sources, the BEFKI 11+ score significantly predicted media use to *inform* oneself. Those nine media sources included both common news and specialized economics sources.

Most variance was significant in the use of tabloids ($F(1,682) = 14.47, p < .001$) with an adjusted R^2 of .02 (Table 6 in App.). It was found that the BEFKI 11+ score significantly predicted frequency of tabloid use ($\beta = -.144, p < .001$). Other sources in which the BEFKI 11+ score predicted more than 1 % were news magazines ($\beta = -.07, p < .001$), science journals ($\beta = -.046, p = .001$), and economic ($\beta = -.054$, $p = .002$), regional ($\beta = -.051$, $p = .005$), and national newspapers ($\beta = -.053$, $p = .006$). All relationships were negative, indicating that a higher BEFKI score resulted in lower frequency of media use across all media (Tables 4–12 in App.).

In five out of 14 media sources, the BEFKI 11+ score did not significantly predict media use to *inform* oneself. Those five sources included university materials (textbooks and course scripts), scientific databases and online encyclopedias as well as TV news.

Simple linear regressions for *RQ1 (ii)* showed that the BEFKI 11+ score predicted the frequency of use of different media to *prepare for classes and/or exams* in eight out of 14 media sources. The relationship was negative across all 14 media sources. Through the BEFKI 11+ score 1.4 % of the variance in the use of TV news was predicted ($F(1,682) = 9.66, p = .001$) with an adjusted R^2 of .01 (Table 18 in App.) while the BEFKI 11+ score significantly predicted the use ($\beta = -.076$, $p = .002$). The variance in the use of economic newspapers ($F(1,682) = 7.73$,

p = .006) was predicted with an adjusted R^2 of .01 (β = -.065, p = .006) and the variance in weekly newspaper use ($F(1,682) = 7.69$, p = .006) with an adjusted R^2 of .01 (β = -.065, p = .006) (Tables 14 & 15 in App.). Again, the BEFKI 11+ score did not significantly predict the use of university materials such as textbooks and course scripts (for discussion, see Section 5.1).

4.2 Comparison of Information Seeking Motives

For *RQ2,* roughly 80 % of students used course scripts almost on a daily basis or even more frequently during the term to both inform themselves about B&E topics (curiosity driven) and to prepare for classes, lectures, and/or exams (goal driven). The difference was not significant in the t-test. Students ranked tabloids as their least used media source for either type of information seeking.

Students used certain media sources more often when informing themselves *(curiosity driven* information seeking), for instance, national and regional newspapers, news magazines, and TV news (Table 1). Students consumed TV news almost daily when motivated by *curiosity driven* information seeking. That frequency went down to a little over once a week during *preparation for classes and/or exams*. The difference between the frequency of curiosity and goal driven TV consumption of news had a medium effect size (*Cohen´s d* = .505). The reverse is seen in the use of textbooks. To *inform themselves* about B&E topics students used textbooks roughly a little over a week. During preparation for their studies the use increased to almost daily with a *Cohen´s d* = .590, indicating a medium effect size (Cohen 1988).

In total, all common news sources and specialized media sources including university materials were used more frequently during preparation *for classes and/or exams*. Remarkably, some common news sources i.e., tabloids, economic newspapers and TV programs were also used more frequently by students when preparing for exams. Tabloids, although still used least frequently of all sources, were used more often during *preparation for classes and/or exams*. There was no significant difference in the use of video platforms between the information seeking motives.

Correlations between the media sources that students used to *inform* themselves ranged mostly between .2 and .5. An exception was the use of course scripts, which only notably correlated with the use of textbooks (Table 2 in App.). Overall, the correlation analyses confirm the expected distinction of three types among the 14 media sources.

Correlations between the media sources students used to *prepare for exams* were higher across most of them. The correlations between course scripts and

other media stood out, as most were negative (Table 3 in App.). Science data bases proved to be an outlier, correlating relatively highly with all sources except course scripts. Still, the three media types were evident in the correlations between the media sources.

Table 1 Median, mean, and standard deviation for frequency of media use including t-test between media use depending on the information seeking motives

	Media use when informing oneself			Media use when preparing for exams					
	Mdn	M	SD	Mdn	M	SD	t(707)	p	d
National Newspapers	1	2.68	1.42	1	2.36	1.74	4.45	.001	.237
Regional Newspapers	1	2.36	1.31	1	2.25	1.75	1.57	.116	.078
Tabloids	0	1.68	1.16	0	2.04	1.74	-5.22	.001	.277
Economic Newspapers	1	2.26	1.24	1	2.35	1.7	-1.48	.14	.073
Weekly Newspapers	1	2.23	1.24	1	2.3	1.71	-1.02	.308	.045
News Magazines	1	2.65	1.45	1	2.43	1.74	2.87	.004	.152
TV News	3	3.48	1.4	3	2.8	1.8	9.51	.001	.505
Economic TV Programs	1	1.97	1.15	1	2.22	1.71	-3.71	.001	.197
Video Platforms	3	3.42	1.62	3	3.45	1.71	-0.4	.688	.012
Science Journals	0	1.72	1.0	0	2.22	1.74	-7.93	.001	.421
Textbooks	2	2.81	1.34	2	3.47	1.72	-11.09	.001	.59
Course Scripts	3	4.32	1.21	3	4.4	1.65	-1.22	.224	.057
Science Data Bases	0	1.89	1.25	0	2.41	1.83	-8.1	.001	.43
Online Encyclopedia	2	3.33	1.36	2	3.55	1.62	-3.87	.001	.206
Others	0	1.85	1.53	0	2.07	1.75	-3.01	.003	.346

