

Self-Reporting News Use in Situ and in Retrospect

Danit Shalev¹, Teresa K. Naab², and Yariv Tsfati¹

¹Department of Communication, University of Haifa, Haifa, Israel

²Institute for Media and Communication Studies, University of Mannheim, Mannheim, Germany

All correspondence concerning this article should be addressed to Danit Shalev, PhD, Department of Communication, University of Haifa, 199 Aba Khoushy Ave. Mount Carmel, Haifa, 3498838, Israel. E-mail: danit.shalev@gmail.com

Abstract

Based on a sample collected in Israel ($N = 1,414$), the current study describes the discrepancies between measures of retrospective and repeated in situ self-reports for exposure to audio-visual news broadcasts on TV, news websites, and social media. It tests the influence of the amount of news broadcast exposure, habitual news use at certain times of the day, and user demographics on the discrepancies between the measures. Results show that people significantly under-report TV news exposure and over-report watching the news on social media in retrospect. More heavy news users tend to under-report exposure in retrospect compared to aggregated in situ values. Daytime news users tend to over-report social media news exposure in retrospect.

Self-Reporting News Use in Situ and in Retrospect

Exposure to news is a central variable in political communication research (Eveland, Hutchens, & Shen, 2009). Yet, measurement of news exposure comes with several challenges. Because of the technical and privacy challenges associated with observational behavior measures, studies on media behavior mostly rely on standardized and retrospective self-reports (de Vreese & Neijens, 2016; Ha et al., 2015). Several authors have discussed limitations of retrospective self-report data on media use, including memory and aggregation errors as well as social desirability biases (Bradburn, Rips, & Shevell, 1987; Iyengar, 1990; Naab, Karnowski, & Schlütz, 2019).

Self-reporting past news use becomes even more challenging in online media ecologies: With the socio-technological developments of digitalization, news content is accessible from a multitude of platforms, including traditional media, but also websites, apps, and social media. Users can access news in nearly all situations of their everyday life (Struckmann & Karnowski, 2016). With the rise of user-generated content, news formats have diversified. Given the drastically increased information availability and the various ways to get in touch with news, acquisition patterns change (e.g., incidental news exposure, Karnowski, Kümpel, Leonhard, & Leiner, 2017).

These changes in the news landscape cause further measurement challenges. It becomes more difficult to identify, remember, and self-report news use correctly. The challenges of self-reporting news find their expression in various studies that show over-reporting of news in retrospective surveys compared to people meter data and other observational data like tracking (Cardenal, Victoria-Mas, Majó-Vázquez, & Lacasa-Mas, 2022; Dvir-Gvirsman, Tsfati, & Menchen-Trevino, 2016; Konitzer et al., 2021; Price, & Zaller, 1993; Prior,

2009a, 2009b, 2012; Shalev & Tsfati, 2022; Wonneberger, Schoenbach, & Van Meurs, 2013).

While such observational data provide a seemingly superior though not necessarily reliable source of information (Bosch, & Revilla, 2022; Wonneberger et al., 2013), many research projects still rely on self-report measures because of their less effortful implementation, the combination with self-reports about inner states that cannot be observed, the difficulty of cross-platform observation, and biases inherent in observational data (e.g., Jürgens, Stark, & Magin, 2020 on tracking data). When focusing on self-report data, the experience sampling method (ESM; Kubey, Larson, & Csikszentmihalyi, 1996; Larson & Csikszentmihalyi, 1983) appears as a complement to traditional retrospective self-reports and observational methods. In ESM, respondents repeatedly over a period of time report on their recent behaviors, emotions, and cognitions, which creates repeated in situ self-reports. Hence, data from ESM studies are less dependent on users' reconstructions than retrospective self-reports and still spread across various more or less typical situations. However, ESM comes with its own challenges, including a high burden for the respondents and consequently biases in the person and situation samples (Myin-Germeys & Kuppens, 2022).

The present study has two aims. First, it describes the discrepancies of exposure to audio-visual news broadcasts reported through retrospective and repeated in situ self-reports. Second, it tests the influence of the amount of news broadcast exposure, habitual news use at certain times of the day, and user characteristics on the discrepancies between the measures. The study is among the rare literature that actually compares ex post and in situ self-reports with the same sample (for an exception, see Naab et al., 2019). Different from most ESM studies, it does not rely on convenience sampling but uses an online panel provider to access a representative population quota with random sampling, thus reducing the

usual person sample biases. Additionally, it focuses on discrepancies in the measurement of audio-visual news broadcast exposure. Thus, the results are informative to communication researchers who include self-report measures of media use in their work and need to be alert of systematic over- and under-reporting. Such studies are prevalent when it comes to news use measures in political communication research, but are also widely used in health, marketing, and entertainment contexts, where ESM has also been used to collect exposure data (Hoang & Kauffman, 2016; Otto & Kruikeimeier, 2023). The study further compares measurement discrepancies in the usage of audio-visual news broadcasts on TV, website, mobile applications, and social media, contributing to a better understanding of platform-specific biases in self-report data.

