Open camera or QR reader and scan code to access this article and other resources online.

Instagram and TikTok Flow States and Their Association with Psychological Well-Being

James A. Roberts, PhD and Meredith E. David, PhD

Abstract

Despite their growing popularity, little research has focused on the association between Instagram and TikTok use and psychological well-being. Informed by Uses and Gratifications Theory, the present study investigates the flow states experienced when using each social media platform and whether these flow states differentially impact user well-being. A flow state is achieved when people are so engrossed in an activity that little else seems to matter to them and they will often continue the activity despite its negative consequences. Based upon a survey of adult Instagram ($n = 195$, $M_{age} = 38$) and TikTok users ($n = 225$, $M_{age} = 37$), the present study identified four unique clusters of users for both platforms based upon the levels of five flow dimensions: focused attention, curiosity, enjoyment, telepresence, and time distortion. Results found that TikTok users reported higher levels of overall flow than Instagram users. TikTok users also reported higher levels of the flow dimensions ''enjoyment'' and ''time distortion.'' The flow dimension of ''telepresence'' (immersion in a world created by the social media application) for both TikTok and Instagram users was associated with higher levels of depression and anxiety. These social media may provide an escape from everyday worries for users, although a suboptimal coping strategy. Whether Instagram and TikTok use are but ''improved means to an unimproved end'' is an important question that requires additional research.

Keywords: TikTok, Instagram, flow states, Uses and Gratifications Theory, psychological well-being, cluster analysis, adults

Introduction

IN HIS BOOK ''Walden,'' Thoreau[1] states ''our inventions are wont to be pretty toys, which distract our attention from serious things. They are but improved means to an unimproved end ….'' Although written nearly 170 years ago, Thoreau's thinking on the impact of humankind's inventions on our quality of life seems apropos regarding the impact of social media use on individual and collective well-being.

Globally, those between the ages of 16–64 spent a daily average of 2 hours and 25 minutes using social media in 2021.[2] Thus, the average social media user spends more time on Facebook, Twitter, Snapchat, Instagram, TikTok, and other social media than they do eating meals, personal grooming, reading, volunteering, or attending religious activities.[3]

Two increasingly popular social media sites are Instagram and TikTok. Instagram has over two billion active users each month[4] who spend an average of 53 minutes per day on the application (app).[5] There are 123 million Instagram users in the United States.[4] The majority of posts to Instagram include photos or videos.[5] Although the majority of Instagram users in the United States are under the age of 35, nearly 40 percent are 35 or older.[6]

TikTok is a videosharing social media app. The videos usually run for less than a minute, often 15 seconds. TikTok has over 1 billion monthly active users who spend an average of 52 minutes per day on the app.[7] User growth was 89 percent and 85 percent in 2019 and 2020.[8] There are ∼138 million active TikTok users in the United States.[7] These users come from all age groups and ∼53 percent are 30 or older.[9]

Hankamer School of Business, Marketing Department, Baylor University, Waco, Texas, USA.

An extensive amount of research has addressed the impact of social media use on psychological well-being.[10–12] Although social media use has been found to have a positive impact on well-being in a number of cases,[13–16] the majority of research has found a negative association between social media use and well-being.[12,17–19] Social media use has been found to be associated with problems sleeping and higher levels of stress, anxiety, and depression.[11]

Less research has focused on the use of Instagram and TikTok in particular, despite their growing popularity.[14,20–22] Drawing from Flow Theory, the present study investigates the flow states experienced when using Instagram and TikTok and whether these states are differentially associated with user well-being. Flow states can be defined as situations in which people are so engrossed in an activity that little else seems to matter to them and they will often continue the activity despite its negative consequences.[23–25]

Uses and Gratifications Theory (U&G) is a useful tool to understand how the gratifications enjoyed while using Instagram and TikTok impact user well-being. At its core, U&G addresses an individual's social and psychological needs and how a particular media can gratify the motives behind the human need to interact (communicate) with others. U&G posits that "communication behavior is goal-directed and purposeful" (p. 757).[26] Unlike more traditional media (e.g., newspapers and television), U&G argues that the interaction afforded by social media fosters connections with others. Social interactivity is a central goal behind social media use.[27] Shao and Lee found the need to communicate was an important predictor of TikTok use.[28] Individuals choose a particular social media platform because it gratifies particular needs[26] and extant research suggests that an immediate theoretical connection exists between U&G and online flow.[29,30]

Specifically, and as stated by Huang et al, a social media user's flow state "plays a facilitating role in shaping the influence of social gratifications on [problematic social media behaviors]" such that the "manner in which SNS users experience the usage process is as important as the gratifi-

cation of their social needs." The intense pleasure (flow) derived from social media use has been identified as the driving force between social media uses and gratifications and both problematic behaviors and lower psychological well-being.[29,31]

High levels of social media use and its attendant negative fallout suggests that some social media users are achieving flow states that encourage their use despite the negative consequences such use may have for an individual's well-being. As argued by Gruner, Displacement Theory may explain the link between the experience of flow states and psychological well-being. Excessive time spent on social media may displace (or reduce) other more meaningful experiences. For example, social media use likely reduces time spent on more healthy face-to-face interactions.[32] Extant research has shown that most social media platforms are used mainly to maintain a wider network of virtual social connections, which are weaker than the connections developed and maintained through offline interactions; intense use of these social media platforms displaces the more meaningful face-to-face connections to the detriment of close relationships and individual well-being.[10,33,34]

