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Article

The influence of purpose-of-use on information overload in online social networking

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SUMMARY

In recent years, information consumption has accelerated as novel social media networking platforms continue to increasingly permeate daily life. Though these means of communication have been incredibly beneficial in terms of addressing accessibility to information, news, and long-distance social connectivity, they have also brought with them multiple other problems. One such drawback is the risk of increased sensory and information overload. Although previous literature has found evidence of a link between social media use and overload, there is little work exploring the intention-related dimensions of social media use and their relationship with experiences of overload. In this work, we administered a short survey to investigate whether different participant purposes for using social media were related to social media fatigue and/or overload. Using various linear models, we examined whether our hypothesized demographic including age range and/or predictor variables such as purpose of using social media could significantly predict experiences of overload online. Our results surprisingly suggest that certain dimensions of social media assumed to be predictors of overload-like experiences, such as the amount of screen time on social media, may not be related to overload-like experiences. We found that purpose of use does not predict the frequency of reported overload-like experiences. The implications of our work for the broader understanding of information overload is discussed and future directions of research are offered.

INTRODUCTION

In the past decade, social media has become a ubiquitous space and arena for human social interaction. According to a study conducted by the Pew Research Center, 65% of adults now use social networking sites, a considerable increase in the past decade (1). With the increasing pervasiveness of digital social networking, the question of whether this increase in presence has resulted in positive or negative consequences has been of great interest to the scientific community. One recent paper argues that social media has led to positive changes including connectivity, education, community building, advertising, and information dissemination (2). Conversely, several negative consequences have been documented in connection to social media, namely cyber-harassing, and mental health concerns (2).

Another notable consequence of social media use is the increased likelihood of experiencing the phenomenon of information overload (3). Both sensory and information overload are experiences elicited when the brain encounters more information than it is capable of compartmentalizing, organizing, or processing in general. The two terms are often used interchangeably because of the similar impacts they have on those who experience them. Some, but not all, of these impacts include shutting down (i.e., refusing to talk or interact with other people) and feeling anxious, depressed, or over-excited (4). Although it may be difficult to conceptually disentangle, sensory overload generally refers to a subjective feeling of distress during an excess of physical sensory stimulation, regardless of the meaning of the stimuli. This could include lights that are too bright or sounds that are too loud where the overstimulation can be attributed to the physical attributes of the stimuli. Information overload more-so refers to an excess in how much symbolic or meaningful information is being processed. The more complex the meaning of experienced stimuli or events, the higher the likelihood of information overload regardless of how physically overloading the stimuli are. Some examples of this include the complexity of a message, how disorganized information is, the frequency of exposure to information, etc. (5). Although both sensory and information overload can be tied to social media experiences, information overload is especially implicated.

A detailed historical framework for overload-like experiences is challenging to construct. Very few rigorous studies have been conducted that characterize information overload. Despite this, psychologists have theorized for centuries that the brain has a limited capacity with which to store information. In 1755, for instance, the French philosopher Denis Diderot wrote about information overload (though the term was not coined at the time). As long as time continues to unfold and progress, Diderot remarks, the number of books and primary sources will continue to perpetually increase, rendering keeping up with the unfathomable amount of information around us an insurmountable task. The term ‘overload’ did not come about until the 1970s, however, when it was popularized by writer Alvin Toffler. One of the earliest known papers to use the term was written by Polish psychiatrist Zbigniew J. Lipowski in 1975, who noted that overstimulation, or overload, may result from the excess and

other attributes of both symbolic and physical stimuli (4).

One definition of overload describes it as a response to the overstimulation of one of our sensory modalities. Sensory overload can cause many people to effectively "shut down" when it happens. They may avoid interaction with others, become irritable, or attempt to close their eyes and ears to shut out sounds and visuals. Papers that discuss this condition observe that "[overload] describes the difficulty a person can have understood an issue and making decisions in the presence of too much information" (7). Similarly, information overload has been defined as "the overburdening stream of information… the feeling that one's reactions are permanently observed as well as demanded may lead to what scholars have described as an 'information overload'" (8).