Measurement Discrepancies in Retrospective and in Situ Self-Reports

In the process of answering a survey question, like how often they watch the news, respondents have to (1) understand the question, (2) recall the relevant behaviors from memory, (3) make judgments, that is, estimations and inferences about these behaviors and their frequency in a time span, (4) adapt their answer to the response format, and (5) edit the answer for reasons of social desirability or self-presentation (Prior, 2009a; Schwarz, & Oyserman, 2001; Tourangeau, Rips, & Rasinski, 2000). These steps put quite a burden on the respondents who do not necessarily process thoughtfully but engage in satisficing (Krosnick, 1991).

With regard to retrospective self-reports, in step 2 of the process, respondents are usually asked to recall behaviors in a specific past time span, for example, the previous week. They are supposed to remember several distant events and aggregate these over the considered time span. To accomplish this task, respondents often rely on semantic memory, which means they infer answers from general knowledge or schemata instead of retrieving specific instances and particular experiences. This can lead to overgeneralizations. In contrast, when respondents are asked to report on specific behavior in a more recent time span, for example, “today” or “at the moment” (i.e., in situ), they can more easily distinguish and retrieve the individual episode (Robinson & Clore, 2002, step 2). They need to make less inferences and aggregations across a period of time (step 3). Therefore, survey answers focusing on in situ reports of more recent behaviors are assumed to be less biased by memory and aggregation errors (Lee et al., 2008; Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003). However, single in situ reports are prone to errors when tapping into atypical situations (Chang & Krosnick, 2003).

ESM aims to adjust for this imbalance of surveying about an atypical situation in that it applies repeated in situ reports. Respondents self-report on their behaviors, emotions, and cognitions. They do so repeatedly over a period of time. They are prompted for the repeated survey by the researchers and fill the experience sampling protocols with little or no time lag to the prompt (Schnauber-Stockmann & Karnowski, 2020). Thus, they provide (almost) in situ reports on the phenomena in question. Hence, data from ESM studies are less dependent on users’ reconstructions than retrospective self-reports and spread across various everyday situations, increasing the ecological validity of the results.

However, ESM comes with its own challenges, most importantly a high burden for the participants and consequently

biases in the person and situation samples (Myin-Germeys & Kuppens, 2022; Rintala, Wampers, Myin-Germeys, & Viechtbauer, 2019; Vachon, Viechtbauer, Rintala, & Myin-Germeys, 2019). For example, respondents with some characteristics are more likely to drop out of the study entirely or show reduced compliance in answering the protocols. Additionally, respondents may not answer protocols in particular situations, thus limiting the representativeness of the situation sample.

Given the frequent use of self-reports in communication research as a complement or alternative to observational measures and given the differences in data collection methods, we ask:

RQ1: How do self-reports on news use in retrospect differ from aggregated in situ reports?

Influence of the Amount of News Use on Measurement Discrepancies

Several empirical studies on different types of media suggest that the accuracy of self-reports depends on the amount of media use with less accurate estimates coming from heavier users: For example, Scharkow (2016) finds that “Users with more logged online days per month were more likely to under- and less likely to overreport (in a retrospective self-report survey). Heavy users who spent many hours online had a reduced likelihood of overestimating the weekly duration of their Internet use, but a higher chance of overreporting the number of days per month they were online” (p. 20; Sewall, Bear, Merranko, & Rosen, 2020). Generally, more frequent usage is assumed to be more difficult to estimate (Schwarz & Oyserman, 2001), while “more distinct events, in terms of intensity, emotionality, unusualness, or personal significance” (Reis & Gable, 2000, p. 196) tend to be recalled better (e.g., Boase & Ling, 2013). Scharkow (2016) suspects that measurement discrepancies could be due to social desirability because heavy users might be motivated to lower their usage—yet, this might not be the case for news use which generally is assumed desirable, causing over-reporting (Barthel, Mitchell, Asare-Marfo, Kennedy, & Worden, 2020). Additionally, more extensive news use could also be accompanied by multitasking with parallel activities. This can lower attention to news use and reduce report accuracy, more specifically lead to under-reporting (Duff, Yoon, Wang, & GlennAnghelcev, 2014; Price & Zaller, 1993). However, in an empirical comparison of retrospective self-reports on Internet use duration and tracking data, Araujo, Wonneberger, Neijens, & De Vreese, (2017) show that more extensive usage is related to under-reporting, yet not to multitasking (see also Wonneberger & Irazoqui, 2017). Furthermore, under-reporting by heavy users might result from a ceiling effect because the possibilities of heavy users to over-report are limited by the response format of fixed scales (Chyung, YonnieHutchinson, & Shamsy, 2020).

Given this past research and argumentation, we pose the following research question:

RQ 2: Does the amount of news use influence discrepancies between self-reports on news use in retrospect compared to aggregated in situ reports?