Research by Kwak et al[35] focused on the flow experienced when using Facebook. Their research identified five flow dimensions: "focused attention" (immersion while using the social media), "enjoyment" (fun experienced while using the social media), "curiosity" (the desire to keep up with what's happening on a social media site), "telepresence" (immersion in a world created by the social media experience), and "time distortion" (losing a sense of time while on social media). Brailovskaia et al conclude that the experience of online flow is a main reason behind high social media use.[23]

Surveying a sample of 398 German Facebook users, Brailovskaia et al found that Facebook flow ("the experience of intense enjoyment and pleasure generated by Facebook use …," p. 1) was positively associated with addiction to Facebook.[25] Interestingly, the telepresence of Facebook flow (immersion in a world created by Facebook) was strongly associated with the Facebook Addiction Disorder Scale. The

Table 1. Descriptive Statistics of the Study Variables for Each Social Media Platform Separately and Collectively

Measure	TikTok		Instagram		Full sample	
	M	SD	M	SD	M	SD
Flow**	**3.71**	0.73	**3.48**	0.83	3.60	0.79
Flow: Curiosity	3.94	0.82	3.87	0.94	3.91	0.88
Flow: Enjoyment**	**4.26**	0.74	**4.01**	0.82	4.15	0.78
Flow: Focused Attention	3.67	1.04	3.47	1.12	3.58	1.08
Flow: Telepresence	2.76	1.25	2.55	1.26	2.66	1.25
Flow: Time Distortion**	**3.90**	0.99	**3.48**	1.16	3.71	1.09
Mind Wandering	2.33	1.13	2.46	1.15	2.38	1.13
FOMO	2.26	0.96	2.40	1.02	2.32	0.99
Addiction	2.06	0.97	2.20	1.13	2.12	1.05
Time on social media	36.20	50.20	33.20	58.74	34.80	54.28
Depression/Anxiety	2.40	1.18	2.45	1.17	2.42	1.17

Note: t Tests were conducted to test for differences in means between TikTok and Instagram variables; Bold numbers indicate statistical significance.
**$p < 0.01$.
FOMO, Fear of Missing Out; M, mean; SD, standard deviation.

authors conclude that immersion in the world created by Facebook is often an attempt to escape the obligations and stressors of everyday life.

In two large samples of Lithuanian ($n=1,640$) and German social media users ($n=727$), Brailovskaia et al,[23] conducted a latent class analysis to group social media users based upon their responses to the Bergen Social Media Addiction Scale, which assesses six characteristics of problematic social media use: salience, tolerance, conflict, mood modification, relapse, and withdrawal symptoms.[36] The analysis resulted in four groups. The largest group, labeled the ''low symptom'' group, scored lower on all six components of social media addiction, and also scored lowest on all measures of flow: overall flow, focused attention, enjoyment, curiosity, telepresence, and time distortion.

On the other extreme, the group labeled the ''high symptom'' group scored higher on all six components of social media addiction. As expected, these highly problematic social media users experienced higher levels of overall flow as well as focused attention, enjoyment, telepresence, and time distortion than the two more moderately problematic social media user groups. The research revealed that the ''low symptom'' group (compared with all other groups) reported the lowest levels of depression, anxiety, and stress in addition to the highest levels of life satisfaction. The ''high symptom'' group reported the highest levels of depression, anxiety, and stress, as well as lower life satisfaction.

It appears from the two Brailovskaia studies described above that flow states are positively associated with problematic social media use,[25] and higher flow states, when using Facebook, are associated with lower psychological well-being.[23,25]

The primary objective(s) of the present study is to investigate the flow states individuals enjoy while using Instagram and TikTok and whether these flow experiences are differentially associated with individual well-being.

Methods

Four hundred and twenty U.S. adults were recruited from CloudResearch's Turk Prime to participate in an online survey through Qualtrics.[37] Requirements for participants included: live in the United States, at least 18 years of age, have at least a 95 percent approval rating, and report having used TikTok and/or Instagram. Participants were randomly assigned to respond to questions about TikTok or Instagram; any participants who reported using only one of these platforms were assigned to respond to questions for that respective platform. The Institutional Review Board at the authors' university approved the study protocol.

The Facebook Flow Questionnaire[25] was adapted for the current study by replacing ''Facebook'' with either TikTok or Instagram; this scale included three items to assess each flow dimension (focused attention, enjoyment, curiosity, telepresence, and time distortion). Five outcome variables were included in the study: Fear of Missing Out (FOMO), mind wandering, social media addiction, time spent on social media, and feelings of anxiety and depression.

FOMO was assessed using the 10-item measure by Przybylski et al.[38] Example items include ''I fear my friends have more rewarding experiences than me'' and ''It bothers me

TABLE 2. CORRELATION MATRIX

| Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Overall flow	—												
(2) Curiosity	0.77**	—											
(3) Enjoyment	0.73**	0.62**	—										
(4) Focused attention	0.84**	0.58**	0.56**	—									
(5) Telepresence	0.73**	0.39**	0.28**	0.51**	—								
(6) Time distortion	0.81**	0.50**	0.53**	0.59**	0.47**	—							
(7) Mind wandering	0.12*	0.03	-0.14**	0.05	0.30**	0.13**	—						
(8) FOMO	0.38**	0.21**	0.06	0.29**	0.51**	0.29**	0.53**	—					
(9) Addiction	0.51**	0.26**	0.14**	0.38**	0.66**	0.41**	0.47**	0.32**	—				
(10) Time on SM	0.27**	0.11*	0.13*	0.21**	0.28**	0.27**	0.13**	0.52**	0.32**	—			
(11) Anxiety and depression	0.18**	0.08	-0.08	0.07	0.35**	0.17**	0.64**	0.59**	0.52**	0.17**	—		
(12) Age	-0.05	0.01	0.05	-0.03	-0.13**	-0.05	-0.14**	-0.17**	-0.15	-0.08	-0.18**	—	
(13) Education	0.05	-0.01	-0.05	0.04	0.16**	-0.01	0.08	0.18**	0.27	0.03	0.09	0.01	—
(14) Income	0.09	0.13*	0.13*	0.04	-0.01	0.10	-0.08	-0.05	-0.01	0.03	-0.21**	0.07	0.25**

