Daily Associations between Social Media Use and Memory Failures: The Mediating Role of Negative Affect

Neika Sharifian, Ph.D.[1], **Laura B. Zahodne, Ph.D.**[1]

[1]Department of Psychology, University of Michigan, Ann Abor 48014

Abstract

Daily social media use has been previously linked to worse everyday memory functioning in adulthood; however, the underlying mechanisms that drive these associations are unclear. One pathway in which social media use may negatively influence memory functioning is through a decrease in emotional well-being. Therefore, using a daily diary study from the Midlife in the United States Refresher cohort (MIDUS; *n*=782, 25-75 years old), the current study conducted a multilevel structural equation model to examine whether social media use influenced memory failures indirectly through positive and negative affect. Analyses revealed that daily negative affect, but not positive affect, was a significant mediator at the within-person level. On days when social media use was high, individuals reported greater negative affect and in turn, more memory failures. The potential underlying socio-evaluative effects that may drive the association between social media use, negative affect and memory failures are discussed.

Keywords

Social Media; Daily Diary; Memory; Emotional Well-Being

The presence of social media in daily life has steadily increased over the past decade such that a majority of adults report using social media sites regularly (Pew Research Center, 2018). With increasing use of social media, there is also an increasing need to assess the implications of daily social media use. Social media use, in particular, may have important implications for day-to-day memory functioning in adulthood (Sharifian & Zahodne, 2020). Prior cross-sectional and experimental investigations have demonstrated that engaging with social media leads to worse objective memory performance (Frein, Jones & Gerow, 2013; Soares & Storms, 2018; Tamir, Templeton, Ward & Zaki, 2018) and even the presence of a smart phone can dampen cognitive performance (Ward, Duke, Gneezy & Bos, 2017).

Although prior research suggests that social media use may have negative implications for both objective memory and everyday memory failures, scant research has examined the underlying mechanisms by which social media may negatively impact memory. Social media use has been linked to worse emotional well-being (Brooks, 2015; Escobar-Viera et

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Correspondence: Correspondence concerning this article should be addressed to Neika Sharifian, University of Michigan, Department of Psychology, Ann Arbor, MI 48109. nsharifi@umich.edu.

al., 2018), which may, in part, explain its effect on memory. Therefore, the current study aimed to extend prior research linking social media use and memory failures (Sharifian & Zahodne, 2020) by examining the underlying emotional pathways by which daily social media use may influence everyday memory in adulthood.

The Negative Implications of Social Media for Emotional Well-Being

Social media use may have negative implications for everyday memory through emotional well-being. Prior correlational as well as experimental research has shown greater social media use has been linked to lower happiness through technostress (i.e., technology-specific stress; Brooks, 2015), greater negative affect (Bennett et al., 2019), and worse overall mood (Sagiaglou & Greitemeyer, 2014). For example, in an ecological momentary assessment study, visiting a greater number of social media sites and spending more time on social media sites were both independently associated with greater general negative affect as well as sadness and guilt specifically (Bennett et al., 2019). Further, in an experimental study, individuals who spent 20 minutes on Facebook reported worse mood compared to those who just browsed the internet (Study 2; see Sagiaglou & Greitemeyer, 2014), suggestive that time spent on social media leads to worse emotional well-being. Social media use may reduce emotional well-being by increasing negative feelings of social comparison (i.e., Chou & Edge, 2012; Lee, 2014) such that an individual who spends time on social media may be exposed to highly-selected and overall positive depictions of others and in turn, feel more negatively about one's self in comparison. Additionally, social media may negatively influence emotional well-being by increasing feelings that one is missing out on fun/ rewarding social events (i.e., fear of missing out; Przybylski, Murayama, DeHaan, & Gladwell, 2013). Social media sites expose individuals to an exorbitant amount of information regarding future events and the on-going events/activities of one's social network members. With increased knowledge regarding these events, individuals may feel as though they are missing out on novel and exciting opportunities or may feel excluded and subsequently have lower emotional well-being.