Influence of Habitual News Use on Measurement Discrepancies

Habits are repetitive behaviors performed in consistent contexts (Naab & Schnauber, 2016). They are based on mental

scripts containing procedural information on how to behave in certain circumstances. Experiencing such circumstances can trigger the habitual behavior stored in the mental script (e.g., a time of the day, a place, a specific mood, Wood & Neal, 2007). News use is a habitual behavior for many users (Möller, Van De Velde, Merten, & Puschmann, 2020). Traditional broadcasting patterns of morning, daytime, and evening newscasts, as well as stable everyday life tasks during these times of the day, lay a fruitful ground to develop habitual news use at specific times of the day (LaRose, 2010; Schnauber-Stockmann, Scharkow, & Breuer, 2023).

Habitual behaviors are highly efficient because the actors do not need to consider repetitive situations in depth, but can follow the script. This also renders habitual behaviors less controllable and conscious (Verplanken & Orbell, 2003). It suggests that the selection of news in stable circumstances like morning, afternoon, and evening hours, can be performed with a lack of awareness (Naab & Schnauber, 2016). This, in consequence, suggests that habitual news users would not recall all distinct instances of news use when asked for retrospective self-reports on their news use frequency. Instead, when making inferences and estimations in self-report surveys (Schwarz & Oyserman, 2001), they might rely on the information stored in their mental script. This script indicates that they use the news during certain hours of the day, and the respondents might not consider exceptions to that habit. Additionally, scholars have pointed out the importance of habits for an individual's identity (e.g., watching the news in the morning "...that's typically 'me'," Verplanken & Orbell, 2003). Habitual behavior can even become a relevant part of a person's self-description (Verplanken, Myrbakk, & Rudi, 2005). This can lead to further overestimation of habitual usage patterns.

Empirical research on the influence of habits on survey measurement errors is limited. Some scholars show that the reliability of self-reports increases with more stable behaviors (Lee et al., 2000; Schwarz & Oyserman, 2001). For example, Wonneberger and Irazoqui (2017) show that TV users with more stable consumption patterns report TV use frequency and duration more accurately, while less stable users over-reported frequency but under-reported duration. However, others suggest that behaviors that are frequent and integrated into people's lives are especially prone to measurement errors (Parry et al., 2021)—because reports might neglect exceptions. However, when respondents report their recent news use quickly upon an in situ survey prompt, they are less likely to report habitual estimates and forget about exceptional non-use. Karnowski, Naab, & Schlütz, (2019) do not find an influence of habitual social media use on reporting discrepancies of usage duration. However, this might be due to the fact that they did not focus on a particular content genre (such as news), which results in much broader, less time-specific habits. Hence, we pose the following research questions:

RQ 3: Do users who habitually use the news in certain hours of the day over-report their news use in retrospect compared to their aggregated in situ reports?

Measurement Discrepancies by Platforms

New broadcasts are available via different platforms. News consumption on traditional media such as TV continues to fall in most countries, while social media are increasingly

important gateways to news (Newman, Fletcher, Eddy, Robinson, & Nielsen, 2023). These platforms provide very different opportunities and contexts for news consumption: Consuming news through traditional TV is usually limited to fixed broadcasting times and a fixed spatial setting. The beginning and end of the news episode are clearly marked; reception is mostly linear. Consuming news on the websites and on the apps of the news providers allow for spatial as well as temporal flexibility in usage. Consequently, the use of traditional news media is more strongly linked to specific times of the day, while online news use is more irregular (Schnauber-Stockmann & Mangold, 2020). This also suggests less habits of consuming online news during specific times of the day, which then might influence the users' ability to self-report their news use. With regard to spatial stability, research also suggests that mobile usage could increase the risk of self-report errors (e.g., over-reporting of the number of days of Internet use, Scharkow, 2016).

News broadcasts distributed on websites and apps are offered in the clearly defined journalistic environment of the news provider. In contrast, news on social media is presented alongside entertainment and personal content. Users might consume news via platforms such as Facebook, while referring to the original producer (e.g., the Cable News Network CNN) as the primary source (Barthel et al., 2020). This confusion may magnify reporting discrepancies when it comes to the consumption of news on social media.

Online news use is embedded in an "permanently online, permanently connected" mobile media consumption that is marked by a dramatically increased frequency of sometimes very short usage episodes (Vorderer, Krömer, & Schneider, 2016). Retrospective self-reports of such mobile media usage are particularly demanding (de Vreese & Neijens, 2016; Niederdeppe, 2016). For example, retrospective self-reports on the usage of social media platforms and messengers like Facebook, YouTube, and WhatsApp strongly deviate from in situ reports, and respondents over-report most phenomena in retrospect (Naab et al., 2019; also Boase & Ling, 2013). Similarly, Verbeij, Pouwels, Beyens, & Valkenburg, 2021 indicate adolescents' over-reporting of fragmented social media use (WhatsApp, Snapchat).

Considering this review, we pose the following research questions:

RQ 4: Do discrepancies between self-reports on news use in retrospect and aggregated in situ reports differ between news use on TV, on websites/apps, and social media?