Previous work has attempted to establish a link between dimensions of information system use and experiences of overload outcomes. Measures such as use-discontinuance have been used as representative indicators of overload in that they suggest avoidance behavior from people in reaction to overwhelming amounts of stimulation (17). A recent paper proposed a stressor-strain-outcome model of overload and argued that obtaining a clearer understanding of what overload is necessitates a deconstruction of the ontology of the term itself (10). As has been discussed, theoretically one distinction between types of resource demands includes sensory and symbolic information demands. Furthermore, the previously mentioned paper proposed that distinct types of overload are relevant to the social-media environment. Namely, they suggest that stressors in the form of having to constantly adapt to changing interfaces, stressors in the form of an increase sense of responsibility to social standing and support online, stressors in the form of both intrusive irrelevant content and increasing amounts of tangentially relevant content, all contribute to unique overload experiences online (10).

Although some recent studies have begun to probe how diverse types of processing demands contribute to overload in diverse ways, little work has focused on how the reason each individual expresses for using social media may affect experiences of overload. While most work has focused on aspects of the information milieu itself, little work has probed the relationship between different personal reasons for using social media, different personal reasons for using specific media platforms, and the relationship between purpose of use with other investigated predictors of social media overload such as duration of use or system-feature processing exhaustion (9).

Studies like the one conducted by Mardikyan and colleagues have found evidence that there are vast individual differences in behavioral intention, or purpose-of-use when it comes to social media behavior (9). These purposes tend to vary by perceived unique platform-features such as Twitter, Facebook, and Tumblr (11). For instance, Whiting *et al.* examined the link between big five personality dimensions and self-reported reasons for using a social media platform (12). Individuals differed in their need for cognitive closure, sociability, etc. which all factored into their intended behavior online. While this work is useful in highlighting individual factors that play a role in social media use and behavior, it extrapolates that personality factors are an indication of the latent variable purpose-of-use. Moreover, little is known about how purpose-of-use is related to consequent experiences of social media overload. Provided the vast diversity in reported purposes of using social media and the contradictory evidence suggesting that social media can have both positive or negative outcomes, it is important to explore the relationship between intention or purpose-of-use on reported outcomes from social media behavior (13). The framework of overload offers a unique way to explore concomitant relationships between these antecedents and consequences of social media use. Our study had two primary aims: first, to replicate prior findings on social media use and overload experiences, and secondly to investigate the role of purpose-of-use in the frequency of self-reported overload experiences. Furthermore, we asked participants to briefly describe how their experience online has changed in the past year, offering insight towards how the pandemic has altered personal relationships between consumers and information systems.

We hypothesized that participants who reported purpose-of-use related to news or information consumption for the purpose of cognitive closure would display significantly increased frequency of overload experiences from participants who use social media to reconnect with friends or to consume entertainment-related content. Finally, we hypothesized that the frequency of overload-like experiences may have increased in the past year because of isolation, more time online, and general stress from isolation or other kinds of circumstantial stressors, such as increased isolation, experienced during the COVID-19 pandemic following the general framework of stressor-strain-outcome model. According to our results, we find that there is no significant relationship between purpose-of-use and the frequency at which individuals experience overload.

RESULTS

Three linear regressions were fit to various models analyzing the relationship between predictor and outcome variables of interest. Before testing the linear models of interest, the correlation between certain participant responses were computed to double-check the extent to which participant responses were reliable. The correlation between true amount of time of use of social media as reported by participants' phones and the participants' estimated of amount of time was statistically significant ($r(25) = 0.70$, $p < 0.001$). This suggests that participants have at least a roughly reliable internal estimate of their behavior online.

We first calculated the correlation between personal beliefs of the importance of social media and reported the average amount of time in hours used per day as reported by

Predictor	Sum of Squares	*df*	Mean Square	*F*	*p*	partial η^2	partial η^2 90% CI [LL, UL]
Importance of Use	0.09	1	0.09	0.24	0.627	0.01	[0.00, 0.14]
Daily Amount	0.70	1	0.70	1.78	0.194	0.07	[0.00, 0.26]
Error	9.38	24	0.39				

Table 1: Predicting frequency of overload from beliefs on the personal importance of social media use and average daily duration of social media use. LL and UL represent the lower limit and upper limit of the partial η^2 confidence interval, respectively. Daily average amount of social media use is the reported amount by their phones and was recorded in hourly intervals.

smartphone logs. The importance of social media use was measured as a continuous variable with a possible response range of 1-0. The length of use recorded was a categorical variable that we split up into possible ranges of use: 1 hour or less, 2-4 hours, 4-6 hours, 6-8 hours, 8-10 hours, and 10 or more hours. Our inferential test results suggest that there was a significant and positive correlation between the reported amount of importance ascribed to social media and the reported average daily length of time spent on social media ($r(25)$ = 0.38, p = 0.048). This suggests two possible ideas: there could be co-linearity between these two predictor variables which could be resolved by conducting a partial least squares regression. Conversely, this could also indicate that the two variables are valid in that they are expected to be related to each other and predict one another.