In turn, lower emotional well-being may negatively influence memory functioning. In support of this notion, prior correlational research has linked greater negative affect to greater self-reported cognitive failures (Payne & Schnapp, 2014). Further, in experimental studies, greater induced negative affect, relative to positive or neutral mood conditions, has been linked to greater mind wandering (Smallwood, Fitzgerald, Miles & Phillips, 2009), worse prospective memory (Kliegel et al., 2005) and poorer memory recall (Ellis, Thomas & Rodriguez, 1984; Ellis et al., 1997). While these experimental studies examined objective memory outcomes rather than everyday memory, they are suggestive of directionality, such that negative mood influences memory rather than vice versa. Experiences of negative affect may be harmful to memory functioning through the allocation of cognitive resources. Previous research suggests that experiences of negative emotions and/or stress may require greater allocation of cognitive resources in order to regulate emotions, and therefore, reduce cognitive performance (Ellis et al., 1984; Muraven & Baumeister, 2000; Muraven, Tice & Baumeister, 1998). Additionally, prior research has argued that positive affect may be beneficial for cognitive functioning (Ashby, Isen & Turken, 1999; Fredrickson, 2001), potentially through the facilitation of the dopamine system (Ashby et al., 1999). For

example, in a study of Dutch adults, older adults with higher reports of positive affect had better performance on a free recall task than those with lower positive affect (Hill, van Boxtel, Ponds, Houx & Jolles, 2005).

Overall, social media use may negatively impact emotional well-being (i.e., increase negative affect and decrease positive affect) and, in turn, decrease memory functioning (Böttcher & Dreisbach, 2014). However, to our knowledge, no research has directly examined whether social media use influences memory through emotional well-being. Further, most research examining social media use has been predominantly cross-sectional in nature. Individuals may not only demonstrate individual differences in social media use and memory (i.e., between-person level), but also show intraindividual variability in these associations from day-to-day (i.e., within-person level). Therefore, the current daily-diary study aimed to examine the indirect effects of social media use on everyday memory functioning. We hypothesized that emotional well-being (negative affect, positive affect) would mediate the relationship between social media use and memory at both the within-person and between-person level. At the within-person level, we hypothesized that on days when social media use was high, individuals would report lower emotional well-being (lower positive affect, greater negative affect), and in turn, lower emotional well-being would be associated with a greater number of memory failures. At the between-person level, we hypothesized that average social media use across the week would be associated with worse overall emotional well-being and in turn, greater overall memory failures.

Methods

Participants and Procedure.

Participants in the current study were from the Midlife in the United States (MIDUS; Brim, Ryff, & Kessler, 2004) Refresher cohort who participated in an 8-day daily diary study between 2012 and 2014 ($n = 782$). Details of the MIDUS Refresher daily diary study design, sampling, and all assessment instruments are available on the MIDUS website (http://midus.wisc.edu) and more detailed information regarding the sample has been reported in prior research (see Sharifian & Zahodne, 2020). In brief, the sample was, on average, 48.27 years old ($SD = 12.68$; 25 – 75 years old) and approximately half of the sample was female (55.10%). Participants were given a short telephone interview daily assessing the study variables of interest in which overall study retention was high (93.50%) with 80.20% of participants completing all eight daily dairy assessments.

Measures

Daily Social Media Use.—Participants were asked daily, "*Since this time yesterday, how much time did you spend on social media websites (i.e., Facebook, Twitter, MySpace)?*" Responses were reported in hours and minutes and converted to minutes for the current analyses.

Daily Positive Affect.—Each day, participants reported how much of the time they had experienced 13 positive emotions (Almeida & Kessler, 1998; Watson, Clark, & Tellegen, 1988), such as "*in good spirits*" and "*cheerful*," on a 5-point scale ranging from 0 (none of

the time) to 4 (All of the time). Scores across all items were averaged (α = .96) and higher scores represented higher positive affect.

Daily Negative Affect.—Each day, participants reported how much of the time they had experienced 14 negative emotions (Almeida & Kessler, 1998; Watson et al., 1988), such as "*restless or fidgety*" and "*upset*," on a 5-point scale ranging from 0 (none of the time) to 4 (All of the time). Scores across all items were averaged (α = .89) and higher scores represented higher negative affect.

Daily Memory Failures.—Everyday memory failures were assessed with 9 items (Sunderland, Harris & Baddeley, 1983) on each of the 8 study days. Participants reported whether they experienced any of the following everyday lapses in memory: (1) "*forget to do an errand or chore*" (2) "*forget to take a medication*", (3) "*forget to finish something you started*", (4) "*forget an appointment*", (5) "*forget why you entered a room*" , (6) "*forget someone's name*" , (7) "*forget where you put something*" , (8) "*forget a word you wanted to use*" and (9) "*forget important information.*" The total number of memory failures experienced were summed for each day and thus could range from 0 (no memory failures) to 9 (reported all memory failures).