4.3 Additional Influence Factors of Students' Media Use

To investigate *RQ3*, we calculated multiple linear regression models and included control variables to predict the frequency of use of different media to *inform* oneself about B&E topics (Tables 4–11 in App.) as well as to *prepare* for exams (Tables 12–20 in App.). Control variables (trust in media sources, gender, migration background, parents' highest educational level, interest in economics and German GPA equivalent) were included in all regression analyses.

Seven out of 14 media sources to *inform oneself* were significantly explained by the BEFKI 11+ score when the control variables were included in the mod-

els. Two regression models explained more than 15 % of the variance: tabloids ($F(7,676) = 19.22, p < .001$) with an adjusted R^2 of .16 ($\beta = -.033, p = .032$) and economic newspapers ($F(7,676) = 17.59, p < .001$) with an adjusted R^2 of .15 ($\beta = -.049$, $p = .003$) (Tables 6 & 7 in App.), indicating a small effect size (Ellis, 2010). The adjusted R^2 for tabloids was .005 and for economic newspapers .001. The highest adjusted R^2 was .016, for news magazines. The BEFKI 11+ score explained less than 10 % of the frequency of media use of all other media sources but remained significant with the exception of video platforms ($F(7,676) = 16.34, p < .001$) with an adjusted R^2 of .14 ($\beta = -.042$, $p = .051$) (Table 10 in App.). The relationship between the BEFKI 11+ score and the frequency of media use was negative, i.e., the lower the students' intelligence test score was, the more frequently they used media to inform themselves.

Regression analyses predicting the frequency of use of different media to *prepare for classes and/or exams* revealed that the use of six media sources could significantly be predicted by the BEFKI 11+ score but overall only five multiple regression models were significant. Three out of five sources were common news sources: Regional newspapers, news magazines and TV news. The other two sources were economic newspapers and economic TV programs. The highest variance was explained by the model with TV news as the dependent variable ($F(7,676) = 5.04, p < .001$), with an adjusted R^2 of .04 ($\beta = -.079, p = .002$) (Table 17 in App.). This media source also showed the highest adjusted R^2 (.012). In total significant variance explained ranged from 1.2 to 4 %. The BEFKI 11+ score did not provide any significant predictions for any media sources from the university formal learning environment, the use of national and weekly newspapers, or video platforms when all previously mentioned control variables were included.

Additional factors that significantly predict how students *inform themselves* are their *general interest in B&E topics* and *trust* in the media source in question. Interest in B&E is especially predictive for specialized economic sources, for instance, economic newspapers ($\beta = .257, p < .001$, Adj. $R^2 = .06$, economic TV programs ($\beta = .16, p < .001$, Adj. $R^2 = .02$) and science journals ($\beta = .191, p < .001$, Adj. $R^2 = .03$). Trust in a media source predicts the use of material that typically has fewer built-in filter systems i.e., tabloids ($\beta = .35, p < .001$, Adj. $R^2 = .13$), regional newspapers ($\beta = .174, p < .001$, Adj. $R^2 = .03$) and video platforms ($\beta = .255, p < .001$, Adj. $R^2 = .06$) (Tables 4 – 11 in App.).

Trust also predicted media use in *preparation for lectures or exams* for different media sources including news magazines ($\beta = .09, p = .019$, Adj. $R^2 = .01$), TV news ($\beta = .175, p < .001$, Adj. $R^2 = .3$), economic TV programs ($\beta = .082, p = .032$, Adj. $R^2 = .01$) and video platforms ($\beta = .278, p < .001$, Adj. $R^2 = .08$). In contrast to media use to inform oneself, parental education played an important role in

predicting the frequency of media use when preparing for lectures and exams. The frequency of use for regional newspapers (β = -.085, p = .03, Adj. R^2 = .01), economic TV programs (β = -.096, p = .014, Adj. R^2 = .01), and science journals (β = -.1, p = .01, Adj. R^2 = .01) was higher where the parents' level of education was lower (Tables 12 – 20 in App.).