*$p<0.05$; **$p<0.01$.
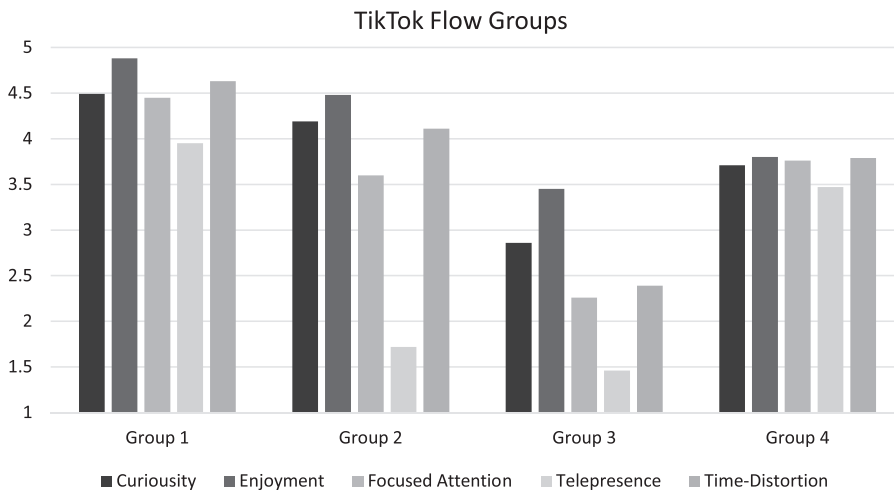
FIG. 1. TikTok clusters based on social media flow characteristics. Group 1 = high flow, high telepresence; Group 2 = moderate flow, low telepresence; Group 3 = low flow, low telepresence; Group 4 = moderate flow, high telepresence.

when I miss an opportunity to meet up with friends.'' A 5-point scale from ''Not at all true of me'' to ''Extremely true of me'' was used.

Mind wandering was assessed using five items from Carriere et al's[39] spontaneous mind wandering and deliberate mind wandering scales. Next, the 6-item Facebook Addiction scale was adapted for TikTok/Instagram and assessed on a 5-point scale ranging from very rarely to very often (in the past month).[36]

Time on social media was assessed objectively through having participants check their phone for the exact amount of time spent on social media over the past 7 or 10 days, depending on the type of smartphone (i.e., Androids report the past 7 days; I-phones report the past 10 days).[40] Anxiety and depression were assessed using the four-item measure (Patient Health Questionnaire-4) developed by Kroenke et al[41] and used in related article by David and Roberts.[42,43] All measures included were reliable, with construct reliability estimates ranging from 0.76 to 0.97. Descriptive statistics of the measures are provided in Tables 1 and 2.

Analysis

A hierarchical cluster analysis was conducted to identify subgroups of social media users based on their experiences

of flow. Scores on the five flow subcategories were entered into the analysis; Ward's method and squared Euclidian distances were used, and the number of clusters was based on the inverse scree technique.[44,45]

The cluster analysis revealed a four-group solution for both Instagram and TikTok. Results show that the sub-dimension telepresence is a key driver of differences between the clusters (i.e., in how flow is experienced). Figures 1 and 2 show the four clusters for TikTok and Instagram, respectively; demographic characteristics of the clusters are provided in Tables 3 and 4. The two largest TikTok clusters included participants with high levels of overall flow and telepresence (Group 1 [G1], 29 percent, $M_{age} = 36$) and participants with moderate overall flow but low telepresence (Group 2 [G2], 30 percent, $M_{age} = 39$). The smallest TikTok cluster consisted of individuals with low overall flow and telepresence (Group 3 [G3], 16 percent, $M_{age} = 39$), followed by a group of users with moderate flow and high telepresence (Group 4 [G4], 24 percent, $M_{age} = 36$).

The pattern of flow across groups for Instagram was similar to that found with TikTok, except with G4. Consistent with the clustering solution for TikTok, the two largest groups of Instagram users included participants with high levels of overall flow and telepresence (G1, 38 percent, $M_{age} = 36$) and participants with moderate overall flow
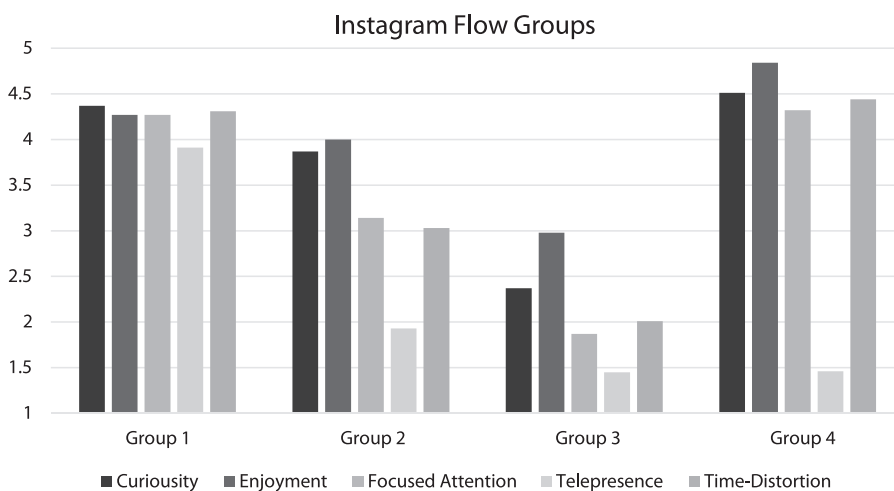