Covariates.—All analyses were controlled for age, gender, education, physical illness burden, and daily stressors. Age was represented by a continuous variable representing the participant's age in years. Gender was self-reported with Males as the reference group. Education, and physical illness burden were self-reported in Wave 1 of the MIDUS Refresher study. Education was self-reported highest completed degree and could range from No school (1) to Advanced Degrees such a PhD, MD, ED.D or other professional degrees (12). Physical illness burden was the number of health problems (history of heart condition, high blood pressure, cancer and/or stroke) and could range from 0 (no health problems) to 4 (history of all listed health problems). Number of daily stressors was a time-varying covariate measured on each day of the daily diary study using the Daily Inventory of Stressful Events (DISE; Almeida, Wethington & Kessler, 2002) and could range from 0 (no stressors) to 7 (all stressors). As daily stressors was time-varying (i.e., Level 1), stressors were controlled for at both the within- and between-person level. Age, gender, education, and physical illness burden were controlled for at the between-person level.

Analytic Strategy

In order to address our research questions and due to the nested structure of the data (days within individuals), a multilevel structural equation model (MSEM) was conducted using Mplus, Version 8 (Muthén & Muthén, 2007) following recommendations by Preacher and colleagues (Preacher, Zyphur, & Zhang, 2010). MSEM combats conflation of within-person and between-person variance by allowing Level 1 variables (i.e., time-varying variables) to be decomposed at both the within-person and between-person level. Analyses corresponded to the 1-(1,1)-1 design in which the predictor (social media), mediators (positive affect, negative affect), and outcome (memory failures) were all assessed at Level-1 (Preacher et al., 2010). Indirect effects were quantified based on the products of its constituent paths as recommended by Hayes (2009) and therefore, indirect effects were calculated through the

computation of the products of $a*b$ (a = coefficient estimate of the association between social media use and the mediating variable, b = the coefficient estimate of the relationship between the mediating variable and everyday memory failures).

Results

Means, standard deviations, correlations, and intraindividual correlations for memory failures, social media use, positive affect and negative affect are described in Table 1. Overall, a majority of participants reported using social media on at least one study day (68%). Similarly, a majority of participants reported experiencing a memory failure on at least one study day (86%). The ICC was calculated initially with a fully unconditional model with no predictors to assess the partition of variance at the within- and between-person levels. ICCs revealed sufficient variance at the within- and between-person levels for a multilevel model approach across Level-1 variables. Subsequently, a MSEM model was conducted and revealed adequate model fit, $\chi^2(4) = 31.15$, $p < .001$, CFI = .98, RMSEA = .03, $SRMR_{within}$ = .00, $SRMR_{between}$ = .04. Standardized estimates, standard errors and p-values are listed in Table 2 and standardized within-person and between-person mediation pathways are depicted in Figure 1.

Between-Person Effects

Overall social media use was not significantly associated with overall positive affect, overall negative affect or overall memory failures at the between-person level. Therefore, no significant between-person indirect effects emerged. Overall negative affect, however, was significantly associated with memory failures such that greater overall negative affect was associated with more overall memory failures.

With regards to covariates at the between-person level, greater overall stressors were associated with greater overall memory failures across the week. In addition, a significant effect of gender were found on memory failures. Being female were associated with more overall memory failures. Older age and greater physical illness burden were associated with higher and lower overall positive affect, respectively. Greater overall stressors were also associated with lower overall positive affect. Age, physical illness burden, stressors and education significantly predicted overall negative affect. Older age and higher education were associated with lower overall negative affect whereas greater physical illness burden and greater overall stressors was associated with higher overall negative affect. In regards to social media, older age significantly predicted less overall daily social media use.

Within-Person Effects

At the within person level, a significant indirect effect of negative affect, but not positive affect, was found. On days when social media was high, negative affect was also high and in turn, higher negative affect was associated with more memory failures. Social media use, however, did not significantly predict positive affect. Finally, greater positive affect significantly and positively predicted memory failures. That is, on days when positive affect was high, individuals also reported more memory failures.