4.4 Comparison of General Fluid Intelligence Groups and Their Media Use

To investigate *RQ4*, the subsample was divided into four groups by quartiles depending on their BEFKI 11+ score. Group 1 included the highest scoring quarter of participants (n_1 = 160, M = 12.9, SD = 1.02) with scores ranging from 12 to 16. Group 2 consisted of the lowest scoring quarter of participants with scores ranging from 0 to 7 (n_2 = 185, M = 5.79, SD = 1.38). The two groups did not significantly differ in terms of age, gender, or attending higher-level economics courses in high school. However, they differed in their obtained German GPA equivalent. Group 1 had a better GPA (M = 1.95, SD = .56) than group 2 (M = 2.32, SD = .56), $t(339) = 6.1357$, $p < .001$. The two groups also differed in the number of students with a migration background. While 18.76 % of the students in group 1 reported that they have at least one parent that was not born in Germany, more than one third of the students in group 2 reported that they have a migration background (36.76 %). 21.08 % of the students in group 2 had completed vocational training in B&E prior to starting their university course, while only 9.38 % group 1 had done so. T-tests were calculated on the basis of the comparison groups approach to explore whether the high general fluid intelligence group (group 1) and the low general fluid intelligence group (group 2) differed systematically. Here, first insights on specific behavioral patterns could be gained in addition to the results of regression analyses related to *RQ1* and *RQ3*. Students in the upper quartile of the BEFKI 11+ score consistently used all 14 media sources less frequently than students in the lower quartile. This applies to both learning purposes, when informing oneself and preparing for exams.

The groups differed significantly in their use of most media sources to inform oneself, except for TV news, course scripts, and online encyclopedias (Table 21 in App.). The highest significant difference was found in the use of tabloids. These findings are consistent with the results related to *RQ1* and *RQ3*. Group 2 used tabloids more (M = .98, SD = 1.42) than group 1 (M = .39, SD = .10), $t(343) = 4.49$, $p < .001$, *Cohen´s d* = .485, indicating a medium effect size (Cohen, 1988). The two groups differ significantly in their media use of textbooks. Group 1 used textbooks

out of a general interest to be *informed* about B&E topics less often (M = .53, SD = .76) than group 2 (M = .89, SD = 1.09), $t(343) = 3.56$, $p < .001$, *Cohen´s* d = .385, indicating a small effect size (Cohen, 1988), although it is on the slightly higher end of the interpretation of effect size. Due to the increased statistical power of the comparison groups approach, the use of university sources can be further differentiated between the groups.

Analyses of the groups concerning their media use to prepare for exam and/or lectures revealed statistically significant differences between the two groups in only five of the 14 media sources: Regional, economic, and weekly newspapers, news magazines, and TV news (Table 22 in App.). None of these were university sources and only one was a specialized economics source. The greatest difference between the groups was found in the use of TV news. Group 2 used TV news more frequently (M = 2.13, SD = 1.82) than group 1 (M = 1.62, SD = 1.84), $t(343) = 2.59$, p = .010, *Cohen´s* d = .28) indicating a small effect size (Cohen 1988). The other four media sources (regional, economic, and weekly newspapers, news magazines) had effect sizes ranging from .228 (news magazines) to .266 (weekly newspapers). These findings are also consistent with the results related to *RQ1* and *RQ3*, even though the regression analyses related to *RQ1* and *RQ3* suggest that the BEFKI 11+ score can predict the use of more media sources for the purpose of preparing for exams and/or lectures.

Overall, the differences in the frequency of media use to inform oneself were more substantial and showed higher effect sizes in 12 of the 14 media sources. In comparison, the groups only differed in five out of 14 media sources significantly concerning the preparation for lectures and/or exams with small effect sizes.

5 Discussion

5.1 Media Use and General Fluid Intelligence of Students

Regarding *RQ1(i)*, the relationship between students' media use to *inform* themselves about B&E topics (*curiosity driven information seeking*) and general fluid intelligence differs depending on the media source, although the relationship was always negative. Nine out of 14 media sources had a significant relationship with general fluid intelligence, including common news and specialized economics sources, while university sources were not significantly predicted by the BEFKI 11+ score. Overall, general fluid intelligence appears to predict media use to inform oneself if the media source is less directly related to formal university learning. General fluid intelligence seems to influence the use of media sources if

students want to inform themselves, as is evidenced by the fact that students with higher scores have a lower frequency of media use. This is especially the case for media sources for which the lowest content quality is expected – tabloids – which supports the general assumption that certain media pose different cognitive demands. Students with lower cognitive abilities seem to prefer consuming media that is less demanding.

There is a correlation between general fluid intelligence and the use of regional, economic, and weekly newspapers as media sources when preparing for lectures and exams (*RQ1(ii)*). Similar to the findings related to *RQ1(i)*, the correlation was negative, i.e., the lower the students' BEFKI 11+ score was, the more frequently they used common media sources (e.g., TV news). Since these media can be expected to be of little help for exam preparation, one interpretation of this finding could be that a more "intelligent" strategy would be to use these media sources less and to concentrate more on media sources that contain more study-related and domain-specific content. However, general fluid intelligence did not significantly predict the use of university materials. This result suggests that students with different levels of general fluid intelligence use the same sources to study for university.

The findings of the present study support the distinction between the U&G information seeking motives and the assumption that they influence the students´ media use behavior *(RQ2)*. In general, the media use across most media sources was more frequent when the process of seeking information was driven by a study-specific goal. A few common news sources were an exception: national and regional newspapers, news magazines, and TV news, which were used more often by students to inform themselves in general. These sources are seemingly not considered by students to be viable options for preparing for lectures and exams, which suggests that they are less likely to use these common news sources to supplement their formal learning.