Influences of Personal Characteristics on Measurement Discrepancies

Various literature consider the influences of socio-demographics on measurement errors. For example, older respondents are more likely to over-report Internet usage in self-report surveys compared to log data (Scharkow, 2016). Male respondents are more likely to overestimate media use (Boase & Ling, 2013; Scharkow, 2016; Wonneberger & Irazoqui, 2017) and TV news exposure in specific (Prior, 2009b), while females tend to under-report (e.g., phone calls, Vanden Abeele, Beullens, & Roe, 2013). In many cases, correlations between socio-demographic factors and self-report biases are related to issues of social desirability (Holbrook & Krosnick, 2010; Price & Zaller, 1993; Prior, 2012;

Waismel-Manor & Sarid, 2011). For example, recipients with higher income and education tend to over-report news (Barthel et al., 2020; Prior, 2009b) and under-report general TV use (Araujo et al., 2017).

RQ 5: Do respondents' gender, age, and education influence discrepancies between self-reports on news use in retrospect compared to aggregated in situ reports?

Study Context

Israel—a parliamentary democracy characterized by the prolonged Israeli-Arab conflict and social tensions between its various political, religious, and social-demographic groups—is known as a diverse yet concentrated media market characterized by high levels of news consumption. At the time of data collection, television remained the dominant medium for news consumption, with 76% of respondents reporting regular viewership. Online news consumption followed at 68%, while social media platforms were used by 46% of the population for news-related content (Limor, Tiargan-Orr, & Moshe, 2021, p. 90).

While the market offers diverse options for political information, the television market is nonetheless concentrated (Schejter & Yemini, 2015). High levels of market concentration were also observed for online platforms, with a large majority of audiences getting their online news through the websites or apps of TV news providers (such as Channel 12's N12 platform; see Bein-Lubovitch, 2021). Online news outlets were the most popular means of daytime news consumption. Interestingly, at the time of the study, 90% of the TV news audience reported watching the 20:00 main news addition, mostly through live linear television (ICE, 2022). These characteristics—particularly the variance in modes of consumption over the day—make Israel ideal for the present in situ study.

Methods

The study compared two methods of self-report: (1) Between August 1 and August 4, 2021, we conducted an experience sampling study over four days to measure news exposure repeatedly in situ. (2) On the fifth day (August 5, 2021), we conducted a retrospective news exposure survey in which the participants were asked about their retrospective exposure to the news over the past four days.

In the in situ surveys as well as in the retrospective survey, we asked respondents to report on their (in situ or past) exposure to audio-visual news broadcasts on (1) television, (2) websites/applications, and (3) social media. The study was approved by the institutional ethics committee, the Faculty of Social Sciences, University of Haifa, approval number 234/21.

Sample

Since the news programs examined in the study were in Hebrew, the sample represents the adult Jewish population. We only included participants (18+ years old) who stated having at least one home television device. The questionnaire was disseminated to participants by an online panel survey company, Panel4all, using Qualtrics. Panel4all is an experienced Israeli company that maintains a large and diverse panel of Israeli participants. Participants received invitations to complete the surveys in exchange for financial

incentives (shopping vouchers). Panel4all emailed 29,578 panelists and sent reminders. 6,396 people agreed to participate in the study. Only participants who responded to all ten in situ surveys of a day were permitted to answer the in situ surveys on the subsequent days and the retrospective survey. The analyses were carried out on 1,414 participants who completed the entire process (i.e., responded to the in situ surveys on all 4 days of the experience sampling study and the retrospective survey on the fifth day). 1,527 participants completed the in situ surveys on all four days. In total, 105 participants answered all in situ surveys but did not respond to the retrospective survey, and 2,594 participants answered the retrospective survey (but not necessarily the in situ surveys).

Of the 1,414 respondents, 30.3% were male, and the others were female. The average age was 40.08 years (standard deviation, SD = 13.36). Regarding education, 23.1% of the sample reported having primary or secondary education, 19.1% post-secondary education, 38.9% bachelor's degree, and 18.9% master's degree (we dichotomized the variable for the statistical analyses: 42.2% no college degree; 57.8% academic degree). In terms of religious identity, 62.8% of the sample identified as secular, 24.2% as traditional, 11.8% as religious, and 1.2% as Ultra-Orthodox. This relatively low percentage of Ultra-Orthodox Jews is because only a few people in this community own a television set. (According to the Israel Democracy Institute data, in 2022, the Israeli Jewish population identified as 44% secular, 22% non-religious traditional, 11% traditional religious, 10% national religious, 2% national-Ultra-Orthodox, and 11% Ultra-Orthodox.) While comparisons to census data are not possible (as the Central Bureau of Statistics data do not include data on households owning a TV set), the final sample is composed of slightly (yet non significantly) more females and educated people compared to the Jewish Israeli population. However, secular people are slightly and significantly overrepresented by about 7% in the final sample (see Online Supplementary Material, Table "Sample Characteristics at Different Stages of Research" on OSF for details: https://osf.io/rjvq2/?view_only=14946edc40cb4c15a631b1d401caa5b8). In sum, the demanding nature of the study reduced the sample size, but its demographic composition did not dramatically change during the course of the study.