In regards to covariate associations at the within-person level, stressors significantly predicted positive affect, negative affect, and memory failures. On days when individuals experienced a greater number of stressors, individuals also experienced less positive affect, more negative affect and more memory failures. Stressors did not significantly predict daily social media use. After accounting for covariate and indirect pathways, no significant direct effect of social media use on memory failures emerged.

Posthoc Analyses

Due to the nature of the design, the specific directionality of these relationships may not be fully disentangled. However, consistent with prior research (Robinson & Lachman, 2020), we also tested the reversed MSEM model to assess whether daily memory failures predicted daily social media use through daily positive and negative affect. There were no direct or indirect effects at the between-person or within-person levels. At the between-person level, overall greater memory failures significantly predicted less overall positive affect ($p = .003$) and greater overall negative affect ($p < .001$). No other effects emerged in this model at the between-person level. At the within-person level, more memory failures were associated with greater negative affect ($p < .001$). Similarly, no other significant effects emerged at the within-person level. Thus, in this model, days with greater memory failures did not predict higher social media use directly or indirectly through emotional well-being.

Discussion

Social media use has been linked to poorer memory in adulthood (Sharifian & Zahodne, 2020; Soares & Storms, 2018; Tamir et al., 2018); however, little work has investigated the underlying pathways by which social media influences memory. The current daily diary study extended previous research (i.e., Sharifian & Zahodne, 2020) by highlighting the role that negative affect may play a role in explaining the impact of social media use on everyday memory failures. Specifically, we found that on days when social media use was high, individuals reported higher negative affect and in turn, more memory failures. This finding is consistent with previous research that linked higher social media use to worse emotional outcomes (Brooks, 2015; Escobar-Viera et al., 2018; Hall, Johnson & Ross, 2019; Kross et al., 2013; Shensa, Sidani, Dew, Escobar-Viera, & Primack, 2018) and a detrimental effect of negative emotions on memory (Brainerd, Stein, Silveira, Rohenkohl, & Reyna, 2008; Ellis et al., 1997; Payne & Schnapp, 2014). Contrasting with our hypothesis, we did not find a parallel indirect effect at the between-person level, highlighting the importance of examining intraindividual variability in the relationship between social media and memory. Associations at the within-person level may reflect links between more transient fluctuations in social media use and memory functioning over time.

In addition, daily social media use was not significantly associated with daily positive affect. This finding contrasts with prior research using an experience sampling method that found that greater use of Facebook at one time was associated with worse emotional well-being when subsequently assessed (Kross et al., 2013). Our discrepant findings may be partially due to the temporal components of our measurements. Prior research has shown that the association between active Facebook use and emotional well-being is stronger when

measured immediately after posting, however, may not show longer-term effects (Bayer, Ellison, Schoenebeck, Brady & Falk, 2018). Thus, it may be the case that more temporally-close measurements of social media use and positive affect would demonstrate a stronger association and future research should further investigate the temporal effects of social media use on emotional well-being.

Additionally, although positive affect did not mediate the relationship between social media use and memory failures, greater daily positive affect was associated with more memory failures. Although this finding contrasts with some prior research that has found beneficial effects of positive affect on cognition (Ashby et al., 1999; Hill et al., 2005), it is somewhat consistent with past research that found that happiness was associated with more global information processing (Gasper & Clore, 2002). That is, individuals in a positive mood state are more likely to attend to the broad, global information rather than the specific, local details (i.e., seeing the forest and not the trees). This relative neglect of specific details may underlie prior research findings that individuals in a positive mood had a greater likelihood of false memories (i.e., recalling the word sleep when presented with sleep-related words such as bed, pillow, etc.; Storbeck & Clore, 2005). In the case of our study, memory was assessed with specific daily lapses in memory (i.e., forgetting an appointment or someone's name that day), which may reflect relative difficulties processing specific, local details rather than more global information. Still, future research is needed to further understand the relationship between social media use, positive affect and memory functioning.

The Consequences of Social Media for Negative Affect

Social media use may increase negative affect through several pathways. One pathway by which social media may increase negative affect and in turn, memory failures may be through increased stress and stressor exposure. Social media newsfeeds expose individuals to a vast amount of information about current social, political and personal events which may be unintendedly negative. For example, in a qualitative study, a commonly reported negative experience of using Facebook was dealing with exposure to negative content such as oversharing, inappropriate or annoying content posted by social network members (Fox & Moreland, 2015). Not only are individuals exposed to potentially negative content generated by their social network members, but they may also experience increased feelings of stress and worry regarding judgements and/or comments when posting content on social media themselves (Weinstein, 2018). This increased stress and stressor exposure, and in turn, negatively affect day-to-day memory functioning.