Generally speaking, general fluid intelligence can account for slightly more variance in media use when informing oneself than when preparing for lectures and exams. One possible explanation for this difference might be the selection process of reliable media sources for curiosity driven information seeking. Students with a higher level of fluid intelligence seem to have identified their trusted media source. Also, they seem to be less likely to "shop around" for the right media source, as a critical selection of their favored media source has already taken place, leading to an overall lower frequency of media use. Findings also suggest that students with a higher level of fluid intelligence consume less media overall, independent of their information seeking motive or media source. One reason for this might be that this group of students might select media sources and acquire and process new information more effectively or faster.

To answer *RQ3*, multiple regressions that included control variables were conducted. Approximately 15 % of the variance of media use when informing oneself was explained for tabloids, economic newspapers, and science journals. The adjusted R^2 for tabloids was .005, for economic newspapers .01, and for science journals .01. There was no significant relationship between the BEFKI+ score and the use of university materials such as textbooks and course scripts even when adding control variables. There was, however, a significant negative relationship between using economic newspapers and general fluid intelligence. Students with a lower level of general fluid intelligence might prefer economic newspapers to university media sources due to their comparatively simple representations of B&E topics. Study materials do not cover current news topics and usually convey basic principles and theories so students can acquaint themselves with the subject domain, which might explain the overall lower frequency of reported media use. Our data, however, do not include information about the quality of media use i.e. how attentively a student might read the text and about the texts students have actually consumed, only about the frequency of use and the type of media sources (for the limitations, see Section 5.2). For instance, students with a higher level of general fluid intelligence might read economic newspapers more rarely but more thoroughly; students with a lower level of general fluid intelligence might need more time to process novel information. This study does not allow for more in-depth conclusions about students' information processing or for explanations regarding the negative relationship between general fluid intelligence and media use for informing oneself about B&E topics.

Students who have more difficulties processing novel information might prefer non-university materials due to simpler or more user-friendly representations of information. Using tabloids is negatively associated with general fluid intelligence, as this medium may provide more easily understandable information regarding B&E and is often written in a flowery, not very fact-based journalistic style. Staying informed (using non-university sources) and keeping up with current trends using tabloids might be connected to the displacement hypothesis (Huston et al. 1999). The use of tabloids as a media source may also be more strongly connected to a different motivator, for example, entertainment, which was not considered in this study. Although students may feel like they are informing themselves about B&E topics, the content of tabloids is less likely to cover this domain in depth. This stereotype about what this media source can offer, backed by the displacement hypothesis of foregoing one activity for another, might offer one initial explanation.

Adding control variables to explain media use when preparing for lectures and exams led to general fluid intelligence not significantly predicting some of the media sources, for example, national and weekly newspapers, video platforms,

and science journals. The remaining significant sources included common news sources and specialized economic sources. The regression model with TV news as dependent variable explained most of the variance. Again, the use of media sources that were not traditionally used for exam preparation negatively correlated with general fluid intelligence. One possible explanation might be a subjective feeling of students with lower fluid intelligence that consuming certain non-university media sources to prepare for lectures and exams is useful. They might rely more on informal or passive learning through media in addition to university sources as a learning strategy, thus spreading their own information processing resources thinner.

Regarding *RQ4,* students in the lower quartile of general fluid intelligence (group 2) consistently reported that they use more media from all 14 sources than the students with a higher level of general fluid intelligence (group 1) when informing themselves. The two groups differed significantly in their use of most media sources except TV news, course scripts, and online encyclopedias. The most significant difference is that students in group 2 used more tabloids and textbooks, although both effect sizes are small. Unlike in *RQ1* and *RQ3,* a difference in the frequency of textbook use emerged for *RQ4*. Although textbooks are a reliable source of information, using them to inform oneself in general might suggest two things. For one, students might consider common news sources, for instance, newspapers or specialized economics sources, a more appropriate choice to obtain current information. Moreover, university sources are more easily available to students and are already "approved" by faculty staff, which might make a selection process of suitable media sources easier, particularly for students in the lower general fluid intelligence group. Students with a low level of general fluid intelligence consistently used all 14 media sources more frequently to prepare for lectures and exams compared to the students with a high level of general fluid intelligence. Statistically significant differences were determined for five of the 14 media sources: regional, economic, and weekly newspapers, news magazines, and TV news. This finding is consistent with the regression analyses. The most notable difference between groups 1 and 2 was identified in the use of TV news, with a small effect size. This finding is in line with previous studies suggesting that groups with a lower educational level process TV news best, while showing a smaller processing capacity for newspapers (Grabe et al. 2009). The groups did not significantly differ in their use of university materials. However, media use differs in sources (e.g., regional, economic, and weekly newspapers, news magazines, and TV news) that might not be specifically needed for achieving a study-related goal such as preparing for a lecture or passing an exam.