The first tested multivariate linear regression probed this possibility further by investigating whether frequency of overload was significantly predicted by importance of use or by average length of time use per day. The results did not replicate previous findings in the literature in that there was no significant relationship between either predictor and frequency of overload for both average length of use ($t(23)$ = 0.49, p = 0.627) as well as for importance of use ($t(23)$ = -1.34, p = 0.194) **(Table 1)**. For a plotted linear regression between frequency of overload and reported views on the importance of social media, please see **Figure 1**. For an illustration of the relationship between reported screen time and overload, please see **Figure 2**. The lack of a significant relationship between these predictor variables and the reported frequency of overload suggests that neither screen time nor personal views on the importance of social media account for the frequency of overload experiences.

The second linear model investigated our main point of interest: the relationship between the primary purpose for using social media and the frequency of experienced overload after using social media. More specifically, a simple linear regression predicting numerical values that represent the categorical frequency of experiences of overload from the categorical primary reported reason for using social media. The question of primary purpose was framed in an overarching manner. Participants were asked the question: *"What is the primary reason that you use social media?"* And were provided with multiple categorical options including: *"To keep in touch with family and friends [1], To find funny or entertaining content [2], To keep up with your favorite artists, musicians, celebrities, or other cultural icons [3], To keep up with and/or discuss current news events [4]"*. The second linear model investigated our main point of interest: the relationship between the primary purpose for using social media and the frequency of experienced overload after using social media.

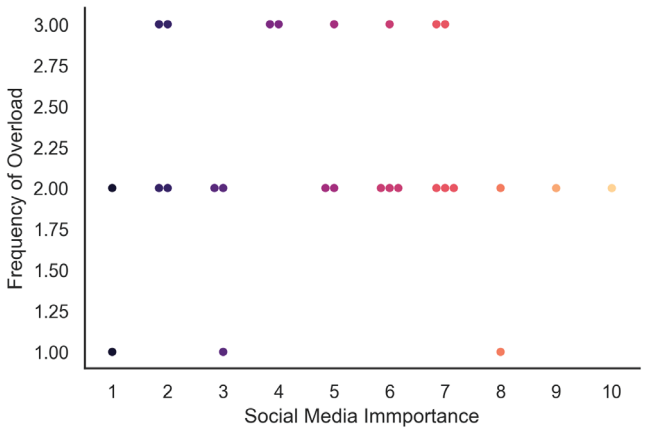

Figure 1: Frequency of overload associated with social media importance. We found little to no relationship between how important social media is to a participant and the frequency of overload.

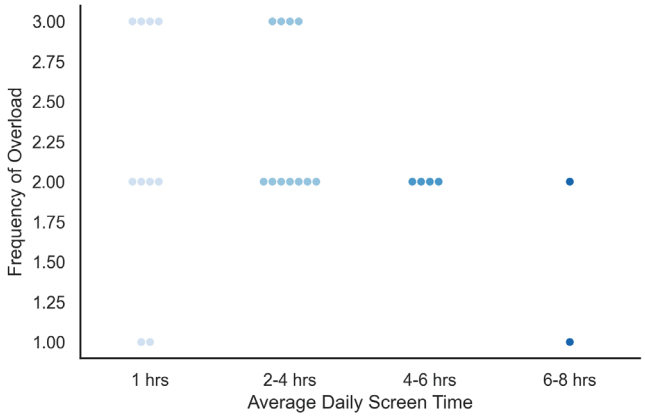

Figure 2: Frequency of overload associated with average daily screen time. The relationship between average screen time as reported by participant phone logs and the frequency of overload showed a stronger relationship but was not statistically significant.