Social media may also increase negative affect through social comparison processes. Prior research has shown that individuals who use social media more tend to engage in more social comparison (Lee, 2014). For example, individuals who spent more time on Facebook each week and individuals who had large Facebook networks that included individuals they did not personally know were more likely to believe that others had better lives than they had, view life as less fair, and think others were happier than they were (Chou & Edge, 2012). On social media sites, individuals tend to portray themselves in the best light and therefore, may present misleadingly positive depictions of themselves (Ellison, Heino & Gibbs, 2006). This exaggerated positive content may foster feelings of inadequacy in others

who view it frequently, which may be distracting, require resources to self-regulate and in turn, may increase daily memory failures.

Another possible mechanism through which social media may dampen well-being is through an increase in fear of missing out (FOMO; Przybylski et al., 2013). FOMO is defined as an intense feeling that one is missing out from rewarding/fun social activities. Social media sites have become integral to event planning among social networks and are a convenient way to organize social events. The downside to this useful tool for event planning is that the individual may be informed about a multitude of events that they cannot attend and, consequently, experience FOMO (Oberst, Wegmann, Stodt, Brand & Chamarro, 2017). Further, FOMO has been linked to poorer emotional well-being (Milyavskaya, Saffran, Hope & Koestner, 2018).

Overall, social media use may have unintended consequences for daily emotional and memory functioning. Social media exposes individuals to a vast amount of potentially stressful and socio-evaluative information that may increase negative emotions. These negative emotions may be distracting and require cognitive resources to regulate (i.e., Muraven et al., 2000), which could inadvertently increase lapses in day-to-day memory.

Limitations and Future Directions

Although the current study is consistent with the possibility that social media use has negative implications for daily emotional and memory functioning, it is important to note that social media use is not universally negative. Some prior evidence has found beneficial effects of social media use for socioemotional (Ellison, Steinfield & Lampe, 2007; Sinclair & Grieve, 2017; Steinfield, Ellison & Lampe, 2008; Weinstein, 2018) and cognitive functioning (Myhre, Mehl & Glisky, 2017; Wang, Lee & Hou, 2017). These mixed findings may be due to individual differences in how and why social media is used. More passive use of social media, such as scrolling through newsfeeds, has been associated with worse well-being compared to more active use, such as chatting and posting comments and updates (Escobar-Viera et al., 2018). Prior research has also shown variability in motivation for using social media (i.e., social versus entertainment motives; Papachariss & Mendelson, 2011). Future research should investigate how these individual differences in the use of social media may moderate the association between social media use and cognitive functioning.

Second, only self-reported social media use was available in the current dataset and may be subject to recall bias. Specifically, some evidence suggests that individuals are less accurate at recalling the amount of time they spend on social media (Junco, 2013). Future research should incorporate both self-reported and objective observations of social media use. Similarly, the use of self-reported methods may not fully capture the number of memory failures an individual experiences. That is, individuals are being asked to remember what they forgot each day, which could yield underestimates of these incidences. Indeed, while most participants reported at least one memory failure over the course of the study, overall reports of memory failures were relatively low.

Third, the current study also can only speculate that social media use increases negative affect by increasing exposure to distressing information, increasing social comparison,

and/or fostering a fear of missing out. No data were available to assess these mechanisms in the current data set, and therefore, future research should further investigate whether these factors drive the association between social media use and emotional well-being.

Fourth, although some evidence suggests that greater negative affect is associated with lower memory functioning (i.e., Ellis et al., 1984; Kliegel et al., 2005; Payne & Schnapp, 2014), the effects of emotional experience on memory (i.e., beneficial vs. harmful effects) are far from settled. Some evidence suggests that negative affect can have beneficial effects on memory in mood-congruent contexts (i.e., recalling more negative content when in a negative state; Mayer, McCormick & Strong, 1995). The current study did not assess memory for mood-congruent content and therefore, future research should examine memory for different types (e.g., valence) of information to fully explore the relationship between emotion and cognition. Further, our measure of memory failures was heterogeneous, such that the measure tapped into several distinct types of memory lapses (i.e., episodic, semantic, prospective). Future research should consider the potential specificity of the associations between social media use and memory subtypes.