5.2 Limitations and Future Directions

The survey data only show a self-reported estimate of students' frequency of media use. Although there is a discrepancy between self-reported measures of media use and actual media use, studies have found strong positive correlations between self-reported and actual time spent consuming different media sources (e.g., Facebook: Junco 2013). Nonetheless, future studies should use different measurements that provide more objective and detailed data, for instance, by asking students to report the concrete duration of use, using a continuous measure or by asking students how many minutes in the last week they spent using certain media, as well as by tracking and analyzing the content and quality of used media. Many of the media surveyed may have content that requires processing at very different (cognitive) levels. New technologies, such as apps like Social Fever and MyAddictometer (Basera 2019), make it possible to track media use in real-time.

Furthermore, traditional media sources have increasingly moved into the online space (Fletcher and Park 2017). The fast-changing media landscape invites active participation rather than passive use. Further research is required on the expansion of the U&G approach presented in this article in combination with a differentiation between active and passive media use. In this study, only two meta-categories of learning purposes were considered, which also require more detailed differentiation and examination in different formal and informal learning situations.

More detailed investigations as to which media from the different categories in particular influenced media use and, for instance, further breaking down the category of news magazines into concrete well-known German magazines like *Der Spiegel, Stern*, and *Focus* would provide a more nuanced insight into students´ media use and allow for in-depth analyses regarding the potential of informal learning through mass media.

The results suggest that in future studies, general fluid intelligence should be measured more comprehensively and used as a covariate when analyzing media use and its influence on student learning. In this study, only one core facet of general intelligence is measured, using a figural reasoning scale as a proxy. Further studies are required which include both additional scales of figural reasoning as well as measurement of other facets of general intelligence. For instance, reading and processing texts in particular may be more strongly related to verbal intelligence.

In addition, as students' media use was assessed only at one measurement point in this study, the findings do not allow for statements about causality. For instance, since the students in group 1 (high general fluid intelligence group) generally used less media from all 14 listed media sources, future research is required to examine media use in relation to general intelligence over the course of study. A longitu-

dinal study with more measurement points, for example spanning the duration of university studies, would allow for initial causality analyses.

Finally, studies with students from other study domains are required to examine to which extent the findings of this study are domain- and B&E-content specific, and which media use patterns may become evident among students from other study domains in different learning situations (for a comparative analysis with social science students, see Maurer et al. 2020).

5.3 Conclusion

This article aimed to examine the relationships between students' media use and their general fluid intelligence, differentiating between two learning purposes: informing themselves (curiosity driven information seeking) and preparing for lectures or exams (goal driven information seeking). This distinction is related to the Uses and Gratification approach (U&G), which suggests different media use motivation, one of them being information seeking motives. Curiosity driven media use can be linked to learning when informing oneself, while goal driven media use can be related to learning when preparing for exams.

The study has shown that depending on the learning purpose, i.e. what drives students to seek out information, they *(i)* use media differently and *(ii)* use different media. The curiosity driven use of media has a stronger relationship with general fluid intelligence than goal driven media use. The patterns of media use depending on the information seeking motive is the same for higher and lower scoring students on a general fluid intelligence test.

For higher education practice, this study emphasizes the crucial importance of establishing a habit of conscious use of media facilitated by academic staff. This can be done by deliberately integrating mass media sources into the learning context as well as by encouraging informal media use, i.e., informal learning through media sources that are not directly study-related. This includes utilizing mass media sources to support habits of active knowledge transfer from one domain to the other to create synergies between the two. Building the habit of knowledge transfer and a strengthened ability to evaluate media sources as conscious media consumers in different domains could support learning in higher education.

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Appendix

Table 2 Bivariate correlation matrix for media use to inform oneself

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. National Newspapers													
2. Regional Newspapers	.441***												
3. Tabloids	.257***	.419***											
4. Economic Newspapers	.460***	.337***	.340***										
5. Weekly Newspapers	.482***	.358***	.352***	.472***									
6. News Magazines	.334***	.361***	.269***	.313***	.440***								
7. TV News	.228***	.308***	.152***	.223***	.231***	.285***							
8. Economic TV Programs	.264***	.266***	.269***	.314***	.301***	.308***	.395***						
9. Video Platforms	.173**	.085*	.197***	.275***	.191***	.153***	.127***	.227***					
10. Science Journals	.275***	.263***	.290***	.519***	.414***	.275***	.152***	.482***	.254***				
11. Textbooks	.075*	.074*	.100**	.165***	.083*	.125***	.079*	.215***	.158***	.300***			
12. Course Scripts	.004	.059	.056	.113**	.000	.075*	.128***	.092*	.144***	.121**	.456***		
13. Science Data Bases	.153***	.162***	.217***	.175***	.261	.137***	.112*	.314***	.272***	.363***	.249***	.184***	
14. Online Encyclopedias	.152***	.103**	.170***	.224***	.184***	.147***	.141***	.205***	.382***	.234***	.348***	.348***	.344***