Predictor	Sum of Squares	*df*	Mean Square	*F*	*p*	partial η^2	partial η^2 90% CI [LL, UL]
Primary Reasons	0.19	1	0.19	0.49	0.490	0.02	[0.00, 0.17]
Error	9.88	25	0.40				

Table 2: Predicting frequency of overload from the reported primary reason for using social media. 'Primary Reasons' represents a multicategorical variable with four dimensions indicating various domains of common reasons for using social media previously indicated by social media use literature. LL and UL represent the lower-limit and upper-limit of the partial η^2 confidence interval (CI), respectively.

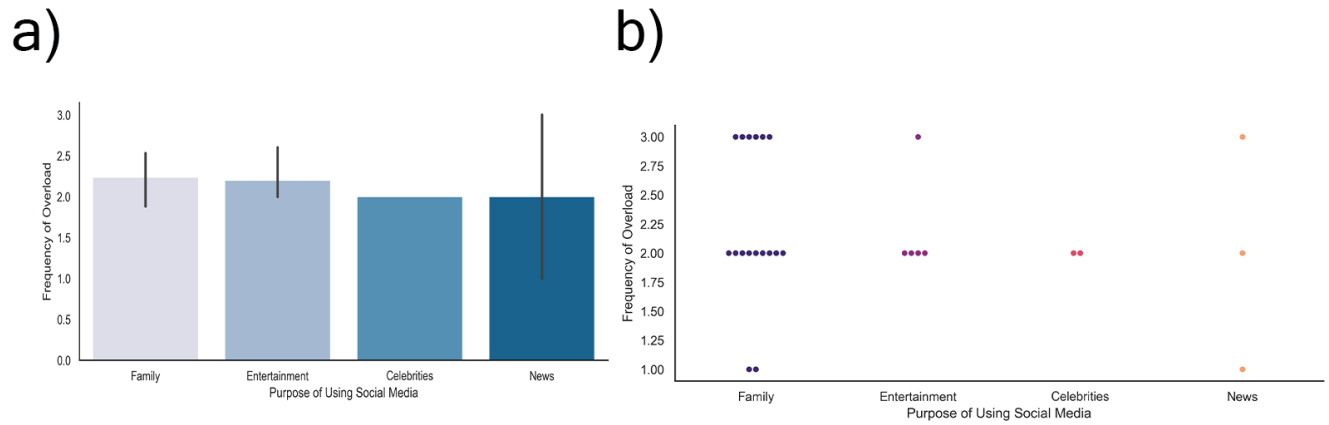

Figure 3: Frequency of overload associated with purpose of using social media. This figure is an illustration of the predictor variable purpose of using social media and its relationship with the outcome variable *frequency of overload*. A response of 1 corresponds to 'connecting with family' as the main purpose, 2 corresponds to 'entertainment', 3 corresponds to 'keeping up with celebrities' and 4 corresponds to 'keeping up with the news'. On the left, the mean frequency of overload is reported for every purpose of use. Error bars represent the standard deviation in each primary purpose category. There was the lack of significant differences between each purpose category and the frequency of overload (left). As mentioned in our results section, an unequal distribution of responses may have contributed to the lack of effect (right).

More specifically, a simple linear regression predicting numerical values that represent the categorical frequency of experiences of overload from the categorical primary reported reason for using social media. The results of the simple linear regression suggest that there is not a significant relationship between primary purpose and reported categorical frequency of experienced overload ($t(23)$ = -0.761, p = 0.490) **(Table 2)**. For the average frequency of overload per selected primary purpose of use and for individual participant frequency of overload scores per selected primary purpose of use, please see **Figure 3**.

In addition to their primary purpose for using social media, participants were asked whether the primary purpose of use varied with the platform of interest (Facebook, Instagram, etc.) in a simple yes/no categorical item. A multivariate regression predicting frequency of overload from participant responses on whether purposes varied by platform was conducted. The results suggest that there is no statistically significant relationship between whether participants used platforms for different reasons and the frequency of overload experiences, ($t(23)$ = -1.41, p = 0.17) **(Table 3)**. For the individual participant data on frequency of overload as associated with the predictors of the mentioned multivariate regression, please see **Figure 4**.