Experience Sampling Study

Procedure

Participants were prompted with ten daily in situ surveys over four weekdays from Sunday to Wednesday at fixed hours: twice in the morning, four times in the afternoon, and four times in the evening. The surveys were prompted via SMS immediately after the news broadcast at fixed times (09:00, 10:00, 15:00, 16:00, 17:00, 18:00, 19:00, 20:00, 21:00, 22:00). The participants were allowed to answer within one hour after being prompted; afterwards, the survey was no longer accessible.

Measures

First, the participants were asked whether they were currently watching a news broadcast (currently watching; not watching; that is, audio-visual content from TV also live broadcast on websites and apps). They were instructed to consider news editions on channels such as Keshet 12, Reshet 13, Channel 11 (KAN 11), Channel 20, Ynet, Walla News, and N12.

Table 1. Comparison of Retrospective Values and Aggregated In Situ Values

Measures	Retrospective value (1)	Aggregated in situ value (2)	Difference between retro. and aggr. in situ (3)	% of respondents with difference = 0 (3a)	% of respondents with difference > 0 (3b)	Correlation between retro. and aggr. in situ (4)
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>			<i>r</i>
Number of days watched news on TV (<i>n</i> = 1,411)	3.30 (1.06)	3.48 (1.11)	-0.18*** (1.08)	61.4	12.1	.507***
Number of days watched news on website (<i>n</i> = 1,409)	1.76 (1.63)	1.72 (1.59)	0.05 (1.29)	52.0	24.8	.680***
Number of days watched news on social media (<i>n</i> = 1,411)	1.30 (1.52)	0.63 (1.11)	0.67*** (1.28)	55.0	38.3	.567***

Note. Significant differences and correlations are printed bold. * $p < .05$, ** $p < .01$, *** $p < .001$.

(1) and (2) Scale: 0 to 4 days.

(3) Scale: -4: full under-reporting in retrospect; 0: no difference between retrospective and aggregated in situ reports; 4: full over-reporting in retrospect.

Second, they were asked on which platform they were currently viewing the news edition (television, internet websites, or applications such as N12; social media such as Facebook or YouTube).

Retrospective Survey

Procedure

On the fifth day, we administered a retrospective survey.

Measures

The retrospective survey included a set of questions about exposure to news editions broadcast between 9:00 and 22:00 over different platforms over the past four days, that is the days of the experience sampling study, asking: “How many days between Sunday to Wednesday, did you watch one of the news broadcasts aired on TV?” “...video(s) from the news broadcast through websites or applications such as N12?” “...video(s) from the news broadcast via social networks such as Facebook or YouTube?” (did not watch at all/watched one day/ watched two days/watched three days/watched all four days).

Additionally, the respondents answered demographic questions on their gender (male/female/other), age, education (primary, secondary, post-secondary, bachelor's degree, master's degree, or higher education), and religious identity (secular, traditional, religious, and Ultra-Orthodox).

Data Transformations

All data and SPSS code used in this study are publicly available here: https://osf.io/rjvq2/?view_only=14946edc40cb4c15a631b1d401caa5b8.

News Exposure Measures

To address our research questions, we calculated several measures (compare Naab et al., 2019):

(1) Retrospective values: Using the retrospective survey data, we computed on how many days, between Sunday and Wednesday, each participant had watched the news

at least once on television, websites/applications, and via social media platforms (resulting in variables ranging from 0 = no exposure on this platform at all to 4 = exposure to news on this platform on all four days). Means and standard deviations over all participants can be seen in Table 1.

(2) Aggregated in situ values: Using the in situ survey data, we computed for each participant on how many days, between Sunday and Wednesday, they had watched the news at least once on television, websites/applications, and via social media platforms (as in the retrospective data, the variables range from 0 to 4). For this purpose, we first created three separate variables indicating whether or not participants reported to have watched the news on television, websites/apps, and via social media platforms in each in situ survey. Second, we aggregated for each day, whether or not each participant had watched the news on each platform at least once on that day. Third, we aggregated the data across all four days for each participant on each platform indicating on how many days, between Sunday and Wednesday, each participant had watched the news at least once on television, websites/applications, and via social media platforms (resulting in variables ranging from 0 = no exposure on this platform at all to 4 = exposure to news on this platform on all four days). Means and standard deviations over all participants can be seen in Table 1.

(3) Difference: For each participant, we calculated the difference between each individual's retrospective value and their aggregated in situ value (retrospective minus in situ). The variable ranges from -4 to +4. Negative values indicate under-reporting in the retrospective survey compared to the aggregated in situ report, and positive values indicate over-reporting. A value of 0 indicates no difference between retrospective reporting and aggregated in situ reporting. This variable was constructed separately for each platform.