*$p < .05$; **$p < .01$; ***$p < .001$

Table 3 Bivariate correlation matrix for media use to prepare for exams

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. National Newspapers													
2. Regional Newspapers	.855***												
3. Tabloids	.830***	.845***											
4. Economic Newspapers	.826***	.780***	.787***										
5. Weekly Newspapers	.856***	.797***	.824***	.817***									
6. News Magazines	.761***	.747***	.743***	.740***	.834***								
7. TV News	.615***	.615***	.545***	.617***	.628***	.699***							
8. Economic TV Programs	.794***	.780***	.790***	.768***	.785***	.746***	.698***						
9. Video Platforms	.292***	.259***	.257***	.293***	.300***	.274***	.310***	.288***					
10. Science Journals	.781***	.751***	.794***	.808***	.801***	.718***	.546***	.815***	.287***				
11. Textbooks	.219***	.210***	.215***	.290***	.239***	.267***	.214***	.281***	.292***	.309***			
12. Course Scripts	-321***	-.303***	-.376***	-.249***	-.300***	-.230***	-.106*	-.292***	.151***	-.290***	.338***		
13. Science Data Bases	.634***	.627***	.661***	.605***	.656***	.595***	.438***	.664***	.283***	.700***	.335***	-.186***	
14. Online Encyclopedias	.240***	.245***	.221***	.274***	.270***	.260***	.296***	.264***	.443***	.278***	.373***	.261***	.368***

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of national newspaper use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	*B*	*B*	*SE B*	*β*
General fluid ability	-.053	.019	-.105**	-.053	.02	-.105**
Gender (female = 0)				.372	.108	.132**
Migration background				-.075	.125	-.023**
Parental education				.038	.047	.03
Interest in B&E topics				.398	.075	.2***
Trust in media				.088	.044	.075*
German GPA equivalent				.005	.01	.021
Adjusted R^2		.01**			.076***	.076***
F		7.55			10.48	10.48

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 5 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of regional newspaper use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
General fluid ability	-.051	.018	-.108**	-.048	.018	-.102**
Gender (female = 0)				.16	.1	.062
Migration background				.231	.114	.076*
Parental education				-.066	.043	-.057
Interest in B&E topics				.199	.07	.109**
Trust in media				.174	.037	.174***
German GPA equivalent				.195	.009	.086*
Adjusted R^2		.01*			.069***	
F		8.09			8.18	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 6 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of tabloid use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.06	-.016	-.144***	-.033	.015	-079*
Gender (female = 0)				-.063	.085	-.027
Migration background				.106	.097	.039
Parental education				-.054	.037	-.052
Interest in B&E topics				.105	.059	.064
Trust in media				.327	.033	.35***
German GPA equivalent				.027	.007	.132***
Adjusted R^2		.019***			.152***	
F		14.56			21.59	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 7 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of economic newspaper use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.054	.017	-.121**	-.049	.017	-.108**
Gender (female = 0)				.487	.092	.196***
Migration background				-.037	.106	-.013
Parental education				.037	.04	.034
Interest in B&E topics				.449	.064	.257***
Trust in media				.081	.038	.076*
German GPA equivalent				.012	.008	.055
Adjusted R^2		.013**			.145***	
F		10.07			17.59	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 8 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of news magazine use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.07	.02	-.135***	-.072	.02	-.138***
Gender (female = 0)				.292	.111	.101**
Migration background				.141	.127	.042
Parental education				-.039	.047	-.03
Interest in B&E topics				.193	.077	.095**
Trust in media				.245	.042	.218***
German GPA equivalent				.005	.01	.018
Adjusted R^2		.017***			.081***	
F		12.57			9.64	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 9 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of economic TV magazine use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.042	.016	-.102**	-.033	.016	-.081*
Gender (female = 0)				.235	.088	.103**
Migration background				.0	.1	.0
Parental education				-.055	.038	-.054
Interest in B&E topics				.256	.061	.16***
Trust in media				.091	.034	.101**
German GPA equivalent				.019	.008	.096*
Adjusted R^2		.009**			.07***	
F		7.18			8.34	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 10 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of video platforms use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.057	.022	-.097*	-.042	.022	-.072
Gender (female = 0)				.556	.12	.172***
Migration background				-.282	.137	-.075*
Parental education				.02	.052	.014
Interest in B&E topics				.226	.084	.099**
Trust in media				.345	.047	.255***
German GPA equivalent				.019	.011	.068
Adjusted R^2		.008*			.135***	
F		6.49			18.95	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 11 Simple and multiple linear regression for media use to inform oneself: Dependent variable = Frequency of science journal use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.046	.137	-.128**	-.04	.0139	-.111**
Gender (female = 0)				.22	.077	.11**
Migration background				-.096	.088	-.041
Parental education				-.007	.033	-.008
Interest in B&E topics				.269	.054	.191***
Trust in media				.075	.03	.095*
German GPA equivalent				.12	.007	.069
Adjusted R^2		.015***			.078***	
F		11.36			9.24	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 12 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of national newspaper use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.048	.024	-.077*	-.044	.025	-.07
Gender (female = 0)				.09	.139	.026
Migration background				-.095	.159	-.023
Parental education				-.069	.06	-.045
Interest in B&E topics				.171	.097	.07
Trust in media				-.008	.057	-.006
German GPA equivalent				-.007	.012	-.023
Adjusted R^2		.004*			.005	
F		4.04			1.45	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 13 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of regional newspaper use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.06	.024	-.096**	-.054	.025	-.086*
Gender (female = 0)				.112	.138	.032
Migration background				-.101	.157	-.025
Parental education				-.13	.06	-.085*
Interest in B&E topics				.123	.096	.05
Trust in media				.075	.051	.056
German GPA equivalent				.0	.012	-.001
Adjusted R^2		.008*			.014*	
F		6.41			2.39	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 14 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of economic newspaper use ($n = 684$)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.065	.023	-.106**	-.059	.024	-.096*
Gender (female = 0)				.177	.135	.052
Migration background				-.031	.155	-.008
Parental education				-.103	.058	-.068
Interest in B&E topics				.224	.094	.094*
Trust in media				.021	.056	.015
German GPA equivalent				-.002	.012	-.006
Adjusted R^2		.01**			.02*	
F		7.73			2.96	