Another relationship that we investigated was that between changes in the past year in terms of social media behavior and the frequency of overload experiences. Because social media behavior changes in the past year was inquired as a simple categorical yes/no question and the frequency of overload was also inquired as a categorical variable, a Spearman's rank correlation was calculated between whether reasons for using social media in the past year had changed and whether the amount of time spent on social media had changed in the past year. The results of the correlation test indicate that there is a significant relationship between the two variables ($r(25)$ = 0.92, p <0.001). We then conducted a final multivariate regression analysis predicting the reported frequency of overload experiences by factoring whether participants reported their primary reasons for using social media changing in the past year as well as if they reported the amount of average daily use had changed in the past year. A significant relationship between reasons for using social media and frequency of reported overload was found ($t(24)$ = 2.09, p = 0.047) and a no significant relationship

Predictor	Sum of Squares	*df*	Mean Square	*F*	*p*	partial η^2	partial η^2 90% CI [LL, UL]
Reasons Changed	1.55	1	1.55	4.37	0.047	0.15	[0.00, 0.36]
Amount Changed	1.12	1	1.12	3.18	0.087	0.12	[0.00, 0.32]
Error	8.49	24	0.35				

Table 3: Predicting frequency of overload from reasons or average daily amount of use of social media change in the past year. LL and UL represent the lower-limit and upper-limit of the partial η^2 confidence interval, respectively. Reasons or amount changed represent categorical variables indicating whether their reasons or average daily use for social media had changed since the pandemic started.

was found for reports that the amount of time spent on social media had changed ($t(24)$ = -1.78, p = 0.087). The results of this regression are interesting in that they suggest participants may have interpreted the question of frequency of overload in a manner that is skewed to their most recent experiences. However, the high correlation between the two predictor variables cannot rule out the possibility of collinearity explaining some of the identified results.

Finally, a multivariate regression was fit controlling for possible demographic covariates including age group and native language. Ultimately, none of the demographic variables exhibited a statistically significant relationship with frequency of overload experiences ($t(24)$ = -1.10, p = 0.283) for age group and ($t(24)$ = 0.211, p = 0.834) for native language.

In addition to responding to itemized questionnaire sections, participants completed open ended questions about their social media experiences. While formal qualitative analyses were not completed, we read through open ended responses and attempted to identify patterns in content and recurring themes. Most participants (78%) reported having mixed feelings about social media rather than their opinion being outright negative or positive. Some commonly cited positives were: "being able to connect with friends and family," and being able to use social media as a form of escapism. "Since losing my job at the start of the pandemic, I see social media as an escape from everyday life," one participant wrote. On the contrary, several people wrote that reading the news was draining and felt like "going down a rabbit hole."

DISCUSSION

Our results suggest that the relationship between assumed predictors of the frequency of social media fatigue and/or overload may be more complex than previously believed. We did not find any significant relationships between average