FIG. 2. Instagram clusters based on social media flow characteristics. Group 1 = high flow, high telepresence; Group 2 = moderate flow, low telepresence; Group 3 = low flow, low telepresence; Group 4 = high flow, low telepresence.

TABLE 3. SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS IN TIKTOK FLOW GROUPS

Demographic variable	G1 n	G1 %	G2 n	G2 %	G3 n	G3 %	G4 n	G4 %
Gender								
Female	38	34	29	29	15	14	29	29
Male	26	24	36	33	20	19	26	24
Marital status								
Single/never married	27	27	28	28	22	22	23	23
Married	30	33	28	31	7	8	26	29
Divorced	5	19	9	35	7	27	5	19
Separated	2	100	0	0	0	0	0	0
Widowed	0	0	0	0	0	0	1	100
Education								
High school	8	38	7	33	3	14	3	14
Some college	9	20	14	31	7	16	15	33
Associate degree	8	27	10	35	7	24	4	14
Bachelor's degree	30	32	28	30	15	16	20	22
Master's degree	9	32	5	18	3	11	11	39
Doctoral degree	0	0	1	25	1	25	2	50
Income								
Less than $30k	9	21	14	33	11	26	8	19
$30k–$49,999	18	27	16	24	13	19	21	31
$50k–$69,999	14	30	16	35	4	9	12	26
$70k–$99,999	12	34	9	26	6	17	8	23
$100k or higher	11	38	10	34	2	7	6	21

Note: G1 = high flow, high telepresence; G2 = moderate flow, low telepresence; G3 = low flow, low telepresence; G4 = moderate flow, high telepresence.

G1, Group 1; G2, Group 2; G3, Group 3; G4, Group 4.

TABLE 4. SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS IN INSTAGRAM FLOW GROUPS

Demographic variable	G1 n	G1 %	G2 n	G2 %	G3 n	G3 %	G4 n	G4 %
Gender								
Female	28	43	18	28	11	17	8	12
Male	44	36	50	40	20	16	10	8
Marital status								
Single/never married	24	28	38	45	14	17	9	11
Married	43	48	24	27	15	17	7	8
Divorced	2	18	4	36	2	18	3	27
Separated	3	75	0	0	1	25	0	0
Widowed	0	0	0	0	2	100	0	0
Education								
High school	7	29	10	42	3	12	4	17
Some college	11	28	18	45	5	12	6	15
Associate degree	3	25	4	33	4	33	1	8
Bachelor's degree	30	38	29	36	14	17	7	9
Master's degree	20	65	5	16	5	16	1	3
Doctoral degree	1	25	2	50	1	25	0	0
Income								
Less than $30k	9	32	10	36	8	29	1	3
$30k–$49,999	22	43	19	37	5	10	5	10
$50k–$69,999	24	47	17	33	6	12	4	8
$70k–$99,999	11	30	14	39	6	17	5	14
$100k or higher	6	24	8	32	7	28	4	16

Note: G1 = high flow, high telepresence; G2 = moderate flow, low telepresence; G3 = low flow, low telepresence; G4 = high flow, low telepresence.

combined with low telepresence (G2, 35 percent, $M_{age} = 39$). The third largest group of Instagram users consisted of individuals with low overall flow and telepresence (G3, 17 percent, $M_{age} = 37$), followed by a small group of users with high flow and low telepresence (G4, 10 percent, $M_{age} = 40$).

Next, analysis of variance (ANOVA) analyses were used to examine differences in study measures between clusters for each respective social media platform. Bonferroni post hoc comparisons were performed, except the Tukey test was used if the assumption of homogeneity of variances was violated.

Results of the ANOVAs revealed the clusters differed significantly for all study measures. Mean scores are provided in Tables 5 and 6 and results of the post hoc comparisons are provided in Tables 7 and 8 for TikTok and Instagram, respectively.

Discussion

The present study shows that TikTok users experience overall higher levels of flow than Instagram users as well as higher levels of enjoyment and time distortion. TikTok users have fun watching the many short videos available on the app (flow state of enjoyment), which provide constant reinforcement to continue watching videos; this behavior leads to higher levels of the flow state "time distortion" than observed with Instagram users. TikTok users reported they were more prone to lose track of time and spend more time than they had intended. This is consistent with the con-

cept of flow in that TikTok users become so engrossed in scrolling through videos that they continue the activity despite its negative consequences. Twenty-four and 28 percent of TikTok and Instagram users, respectively, would qualify as addicted based upon the diagnostic criteria developed by Andreassen et al.[36]

The four TikTok groups created by the present study's cluster analysis provide additional insight into the relationship between TikTok use and well-being. G1 users (high flow, high telepresence) exhibited high scores across all flow states. As would be expected, these higher flow levels led to higher levels of mind wandering than G3 (low flow, low telepresence) and higher levels of FOMO, addiction, and time spent on TikTok than G2 (moderate flow, low telepresence) and G3. G1 also reported higher levels of anxiety and depression than G3.