Note. Subsample $n = 709$, missings = 25; *$p < .05$; **$p < .01$; ***$p < .001$

Table 15 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of weekly newspaper use ($n = 684$)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.065	.024	-.106**	-.059	.024	-.096*
Gender (female = 0)				-.084	.136	-.024
Migration background				-.174	.156	-.044
Parental education				-.029	.059	-.019
Interest in B&E topics				.112	.095	.046
Trust in media				.026	.054	.018
German GPA equivalent				-.003	.012	-.01
Adjusted R^2		.01**			.006	
F		7.69			1.56	

Note. Subsample $n = 709$, missings = 25; *$p < .05$; **$p < .01$; ***$p < .001$

Table 16 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of news magazine use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.062	.024	-.099*	-.059	.025	-.095*
Gender (female = 0)				.0	.138	.0
Migration background				.031	.158	.008
Parental education				-.079	.059	-.051
Interest in B&E topics				.096	.096	.039
Trust in media				.123	.052	.09*
German GPA equivalent				.0	.012	-.001
Adjusted R^2		.008**			.012*	
F		6.73			2.22	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 17 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of TV news use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.076	.025	-.118**	-.079	.025	-.122**
Gender (female = 0)				.017	.14	.005
Migration background				-.058	.161	-.014
Parental education				-.069	.061	-.043
Interest in B&E topics				.159	.098	.063
Trust in media				.262	.057	.175***
German GPA equivalent				.004	.012	.012
Adjusted R^2		.013**			.04***	
F		9.66			5.04	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 18 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of economic TV magazine use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.054	.024	-.087*	-.054	.025	-.087*
Gender (female = 0)				-.06	.135	-.018
Migration background				-.056	.154	-.014
Parental education				-.146	.059	-.096*
Interest in B&E topics				.106	.094	.044
Trust in media				.111	.052	.082*
German GPA equivalent				-.008	.012	-.028
Adjusted R^2		.006*			.017**	
F		5.25			2.7	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 19 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of video platform use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
General fluid ability	-.047	.023	-.077*	-.041	.023	-.066
Gender (female = 0)				.254	.13	.075
Migration background				.0	.149	.0
Parental education				-.05	.056	-.033
Interest in B&E topics				.162	.03	.068
Trust in media				.385	.051	.278***
German GPA equivalent				.007	.011	.022
Adjusted R^2		.005*			.092***	
F		4.06			10.94	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 20 Simple and multiple linear regression for media use to prepare for exam: Dependent variable = Frequency of science journal use (n = 684)

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
General fluid ability	-.048	.024	-.076*	-.046	.025	-.073
Gender (female = 0)				.03	.138	.009
Migration background				-.138	.158	-.034
Parental education				-.154	.06	-.1*
Interest in B&E topics				.152	.096	.062
Trust in media				.079	.053	.058
German GPA equivalent				-.012	.012	-.04
Adjusted R^2		.004*			.014*	
F		3.96			2.42	

Note. Subsample n = 709, missings = 25; *p < .05; **p < .01; ***p < .001

Table 21 T-tests with BEFKI 11+ scores for media use to inform oneself

	M	SD	95 % CI	*t*(df = 343)	*p*	*d*
National Newspapers						
Group 1: Upper Quartile	1.48	1.355	[1.263; 1.687]	2.911	.004**	.314
Group 2: Lower Quartile	1.91	1.398	[1.705; 2.111]			
Regional Newspapers						
Group 1: Upper Quartile	1.19	1.221	[1.003; 1.384]	2.570	.011*	.277
Group 2: Lower Quartile	1.56	1.413	[1.357; 1.767]			
Tabloids						
Group 1: Upper Quartile	.39	.891	[.255; .533]	4.494	>.001***	.485
Group 2: Lower Quartile	.98	1.422	[.772; 1.185]			
Economic Newspapers						
Group 1: Upper Quartile	1.05	1.186	[.865; 1.235]	3.120	.002**	.337
Group 2: Lower Quartile	1.48	1.327	[1.283; 1.668]			