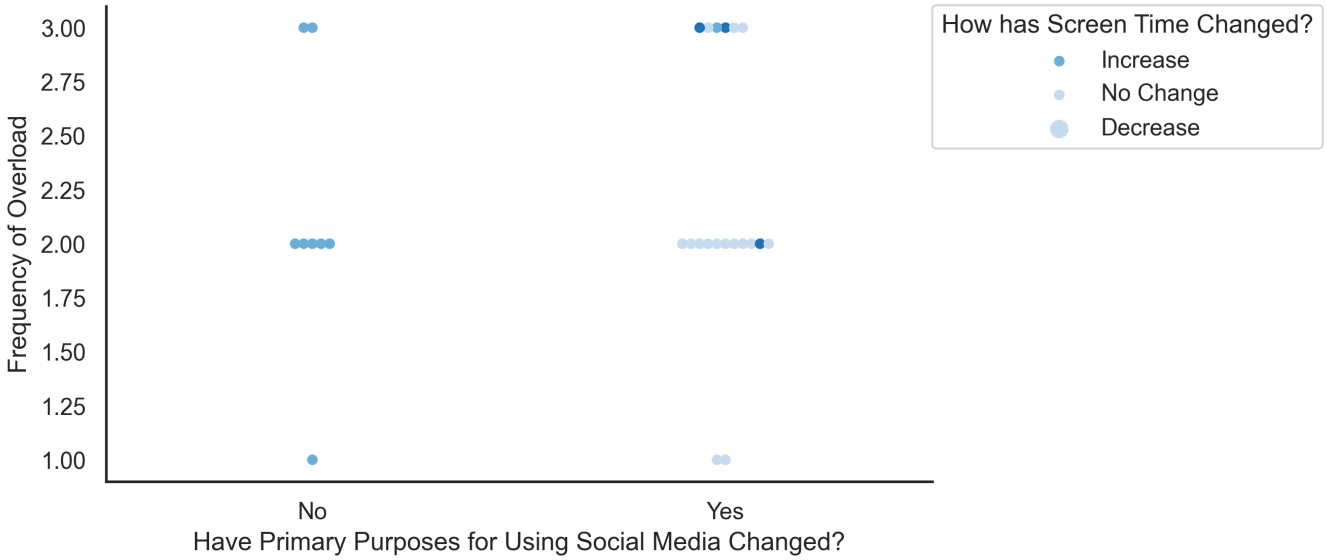

Figure 4: Frequency of overload associated with changes in social media activity in the past year. This figure is an illustration of the predictor variables 'have reasons for using social media changed' coded as a categorical yes/no answer and the predictor variable 'has the amount of social media use changed' also coded as a yes/no categorical response and the outcome variable *frequency of overload*. The 0 at the bottom corresponds to a participant responding with *no* to the question about reasons changing and a 1 corresponds to a *yes* answer to this question. The circles in *blue* correspond to responding to *no* with questions of whether the amount of time spent online changed and the circles.

duration of use or importance of social media and subjective experiences of overload. This may suggest that social media overload could be less of a *quantity* concern and more of a *quality* concern. The type of activity engaged with online may be more predictive of overload than the amount of time spent online. It is important to note that this finding conflicts with previous findings of the causal relationship between duration of time online and experiences of social media fatigue (16). The lack of a statistically significant result here could be an artifact of the lower internal reliability of our survey items as suggested by our low Cronbach's Alpha score of -0.016. It could be that, due to the specific wording of our survey items, questions may have been interpreted in a variable manner. Nonetheless, the fact that participants were able to reliably report how much time they spent online off the top of their head, and this closely matched their cellphone screen time report, supports that to a certain extent responses to items are reliable.

Our second simple linear model did not find any evidence that the primary purpose of using social media significantly predicts the frequency of overload-like experiences. In other words, the qualitative differences in social media use also did not predict the frequency of social media overload. One possible explanation is that there was an unequal number of participants representing reasons for using social media as 63% of participants selected keeping in touch with family as the primary reason for using social media. This indicates that activities more commonly associated with social media overload, such as reading the news [14], were less commonly reported in our sample which could lead to a less clear relationship between purpose of use and social media overload frequency. Interestingly, we did not find any relationship between demographic variables and the frequency of social media use. This suggests that, contrary to previous findings, susceptibility to overload is not dependent on factors such as age. However, this also may be an artifact of our skewed sample demographic distribution as indicated by the fact that over half our sample reported to be in the age group 40–55 years old.

Finally, we were interested in whether participants' social media engagement behavior had changed in the previous year provided that the COVID-19 pandemic produced situations of increased physical isolation and the survey was being completed during pandemic times. We hypothesized that participants would report their reasons for using social media as having changed in the past year. Our findings suggest that responses to a yes/no question of whether participant reasons for using social media changed in the past year significantly predicts experiences of overload. In other words, the frequency of overload experiences could be predicted by whether participants reported shifts to the purpose of using social media in the past year. To corroborate this, the extent to which participants' amount of time spent on social media changed in the past year also significantly predicted reported frequency of overload experiences. This suggests that participants may be more in tune to recent experiences of overload in the past year which may be skewing their view and subjective responses on social media in general and on their reported frequency of social media overload. This is an interesting finding in that it may suggest that people's metacognitive reflections on their activity online and their feelings during those activities may be inflated or deflated depending on whether the experiences are recent or not. Evidence suggests that recent events are remembered more readily (15). A recency effect could be leading participants to remember experiences of overload from recent times more readily than other experiences further in the past. Nonetheless, we cannot rule out the possibility of collinearity between the predictor variables included in the multivariate regression analysis. A partial least squares regression analysis designed to partialize and isolate relationships may be able to account for this in the future.

Further research should explore developing standardized and validated survey items. Our present study fully relied on subjective self-report on the part of the participants which could introduce bias in responses as was identified from the recency bias in responses to frequency of social media overload. It may be useful for future research to consider data scraping or text mining approaches that rely on open-source participant data online. This may be a more reliable method of obtaining descriptive information about social media behavioral patterns so that participants are not required to self-report to the best of their ability.