Of note, the lack of significant differences in outcomes across G1 and G4 may well suggest that overall flow has a less major role in determining how social media experiences impact well-being; instead, it seems that telepresence is a stronger driver.

G2 of TikTok users (moderate flow, low telepresence) reported lower levels of FOMO, addiction, and time spent on TikTok than did G4 (moderate flow, high telepresence). The lower levels of reported telepresence in G2 users in contrast to G4 suggests that immersion in TikTok (telepresence) is associated with more time spent with social media and more negative psychological outcomes. Using U&G, Omar and Dequan identified the desire to escape as a primary need

TABLE 5. MEAN SUM SCORES OF THE STUDY VARIABLES IN TIKTOK FLOW GROUPS

Measure	G1 (n=66)		G2 (n=67)		G3 (n=37)		G4 (n=55)	
	M	SD	M	SD	M	SD	M	SD
Flow	4.48	0.29	3.62	0.31	2.48	0.50	3.71	0.29
Flow: Curiosity	4.49	0.52	4.19	0.41	2.86	0.98	3.71	0.54
Flow: Enjoyment	4.88	0.22	4.48	0.47	3.45	0.95	3.80	0.37
Flow: Focused Attention	4.45	0.56	3.60	0.91	2.26	0.93	3.76	0.63
Flow: Telepresence	3.95	0.71	1.72	0.67	1.46	0.63	3.47	0.54
Flow: Time Distortion	4.63	0.47	4.11	0.70	2.39	0.95	3.79	0.58
Mind Wandering	2.56	1.22	1.63	1.16	1.83	1.01	2.63	0.91
FOMO	2.68	1.05	1.92	0.69	1.65	0.73	2.58	0.94
Addiction	2.60	1.00	1.63	0.63	1.30	0.55	2.44	0.91
Time on SM	53.79	4.51	23.92	28.71	10.45	19.01	47.35	56.38
Depression/Anxiety	2.64	1.23	2.17	1.21	1.97	1.13	2.68	0.97

Note: G1=high flow, high telepresence; G2=moderate flow, low telepresence; G3=low flow, low telepresence; G4=moderate flow, high telepresence.

driving TikTok consumption.[46] This ability to escape into a world created by TikTok appears to be a poor coping strategy.[47] This finding is consistent with the results of Brailovskaia et al, which found that immersion in a world created by Facebook was associated with higher levels of Facebook addiction.[25]

Cluster 3 of TikTok users (low flow, low telepresence) reported less mind wandering, FOMO, addiction, and time spent on TikTok than G4 (moderate flow, high telepresence). G3 members were also less anxious and depressed than G4 members. These results are consistent with the argument that lower flow, telepresence in particular, is associated with less negative psychological outcomes.

Results of the cluster analysis for Instagram users were consistent with the TikTok results with the exception of G4. G4 of Instagram users was characterized by high flow and low telepresence (vs. TikTok G4 of moderate flow, high telepresence). This difference in dimensional flow composition of G4 TikTok versus Instagram users suggests important differences may exist in how individuals experience flow across different social media platforms. Instagram is more personal in nature than TikTok. Users post photos and comment on others' posts with a more intimate circle of friends while TikTok videos are shared with a larger network of friends, followers, and often strangers with the primary purpose to entertain and garner likes, comments, and shares.

Results of the ANOVA tests in mean differences on outcome variables across Instagram groups were largely consistent with the TikTok groups. G1 (high flow, high telepresence) users reported higher levels of mind wandering, FOMO, addiction, and anxiety and depression than G2 (moderate flow, low telepresence), G3 (low flow, low telepresence), and G4 (high flow, low telepresence) and more time spent on Instagram than G2 and G3. These findings seem to suggest that time spent on Instagram is largely determined by overall flow. However, the results discussed next seem to suggest that psychological well-being-related outcomes are influenced more so by the telepresence dimension of flow than by overall flow levels.

G3 members reported low levels of all five flow dimensions. They also reported less time spent on Instagram compared with G4. G4 was high on four flow dimensions but not telepresence. This difference between it and G1 might explain why the cluster reported lower levels of mind wandering, FOMO, addiction, and anxiety and depression compared with G1. Importantly, these results seem to provide support for previous research, which has found that telepresence is the key component of flow that drives

TABLE 6. MEAN SUM SCORES OF THE STUDY VARIABLES IN INSTAGRAM FLOW GROUPS

Measure	G1 (n=74)		G2 (n=69)		G3 (n=33)		G4 (n=19)	
	M	SD	M	SD	M	SD	M	SD
Flow	4.23	0.38	3.19	0.28	2.14	0.47	3.91	0.29
Flow: Curiosity	4.37	0.48	3.87	0.58	2.37	0.84	4.51	0.63
Flow: Enjoyment	4.27	0.75	4.00	0.42	2.98	0.83	4.84	0.23
Flow: Focused Attention	4.28	0.51	3.14	0.82	1.87	0.79	4.32	0.51
Flow: Telepresence	3.91	0.61	1.93	0.71	1.45	0.66	1.46	0.55
Flow: Time Distortion	4.31	0.51	3.03	0.83	2.01	1.00	4.44	0.66
Mind Wandering	2.95	1.19	2.21	1.03	2.34	1.09	1.72	0.81
FOMO	3.14	1.05	1.95	0.70	1.85	0.69	2.12	0.67
Addiction	3.22	1.02	1.53	0.51	1.44	0.64	1.94	0.85
Time on SM	50.63	57.37	16.54	36.25	11.75	15.69	63.09	119.72
Depression/Anxiety	3.08	1.21	2.05	0.91	2.20	1.12	1.86	0.93

Note: G1=high flow, high telepresence; G2=moderate flow, low telepresence; G3=low flow, low telepresence; G4=high flow, low telepresence.