(3a) Share of congruent estimates: When the overall average difference is positive, this does not imply that all respondents estimate their exposure higher in retrospect compared to their

Table 2. Multiple Linear Regression Models Explaining the Gap Between Retrospective Values and Aggregated In Situ Values of News Exposure on TV, Websites/Apps, and on Social Media

	Gap for news on TV ¹ ß	Gap for news on websites, and apps ¹ ß	Gap for news on social media ¹ ß
Age	0.043	-0.052	-0.129***
Gender (0 = male, 1 = female)	0.008	-0.023	0.003
Education (0 = no college degree; 1 = degree)	0.009	-0.025	0.101**
Habitual morning news use	0.130***	0.054	0.079*
Habitual afternoon news use	0.295***	0.080	0.103*
Habitual night news use	0.236***	0.059	0.027
Amount of TV news use	-0.531***		
Amount of website news use		-0.309***	
Amount of social media news use			-0.205***
N	956	954	956
R ² /corr. R ²	0.147/0.141	0.085/0.078	0.072/0.065

Note. Table entries are standardized regression coefficients. Significant coefficients are printed bold. * $p < .05$, ** $p < .01$, *** $p < .001$.

¹Scale: -4: full under-reporting in retrospect; 0: no difference between retrospective and aggregated in situ reports; 4: full over-reporting in retrospect.

aggregated in situ statement. To account for unequal distributions, we calculated the percentage of participants who have a difference of 0 (i.e., who's retrospective and aggregated in situ estimates are equal).

(3b) Share of retrospective over-reporting: Additionally, we computed the percentage of participants with a positive difference on the individual level (i.e., who estimated higher values in retrospect than in situ, i.e., with retrospective over-reporting).

(4) Correlation: We calculated the association between retrospective and aggregated in situ values.

Measures of Determinants

Habitual morning/afternoon/night news use

As an indicator of habitual news usage during certain times of the day, we calculated each participant's probability of using the news during the (1) morning, (2) afternoon, and (3) night hours. To that aim, we used each participant's validly filled in situ surveys that were prompted (1) in the morning (9:00, 10:00, max. 8 in situ surveys per participant), (2) in the afternoon (15:00, 16:00, 17:00, 18:00, max. 16), and (3) during night times (19:00, 20:00, 21:00, 22:00, max. 16). For each participant, we calculated the number of in situ surveys in which they reported to have watched the news. The measures range from 0 = the respondent never watched the news in the morning/afternoon/night in situ surveys to 1 = the respondent watched news during all morning/afternoon/night occasions. A value of 1, thus, indicates habitual news use during the respective time of the day with a high predictability of usage from time of the day. On average across all participants, habitual morning news is less likely ($M = 19.53$; $SD = 29.75$) than habitual afternoon news use ($M = 26.18$; $SD = 29.96$) and habitual night use ($M = 37.19$; $SD = 31.88$). The descriptives can also be read that, on average, participants used the news in 19.53% of the morning surveys, 26.18% of the afternoon surveys, and 37.19% of the night surveys. The standard deviations indicate strong variability in the respondents' habitual predictability of news use.

Amount of platform news use

As an indicator of heavy platform news exposure, we calculated the amount of validly filled in situ surveys (max. 40) in which a participant reported to have watched the news on (1) television, (2) website/applications, and (3) social media. The measures range from 0 = the respondent never watched the news on television/websites/social media to 1 = the respondent watched the news on television/websites/social media during all occasions. On average, participants used the news on television in 19.6% of the in situ surveys (descriptive statistics of the computed measure: $M = 19.60$; $SD = 23.43$), on websites/application in 7.28% of the surveys ($M = 7.28$; $SD = 14.16$), and on social media in 2.42% of the surveys ($M = 2.42$; $SD = 7.68$).

Results

In the in situ self-reports as well as the retrospective survey, participants reported on average that they have watched audio-visual news broadcasts on TV at least once on more than three out of four days. They reported website/app news broadcast exposure for a little less than two days and social media news broadcast exposure for around one day out of four on average (Table 1). Participants' retrospective self-reports of how many days they have watched the news at least once correlated moderately and significantly with the aggregated in situ reports of watching the news during these days. However, the absolute values from both methods differed. For watching the news on television, people significantly under-reported exposure in retrospect. For watching the news on social media, people significantly over-reported in retrospect. The measures did not differ significantly for exposure to news broadcasts on websites and on apps.

To examine which factors explain the gap between the two methods, we conducted three multiple linear regressions (for news use on TV, websites/apps, and social media separately; Table 2). Age, gender, education, likelihood of news broadcast use during morning, afternoon, and night hours (as an indicator of temporal news use habits) as well as the amount

of news use on the respective platform (TV, websites/apps, and social media) served as independent variables. Depending on the platform, the models explained between 6.5% and 14.1% of the variances in the gaps between retrospective and aggregated in situ reports. Thus, for all three platforms, socio-demographics, temporal news use habits, and amount of platform news usage explained a relevant part of the measurement discrepancies between the two self-report approaches.