Importantly, future work should consider continuing to investigate the construct validity of the term sensory and information overload. Although our survey identified some possible leads in terms of how respondents reflect on their social media behavior, we had mixed findings and even some null findings in terms of common predictors of social media fatigue and overload. It is important to also note that our findings cannot be interpreted in terms of causal relationships. Because our inferential tests relied on self-reported responses from participants, we did not have control over extraneous variables that may have influenced their responses. Therefore, we can make correlational and concomitant conclusions about our results, but not causal claims about the variables of interest.

On a final note, our survey asked participants what they typically do to mitigate the effects of information overload while using social media. Respondents gave some possible solutions, the most popular of which was keeping their device farther away from themselves. Nearly everyone reported that when faced with feelings of overload, they would distance themselves from the internet and "interact with the real world." The developing discourse on media literacy could prove to be vital in its role in combating experiences of sensory or information overload. Future work should attempt to not only clarify what overload is but also how to combat its negative consequences. Overall, our results suggest that while the relationship between social media use and cognitive

limitations may be more complex than anticipated, contextual, personal, and metacognitive factors may help uncover primary contributors to experiences of information overload.

MATERIALS AND METHODS

Questionnaire

A custom, short questionnaire was developed probing participants on various dimensions of their social media use. The survey was created and platformed on *Qualtrics.com*. Survey items were developed and carefully worded by cross-referencing previous social media fatigue survey items (16). Our final sample included 27 respondents. After obtaining an SRC Approval Form, participants (the majority of whom were either teenagers or middle-aged) who had experience using social media were recruited through a convenience/snowball sampling method. All participants completed an informed consent section, and all participant data was anonymized. Questions from the first portion of the survey focused on the participants' overall thoughts and beliefs about social media as well their personal experiences with social media. Responses about average screen time or time spent on social media in one session were collected in this segment. Furthermore, general feelings regarding activity online, as well as whether their social media usage had changed over the past year were probed. Finally, demographic covariates such as age or ethnic background were collected to control for individual dimensions that have been found to be associated with experiences of overload, as demonstrated by *Benselin et al.* (14).

Survey questions were self-generated and tested for internal reliability using Cronbach's alpha, as reported in the results section. Survey items were measured either as categorical variables or as continuous variables. For instance, one question in the survey probed participants to mention their primary reasons for using social media. Categorical responses were converted into numerical representations through the development of a simple coding scheme. Possible responses included: To keep in touch with family [1], to find funny or entertaining content [2], to keep up with favorite artists, musicians, or content creators [3], and to keep up with news [4]. These options were selected citing a 2021 Pew Research survey on common reasons for using social media (1). Although descriptive data such as the mean and standard deviation is meaningless for this coding scheme, trends in categorical frequency were graphically inspected and Spearman's rank correlations were computed to measure the tonicity and strength of the relationship between the categorical variables and other variables.

Statistical Analysis

Analyses for continuous predictors and outcomes variables consisted of implementing both simple linear regression and multivariate regression models to the collected response data. An alpha significance level of 0.05 was set as our standard of statistical inference. The ANOVA results tables were generated using the apaTables RStudio package created by Dr. David Stanley from the University of Guelph. The linear models were fit using the linear model function in RStudio and F statistics were extracted from the summary function. In the results, *r* represents the correlation coefficient along with its corresponding degrees of freedom, *t* represents the test statistic for each linear model and p represents the statistical significance of the results. The results from the regression analyses were then further analyzed by conducting inferential tests for statistical significance. One-way analysis of variance (ANOVA) was conducted on the residuals of all the conducted linear regression models in order to test for the statistical significance of the co-variability of the selected variables per model of interest. A total of three linear regressions were fit to various models analyzing the relationship between predictor and outcome variables of interest. An alpha significance level of 0.05 was set as our standard of statistical inference. The ANOVA results tables were generated using the apaTables RStudio package created by Dr. David Stanley from the University of Guelph. The linear models were fit using the linear model function in RStudio and F statistics were extracted from the summary function. In the results, *r* represents the correlation coefficient along with its corresponding degrees of freedom, *t* represents the test statistic for each linear model and *p* represents the statistical significance of the results. Because no significant main effects were found between the main variables of interest, no additional post-hoc tests were conducted.

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