TABLE 7. POST HOC COMPARISONS OF MEAN DIFFERENCES IN KEY OUTCOME VARIABLES ACROSS TIKTOK GROUPS

Measures	Comparison	Mean difference	SE	p	95% CI
Mind Wandering	G1 vs. G2	0.44	0.19	0.139	−0.07 to 0.96
	G1 vs. G3	0.73	0.23	**0.010**	0.12 to 1.34
	G1 vs. G4	−0.08	0.20	1.000	−0.61 to 0.46
	G2 vs. G3	0.29	0.19	1.000	−0.32 to 0.89
	G2 vs. G4	−0.52	0.23	0.064	−1.05 to 0.02
	G3 vs. G4	−0.81	0.24	**0.005**	−1.43 to −0.18
FOMO	G1 vs. G2	0.77	0.15	**<0.001**	0.35 to 1.18
	G1 vs. G3	1.03	0.18	**<0.001**	0.53 to 1.52
	G1 vs. G4	0.11	0.16	1.000	−0.32 to 0.53
	G2 vs. G3	0.26	0.18	0.902	−0.22 to 0.75
	G2 vs. G4	−0.66	0.16	**<0.001**	−1.09 to −0.24
	G3 vs. G4	−0.92	0.19	**<0.001**	−1.43 to −0.43
Addiction to TikTok	G1 vs. G2	0.97	0.14	**<0.001**	0.59 to 1.35
	G1 vs. G3	1.31	0.17	**<0.001**	0.86 to 1.75
	G1 vs. G4	0.16	0.15	1.000	−0.23 to 0.56
	G2 vs. G3	0.34	0.17	0.274	−0.11 to 0.78
	G2 vs. G4	−0.81	0.15	**<0.001**	−1.20 to −0.41
	G3 vs. G4	−1.14	0.17	**<0.001**	−1.61 to −0.68
Time Spent on TikTok	G1 vs. G2	29.86	8.27	**0.002**	7.85 to 51.88
	G1 vs. G3	43.34	9.79	**<0.001**	17.27 to 69.41
	G1 vs. G4	6.43	8.71	1.000	−16.74 to 29.62
	G2 vs. G3	13.47	9.77	1.000	−12.53 to 39.48
	G2 vs. G4	−23.43	8.68	**0.045**	−46.53 to −0.33
	G3 vs. G4	−36.90	10.14	**0.002**	−63.90 to −9.91
Depression/Anxiety	G1 vs. G2	0.47	0.20	0.130	−0.07 to 1.01
	G1 vs. G3	0.67	0.24	**0.034**	0.03 to 1.31
	G1 vs. G4	−0.04	0.21	1.000	−0.60 to 0.52
	G2 vs. G3	0.20	0.24	1.000	−0.44 to 0.84
	G2 vs. G4	−0.51	0.21	0.099	−1.07 to 0.05
	G3 vs. G4	−0.71	0.25	**0.026**	−1.37 to −0.05

Note: Bold numbers indicate statistical significance. G1 = high flow, high telepresence; G2 = moderate flow, low telepresence; G3 = low flow, low telepresence; G4 = moderate flow, high telepresence.

CI, confidence interval; SE, standard error.

problematic social media behaviors and addiction.[25,47–49] Consistent with Brailovskaia et al,[49] and as shown in Table 2, our results indicate that, of the flow subscales, telepresence has the highest correlation (even higher than overall flow) with addiction, mind wandering, FOMO, and anxiety and depression. One possible explanation for these findings stems from the Displacement Theory. Specifically, it is likely that immersion in the world created by the social media experience, that is, telepresence, likely displaces the more meaningful and close interpersonal relationships on which our psychological well-being depends.[10,33]

This study makes several significant contributions to the extant literature. First, it answers the need for more research on TikTok and Instagram. Despite their popularity, little research has addressed how people's experiences using these platforms may impact their well-being.[20,22] A second contribution is that the present study identified the flow states experienced with TikTok and Instagram. Although the experience of flow appears to be similar across social media platforms, this is not always the case. For example, G4 was different across platforms; high telepresence was characteristic of the flow states for two groups of TikTok users, whereas telepresence was low in all but one of the flow states identified by the Instagram user groups. A third contribution is the elucidation of the psychological outcomes of the flow states experienced while using each social media network. It

appears that increased flow levels, particularly telepresence, are associated with lower psychological well-being.

An important implication of the present study for healthier social media use includes spending less time on apps. This could entail using the screen-time management settings available on most social media apps. Cutting screen time may necessitate parental, spouse, or an accountability partner monitoring the time an individual spends on social media. On a more personal level, stopping app use after a predetermined amount of time helps strengthen an individual's ability to practice restraint the next time they use social media. These practices will help mitigate the negative impact of the flow states of time distortion and telepresence on the psychological well-being of social media users.