Finally, although the current micro-longitudinal design allows for the examination of day-to-day effects of social media use on affect and cognition, asking participants to reflect back on an entire day may still be subject to recall bias. Future research should utilize more fine-grained techniques such as ecological momentary assessments to better understand the temporal associations of social media use, affect and memory. Further, while the current study tested the reversed model to assess directionality of these effects, the study design was still observational rather than experimental in nature. As our variables of interests were measured concurrently on the same day, we cannot disentangle the directionality of these findings. Future research is needed to verify the hypothesized causal effects of social media use on emotional well-being and memory.

Conclusion

In conclusion, social media use, measured daily over eight days, was associated with greater negative affect and memory failures within individuals. As the presence of social media in our daily lives increases, these findings highlight the importance of studying the myriad implications of daily use of these new technologies. The current study suggests that social media use may have at least short-term effects on emotional functioning and self-reported memory in adulthood and may therefore be a risk factor for potential mental or cognitive disorders. A greater understanding of how, when and why individuals engage with social media is needed in our rapidly modernizing society.

Acknowledgments

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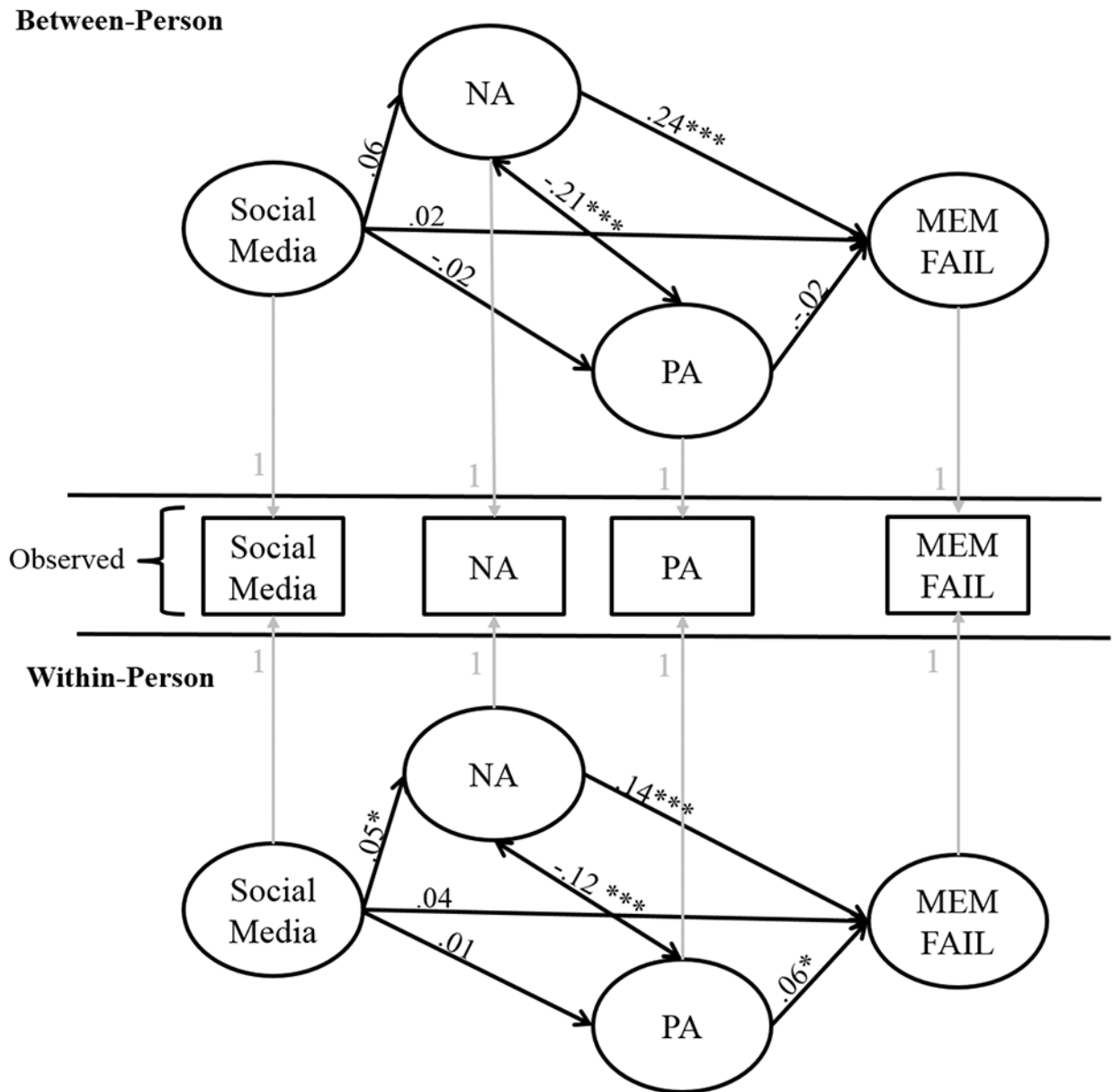
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Figure 1.
MSEM 1- (1, 1) – 1 Mediation Model. Standardized estimates are reported. For simplicity, covariate pathways are not depicted. Note, NA = Negative Affect, PA = Positive Affect, MEM FAIL = Memory Failures, * = p < .05, ** = p < .01, *** = p < .001.