The more often participants watched the news broadcasts (i.e., in more of the 40 in situ surveys), the more they tended to under-report exposure in retrospect compared to aggregated in situ values. This was the case for heavy TV, websites, as well as social media use. The more habitually participants watched news during specific times of the day (i.e., in more of the morning/afternoon/night in situ surveys), the more they over-reported TV news exposure in retrospect compared to aggregated in situ values. Similarly, participants who were highly likely to consume the news in the morning and afternoon hours also tended to over-report social media news exposure in retrospect. Watching the news on certain times of the day did not affect over- or under-reporting of exposure to news on websites.

Socio-demographic factors did not determine the differences between measures of news broadcast watching on TV or websites/apps. However, older respondents tended to under-report watching news broadcasts on social media in retrospect compared to younger participants. Additionally, users with college degrees tended to over-report social media news use in retrospect compared to users without degrees.

Discussion

We compared the number of days participants watched news broadcasts according to an ESM study to the number of days reported in a retrospective self-report survey by the same participants. Both measures correlate moderately for news broadcast watching on TV, websites/apps as well as social media. Such shared variance of measures derived with different self-report methods can conciliate scholars who are less interested in determining the absolute levels of news exposure rather than correlational patterns of news exposure with other variables. However, three findings give reason for concern: First, the correlations are only medium-sized, which means that correlational studies can still lead to different results depending on the method of self-report. Second, scholars interested in absolute levels of news exposure are confronted with significantly different results contingent on the method. Although we outlined some arguments that favor repeated in situ over retrospective measures, we cannot claim one approach to be the gold standard, particularly since ESMs come with challenges in person and situation sample biases (Myin-Germeys & Kuppens, 2022; Rintala et al., 2019; Vachon et al., 2019), require high effort from the participants, and are still susceptible to social desirability biases (Myin-Germeys & Kuppens, 2022, S. 89). Thus, depending on the specific research interest and population, researchers might weigh the benefits and demands of retrospective and repeated in situ self-reports differently and prefer retrospective measures for the sake of a broader person sample. Third, there is no general pattern of discrepancies. While participants report less news broadcast exposure on TV in retrospect than they report in situ, they also report more exposure on social media in retrospect than they report in situ. This

indicates that, depending on the platform, respondents have different challenges going through the process of answering the survey questions (Prior, 2009b; Schwarz & Oyserman, 2001; Tourangeau et al., 2000). The findings suggest that the ephemerality and ubiquitous high frequency of social media use leaves users with a strong impression of frequent usage in retrospect that exceeds the in situ responses. Naab et al. (2019) have shown this pattern for several social media use behaviors. However, the current study is the first that compares the measurement discrepancies for different platforms, which points out that such over-reporting is a phenomenon of social media use rather than of other platforms. At the same time, we controlled for the consumed genre, that is, audio-visual news broadcasts. This excludes the possibility that differences between platforms are due to different content used on the platforms. However, it also comprises a particular challenge for the estimation of social media news exposure: News-related content on social media is very diverse, including the standard audio-visual television news editions as well as a range of other journalistic and non-journalistic news content. Respondents thus probably have difficulties differentiating exposure to audio-visual news editions from further news content and thus over-report in retrospect.

Given the varying patterns across the three media platforms, the results of the regression analyses are particularly informing: In line with previous research, the amount of news use significantly predicts the gaps between retrospective and aggregated in situ self-reports. Heavier news watching leads to under-reporting in retrospect compared to aggregated in situ reports. While we can only speculate about the reasons for such retrospective under-reporting, it seems plausible that this indicates a ceiling effect (Chyung et al., 2020). The exposure measures consider if a participant states has watched news broadcasts at least once a day. Therefore, for heavy users, it is practically difficult to over-report, because they only need to remember having watched once per day. Light users, on the contrary, can more easily over-report. At the same time, social desirability seems less plausible since this should lead to over-reporting rather than under-reporting in retrospect. This increases the awareness that the diverse findings on the discrepancies between methods in previous literature are contingent on the specific frequency operationalization (here: exposure at least once a day). Furthermore, the effect of heavy usage is independent of the media platform.

Temporal usage habits further explain discrepancies between retrospective and aggregated in situ values. A high likelihood of watching during specific daytimes signals habitual use, which is more predictable, yet less conscious, and less controllable for the individual. While stable usage patterns generally could establish reliable self-reports (Schwarz & Oyserman, 2001; Wonneberger & Irazoqui, 2017), previous literature has also pointed out that people are more likely to forget to report exceptions to their habitual usage when asked in retrospect (Parry et al., 2021). This can explain the found pattern of increased reporting in retrospect—even if, on one day or another, the participant has missed the TV or social media news. We did not find an influence of habitual nighttime news use on over-reporting news watching on social media in retrospect. Probably, nighttime news users consume entertainment content and (incidentally) take in news. Thus, over-reporting is less likely. Interestingly, watching the news broadcasts on certain times of the day does not affect over- or under-reporting of exposure to news on websites or using

apps. This might be because the gap between retrospective and aggregated in situ self-reports is small for websites/apps news use.

Generally, the considered factors explain a greater proportion of the variance in the discrepancy of TV news exposure (14.1%) than in the discrepancies of social media (6.5%) and website news exposure (7.8%). This might be due to the fact that TV news broadcasts have a fixed schedule and thus lend themselves more to habitual usage with fixed time cues. Additionally, the respondents generally prefer TV news use over other platforms.