Future Research and Limitations

Although this study was the first to investigate the flow states experienced while using TikTok and Instagram and their impact on psychological well-being, the results must be tempered by certain limitations. First, the study was cross-sectional. Causal and longitudinal research will help clarify the relationship between telepresence and well-being. Are TikTok and Instagram users seeking to escape everyday worries by using these platforms or does the use of these platforms create a new world that might crowd out other

TABLE 8. POST HOC COMPARISONS OF MEAN DIFFERENCES IN KEY OUTCOME VARIABLES ACROSS INSTAGRAM GROUPS

Measures	Comparison	Mean difference	SE	p	95% CI
Mind Wandering	G1 vs. G2	0.73	0.73	**<0.001**	0.24 to 1.22
	G1 vs. G3	0.60	0.60	**0.058**	−0.01 to 1.22
	G1 vs. G4	1.23	1.23	**<0.001**	0.48 to 1.97
	G2 vs. G3	−0.13	−0.13	1.000	−0.75 to 0.49
	G2 vs. G4	0.50	0.50	0.469	−0.25 to 1.25
	G3 vs. G4	0.63	0.63	0.283	−0.21 to 1.47
FOMO	G1 vs. G2	1.19	0.14	**<0.001**	0.81 to 1.57
	G1 vs. G3	1.28	0.18	**<0.001**	0.81 to 1.76
	G1 vs. G4	1.02	0.22	**<0.001**	0.44 to 1.60
	G2 vs. G3	0.10	0.18	1.00	−0.38 to 0.58
	G2 vs. G4	−0.17	0.22	1.00	−0.75 to 0.42
	G3 vs. G4	−0.26	0.24	1.00	−0.91 to 0.39
Addiction to Instagram	G1 vs. G2	1.69	0.13	**<0.001**	1.34 to 2.05
	G1 vs. G3	1.78	0.17	**<0.001**	1.34 to 2.22
	G1 vs. G4	1.28	0.20	**<0.001**	0.74 to 1.83
	G2 vs. G3	0.09	0.17	1.000	−0.36 to 0.53
	G2 vs. G4	−0.41	0.21	0.294	−0.96 to 0.14
	G3 vs. G4	−0.49	0.23	0.191	−1.10 to 0.11
Time Spent on Instagram	G1 vs. G2	34.09	9.34	**0.002**	9.18 to 59.00
	G1 vs. G3	38.88	11.69	**0.006**	7.72 to 70.04
	G1 vs. G4	−12.46	14.36	1.000	−50.74 to 25.83
	G2 vs. G3	4.78	11.82	1.000	−26.72 to 36.29
	G2 vs. G4	−46.55	14.47	**0.009**	−85.12 to −7.98
	G3 vs. G4	−51.33	16.08	**0.010**	−94.20 to −8.46
Depression/Anxiety	G1 vs. G2	1.03	0.18	**<0.001**	0.55 to 1.51
	G1 vs. G3	0.88	0.23	**<0.001**	0.28 to 1.49
	G1 vs. G4	1.23	0.28	**<0.001**	0.49 to 1.96
	G2 vs. G3	−0.15	0.23	1.000	−0.76 to 0.46
	G2 vs. G4	0.20	0.28	1.000	−0.54 to 0.94
	G3 vs. G4	0.35	0.31	1.000	−0.48 to 1.17

Note: Bold numbers indicate statistical significance. G1 = high flow, high telepresence; G2 = moderate flow, low telepresence; G3 = low flow, low telepresence; G4 = high flow, low telepresence.

more meaningful pursuits? This is an important question given the relationship found between telepresence and depression and anxiety. Relatedly, future research could examine specific uses and gratifications that motivate the use of social media platforms and how such U&G relate to overall flow and its subdimensions.

A second possible limitation may be that more was not done to identify how people were using the social media platforms. Additional research is needed to understand how usage (e.g., more passive vs. active) varies across the platforms and clusters. Recent research suggests that more passive use of social media leads to lower well-being.[10,11,50] However, Burnell et al[20] found that browsing one's own Instagram profile led to positive changes in psychological well-being but browsing an acquaintance or influencer's profile led to negative psychological consequences. How social media is used, more so than time spent on social media, impacts whether its influence on well-being is negative or positive.[10]

It appears that an answer to whether social media use is an "improved means to an unimproved end" remains to be seen. The present study provides a partial answer in regard to TikTok and Instagram use, but more research is needed. Given the amount of time spent on social media and its often-demonstrated negative influence on individual and social well-being, it is paramount that future research address the pleasures derived from its use.

Author Disclosure Statement

Funding Information

References

1. Thoreau HD. Walden Pond, or Life in the Woods. Tickner & Fields: Boston, MA; 1854; p. 39.
2. Statista. Daily Time Spent on Social Networking by Internet Users Worldwide from 2012–2022 (in Minutes). 2022. Available from: https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/#:~:text=Daily%20social%20media%20usage%20worldwide%202012%2D2022&text=As%20of%202022%2C%20the%20average,minutes%20in%20the%20previous%20year [Last accessed: April 17, 2022].
3. Nexalearning. Startling Statistics About How We Spend Our Time. Available from: https://www.nexalearning.com/blog/bid/50652/startling-statistics-about-how-we-spend-our-time [Last accessed: April 18, 2022].
4. Omnicoreagency. Instagram by the Numbers: Stas, Demographics & Fun Facts. 2022. Available from: https://www.omnicoreagency.com/Instagram-statisticd [Last accessed: April 13, 2022].