	M	SD	95 % CI	*t*(df = 343)	*p*	*d*
Weekly Newspapers						
Group 1: Upper Quartile	1.12	1.215	[.929; 1.308]	2.525	.012*	.273
Group 2: Lower Quartile	1.47	1.315	[1.274; 1.656]			
News Magazines						
Group 1: Upper Quartile	1.44	1.326	[1.321; 1.645]	3.254	.001**	.351
Group 2: Lower Quartile	1.93	1.464	[1.718; 2.142]			
TV News						
Group 1: Upper Quartile	2.48	1.317	[2.269; 2.681]	.366	.714	.040
Group 2: Lower Quartile	2.53	1.437	[2.321; 2.738]			
Economic TV Programs						
Group 1: Upper Quartile	.87	1.077	[.701; 1.037]	2.890	.004**	.312
Group 2: Lower Quartile	1.24	1.298	[1.055; 1.432]			
Video Platforms						
Group 1: Upper Quartile	2.21	1.572	[1.967; 2.458]	2.718	.007**	.293
Group 2: Lower Quartile	2.68	1.619	[2.446; 2.916]			
Science Journals						
Group 1: Upper Quartile	1.7	1.293	[1.498; 1.902]	1.967	.05*	.212
Group 2: Lower Quartile	1.98	1.373	[1.785; 2.183]			
Textbooks						
Group 1: Upper Quartile	.52	.76	[.406; .644]	3.565	>.001***	.385
Group 2: Lower Quartile	.89	1.093	[.733; 1.05]			
Course Scripts						
Group 1: Upper Quartile	3.18	1.207	[2.993; 3.37]	1.608	.109	.174
Group 2: Lower Quartile	3.4	1.247	[3.214; 3.575]			

	M	SD	95 % CI	t(df = 343)	p	d
Science Databases						
Group 1: Upper Quartile	.69	1.167	[.505; .87]	2.527	.012*	.273
Group 2: Lower Quartile	1.02	1.272	[.837; 1.206]			
Online Encyclopedias						
Group 1: Upper Quartile	2.23	1.309	[2.027; 2.436]	1.535	.126	.166
Group 2: Lower Quartile	2.46	1.433	[2.252; 2.667]			

*$p < .05$; **$p < .01$; ***$p < .001$

Table 22 T-tests with BEFKI scores for media use to prepare for exam

	M	SD	95 % CI	t(df = 343)	p	d
National Newspapers						
Group 1: Upper Quartile	1.24	1.779	[.96; 1.515]	1.453	.147	.157
Group 2: Lower Quartile	1.51	1.678	[1.265; 1.752]			
Regional Newspapers						
Group 1: Upper Quartile	1.09	1.758	[.819; 1.368]	2.337	.02*	.252
Group 2: Lower Quartile	1.53	1.741	[1.283; 1.788]			
Tabloids						
Group 1: Upper Quartile	.94	1.785	[.665; 1.222]	1.404	.161	.152
Group 2: Lower Quartile	1.21	1.743	[.958; 1.464]			
Economic Newspapers						
Group 1: Upper Quartile	1.17	1.716	[.901; 1.437]	2.234	.026*	.241
Group 2: Lower Quartile	1.58	1.724	[1.334; 1.834]			
Weekly Newspapers						
Group 1: Upper Quartile	1.15	1.763	[.875; 1.425]	2.467	.014*	.266
Group 2: Lower Quartile	1.61	1.7	[1.364; 1.857]			

	M	SD	95 % CI	t(df = 343)	p	d
News Magazines						
Group 1: Upper Quartile	1.31	1.816	[1.029; 1.596]	2.113	.035*	.228
Group 2: Lower Quartile	1.71	1.706	[1.466; 1.961]			
TV News						
Group 1: Upper Quartile	1.62	1.836	[1.332; 1.905]	2.593	.01**	.28
Group 2: Lower Quartile	2.13	1.816	[1.866; 2.393]			
Economic TV Programs						
Group 1: Upper Quartile	1.17	1.792	[.889; 1.449]	1.759	.08	.19
Group 2: Lower Quartile	1.5	1.729	[1.252; 1.753]			
Video Platforms						
Group 1: Upper Quartile	2.35	1.778	[2.072; 2.627]	1.595	.112	.172
Group 2: Lower Quartile	2.64	1.636	[2.406; 2.881]			
Science Journals						
Group 1: Upper Quartile	1.15	1.816	[.866; 1.434]	1.109	.268	.12
Group 2: Lower Quartile	1.36	1.733	[1.111; 1.614]			
Textbooks						
Group 1: Upper Quartile	2.43	1.814	[2.148; 2.715]	1.023	.307	.11
Group 2: Lower Quartile	2.62	1.641	[2.384; 2.860]			
Course Scripts						
Group 1: Upper Quartile	3.38	1.678	[3.119; 3.643]	.044	.965	.005
Group 2: Lower Quartile	3.39	1.648	[3.15; 3.628]			
Science Data Bases						
Group 1: Upper Quartile	1.31	1.867	[1.021; 1.604]	1.341	.181	.145
Group 2: Lower Quartile	1.58	1.81	[1.316; 1.841]			

	M	SD	95 % CI	*t*(df = 343)	*p*	*d*
Online Encyclopedias						
Group 1: Upper Quartile	2.5	1.602	[2.25; 2.750]	.874	.383	.094
Group 2: Lower Quartile	2.65	1.658	[2.413; 2.895]			

*$p < .05$; **$p < .01$; ***$p < .001$