Socio-demographic factors only determine discrepancies between the measures of social media news exposure. Previous studies have already pointed to the fact that elderly prefer traditional media for news (Pew Research Center, 2023). The data at hand suggest that while elderly watch news broadcasts on social media (as shown by their in situ reports), they report it less in retrospective surveys. The reason might be that elderly ascribe less value to social media news, focus more on the more established journalistic outlets instead of intermediary distributors, or perceive social media news as less socially desirable and refrain from reporting it. They might also confuse exposure to audio-visual news editions on social media with exposure on television and thus under-report social media exposure. However, under-reporting of social media in retrospect by elderly does not necessarily come from a wrongful attribution of TV exposure but could also mean that they used some other (news or non-news) content on social media and report having used audio-visual news editions on social media. Alternatively, they might not remember incidental exposure in retrospect while they report it in situ (Southwell, 2008). People with an academic education tend to over-report news use in social media. This corroborates findings from previous research (Barthel et al., 2020). Probably, they subscribe to more social media news channels. However, incidentally seeing posts about broadcast editions might lead to the impression that they used the news in retrospect, while it is not reported in situ because they did not actually watch the broadcast edition (Kümpel, 2020; Strauß, Huber, & Gil De Zúñiga, 2020). These socio-demographic effects have important consequences for studies that compare news use across age and education levels. In such studies, results can vary with the measurement approach. Compared to experience sampling studies, traditional retrospective surveys strengthen the often-stated assumption that younger and more educated people use social media news more.

Our findings are limited in several respects: We investigated exposure to audio-visual news broadcasts. Thus, we focused on clearly defined content and excluded other forms of news with more or less journalistic origin, variable presentation formats, and content. This should have helped the respondents to assess their usage. It also allowed for a more straightforward comparison of different platforms, which also offer further news formats which might differ in their demands for self-reports (e.g., self-reports on reading social media news headlines in feeds might be more error-prone than self-reports on watching news broadcasts). However, this focus also limits the external validity of the results, and we can only speculate whether the present findings also hold for exposure to text or audio news and to news from less well-known journalistic sources. In addition, we examined over- or under-reporting in retrospect, such phrasing is more aimed at simple language rather than suggesting definitive proof that the aggregated in situ values are correct, while the retrospective values would contain measurement errors.

Since all methods contain measurement errors, it is impossible to create a definitive benchmark. Future studies can add information on exposure to new broadcasts from additional sources like observational methods.

The study did not consider variability in the situational circumstances of news use (Schnauber-Stockmann et al., 2023, *in press*). For example, situational factors like spatial and social contexts can explain attention to news content and thus influence discrepancies in retrospective and in situ self-reports of this behavior. Furthermore, we cannot exclude the possibility that situational circumstances might have distorted the participants' compliance to the study and that certain news use situations are not covered by the situation sample (e.g., news use during working hours might be underrepresented in the situation sample because these situations hinder filling the survey).

The work is among the very few experience sampling studies that use an online panel provider to access a representative quota sample with random sampling. Still, the Israeli case of news exposure might not be typical for other nations. Additionally, we excluded participants from the analyses who did not complete all in situ surveys to strengthen the quality of the situation sample. This points to a general challenge of experience sampling studies: The high demands placed on participants make it necessary to balance expectations of the quality of the person vs. the situation sample. In particular, studies concerned with generalizability of results to various, hard-to-reach socio-demographic groups might want to loosen their requirements for full completion of all in situ surveys. However, in the current study, the bias is limited: While recruitment to the study resulted in a sample that tilted somewhat towards educated and secular females, dropouts during the study were not related to age, gender, or education. Future research will have to examine the personal and contextual factors determining the completion of demanding repeated in situ measures.

Even with the technological advancements in automatic tracking of media use, surveys are still the most popular means by which public opinion scholars measure media exposure and will likely continue to be. Understanding how people respond to surveys and the underlying reasons behind survey biases is a very long journey. The current exploration takes us a few steps further by exploring the factors explaining the discrepancies between self-report methods. Our ability to understand survey responses and response biases is improved when we understand that different methods yield incompatible results for different respondents, among them heavy news consumers, older respondents, and those watching more daytime news.

Conflict of interest

The authors have no conflicts of interest to declare.

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Data availability

All data, SPSS code, and online supplementary material used in this study are publicly available here: https://osf.io/rjqv2/?view_only=14946edc40cb4c15a631b1d401caa5b8.

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Biographical Notes

Danit Shalev is a postdoctoral researcher at the Department of Communication, University of Haifa. Her dissertation research attempted to understand and improve self-reporting of news media exposure.

Teresa K. Naab is a full professor at the University of Mannheim. Her research interests include audience and reception studies of digital communication, media effects, and methods of social sciences.

Yariv Tsfati is a professor at the Department of Communication, University of Haifa. His research interests include audience perceptions of media, political communication, and media effects.

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