Table 1.

Means, Standard Deviations, Intraclass Correlations and Correlations for Variables of Interest

	M	*SD*	ICC	1	2	3	4
1. Memory Failures	0.76	1.18	.48				
2. Social Media Use (min)	24.14	58.77	.61	.06***			
3. Positive Affect	2.52	0.84	.76	−.19***	−.04**		
4. Negative Affect	0.22	0.35	.56	.33***	.07***	−.48***	

Note. ICC = Intraclass Correlation

*
= *p* < .05

**
= *p* < .01

***
= *p* < .001

Table 2

Standardized Coefficients and Indirect Effects for 1-(1 1)-1 MSEM

	β	SE	Estimate / SE
Between-Person Effects			
Intercept	.01	02	0.25
SMU → MEM	.02	.04	0.67
SMU → PA	−.02	.04	−0.59
SMU → NA	.06	.04	1.52
PA → MEM	−.02	.03	−0.56
NA → MEM	.24***	.09	2.87
NA ←→ PA	−.21***	.04	−5.24
STRESS → MEM	.69***	.10	6.74
STRESS → SMU	.09	.10	0.87
STRESS → PA	−.52***	.08	−6.62
STRESS → NA	.80***	.08	10.05
AGE → MEM	.04	.02	1.75
AGE → SMU	−.07*	.03	−2.47
AGE → PA	.19***	.03	6.33
AGE → NA	−.07*	.03	−2.53
GENDER → MEM	.06**	.02	2.67
GENDER → SMU	.04	.03	1.39
GENDER → PA	.02	.03	0.57
GENDER → NA	.01	.03	0.42
EDU → MEM	−.02	.03	−0.60
EDU → SMU	−.03	.02	−1.15
EDU → PA	.01	.03	0.33
EDU → NA	−.08**	.03	−2.87
BURDEN → MEM	.03	.03	1.16
BURDEN → SMU	.05	.04	1.19
BURDEN → PA	−.09*	.04	−2.29
BURDEN → NA	.11*	.05	1.97
Residual MEM Variance	.28***	.04	7.42
Indirect Effect via PA	.00	.00	0.38
Indirect Effect via NA	.01	.01	1.22
Within-Person Effects			
SMU → MEM	.04	.02	1.77
SMU → PA	.01	.01	0.71
SMU → NA	.05*	.02	2.43
PA → MEM	.06*	.03	2.18

	β	SE	Estimate / SE
NA → MEM	.14***	.02	5.82
NA ←→ PA	−.12***	.01	−12.40
STRESS → MEM	.10***	.02	6.72
STRESS → SMU	.01	.01	0.68
STRESS → PA	−.10***	.01	−10.65
STRESS → NA	.26***	.01	20.32
Residual MEM Variance	.51***	.02	21.49
Indirect Effect via PA	.00	.00	0.66
Indirect Effect via NA	.01*	.00	2.29

Note. Standardized estimates are reported. SMU = Social Media Use, NA = Negative Affect, PA = Positive Affect, MEM = Memory Failures, Stress = Stressors, Edu = years of education, burden = physical illness burden,

* = $p < .05$

** = $p < .01$

*** = $p < .001$.