5. SM Perth (Social Media Perth). Instagram Statistics for 2023: Facts and Figures. Available from: https://www.smperth.com/resources/instagram/instagram-statistics [Last accessed: April 13, 2022].

6. Statista. Distribution of Instagram Users in the United States as of July 2021, by Age Group. 2021. Available from: https://www.statista.com/statistics/398166/us-instagram-user-age-distribution [Last accessed: April 18, 2022].

7. Omnicoreagency. TikTok by the Numbers: Stas, Demographics & Fun Facts. 2022. Available from: https://www.omnicoreagency.com/tiktok-statistics/#:~;text=57%25 [Last accessed: April 18, 2022].

8. Statista. Annual TikTok User Growth in the United States from 2019 to 2024. 2022. Available from: https://www.statista.com/statistics/1100842/tiktok-us-user-growth [Last accessed: April 19, 2022].

9. Statista. Distribution of TikTok Users in the United States as of September 2021, by Age Group. 2022. Available from: https://www.statista.com/statistics/1095186/tiktok-us-users-age/#:~:text=Overall%2C%20as%20of%20November%202021,very%20unfavorable%20view%20of%20TikTok [Last accessed: April 18, 2022].

10. Liu D, Baumeister RF, Yang C, et al. Digital communication media use and psychological well-being: A meta-analysis. J Comput Mediat Commun 2019;24:259–274.

11. Roberts JA, David ME. On the outside looking in: Social media intensity, social connection, and user well-being: The moderating role of passive social media use. Can J Behav Sci 2022; doi: 10.1037/cbs0000323

12. Verduyn P, Ybarra O, Reisbois M, et al. Do social networks sites enhance or undermine subjective well-being? A critical review. Soc Issues Policy Rev 2017;11(1):274–302.

13. Best P, Manktelow R, Taylor B. Online communications, social media and adolescent wellbeing: A systematic narrative review. Child Youth Rev 2014;41:27–36.

14. Meier A, Gilbert A, Borner S, et al. Instagram inspiration: How upward comparison on social network sites can contribute to well-being. J Commun 2020;70:721–743.

15. Tosun LP, Kasdarma E. Passive Facebook use and depression: A study of the roles of upward social comparisons, emotions, and friendship type. J Media Psychol 2020; 32(4):165–175.

16. Valkenburg PM, Beyens I, Pouwels JL, et al. Social media browsing and adolescent well-being: Challenging the ''passive social media use hypothesis.'' J Comput Mediat Communic 2021;27(1):1–19; doi: 10.31234/osf.io/gzu3y

17. Baker ZG, Krieger H, LeRoy AS. Fear of missing out: Relationships with depression, mindfulness, and physical symptoms. Transl Issues Psychol Sci 2016;2(3):275–282.

18. Primack BA, Shensa A, Escobar-Viera CG, et al. Use of multiple social media platforms and symptoms of depression and anxiety: A nationally representative study among U.S. young adults. Comput Hum Behav 2017;69:1–9.

19. Wang JL, Gaskin J, Rost DH, et al. The reciprocal relationship between passive social networking site (SNS) usage and users' subjective well-being. Soc Sci Comput Rev 2018;36(5):511–522.

20. Burnell K, George MJ, Underwood MK. Browsing different Instagram profiles and associations with psychological well-being. Front Hum Dyn 2020;2:585518; doi: 10.3389/fhumd.2020.585518

21. Faelens L, Hoorelbeke K, Cambier R, et al. The relationship between Instagram use and indicators of mental health: A systematic review. Comput Hum Behav 2021;4:1–18; doi: 10.1016/j.chbr.2021.100121

22. Montag C, Yang H, Elhai JD. On the psychology of TikTok use: A first glimpse from empirical findings. Front Public Health 2021;9:1–6; doi: 10.3389/fpubh.2021.641673

23. Brailovskaia J, Truskauskaite-Kuneviciene I, Kazlauska E, et al. The patterns of problematic social media use (SMU) and their relationship with online flow, life satisfaction, depression, anxiety and stress symptoms in Lithuania and in Germany. Curr Psychol 2021:1–12; doi: 10.1007/s12144-021-01711-w

24. Csikszentmihalyi M. Flow: The Psychology of Optimal Performance. Cambridge University Press: New York; 1990.

25. Brailovskaia J, Rohmann E, Bierhoff HW, et al. The brave blue world: Facebook flow and Facebook addiction disorder (FAD). PLoS One 2018:1–12; doi: 10.1371/journal.pone.0201484

26. Chen GM. Tweet this: A uses and gratifications perspective on how active Twitter use gratifies a need to connect with others. Comput Hum Behav 2011;27:755–762.

27. Whiting A, Williams D. Why people use social media: A uses and gratifications approach. Qual Mark Res 2013; 16(4):362–369; doi: 10.1108/qmr-062013-0041

28. Shao J, Lee S. The effect of Chinese adolescents' motivation to sue TikTok on satisfaction and continuous use intention. J Converg Cult Technol 2020;6:107–115.

29. Huang LY, Hsieh YJ, Wu YCJ. Gratifications and social network service usage: The mediating role of online experience. Inform Manage 2014;51(6):774–782.

30. Stafford TF, Stafford MR, Schkade LL. Determining uses and gratifications for the Internet. Dec Sci 2004;35(2):259–288.

31. Pempek TA, Yermolayeva YA, Calvert SL. College students' social networking experiences on Facebook. J Appl Dev Psychol 2009;30(3):227–238.

32. Gruner DT. New digital media and flow: A study of experience. Creativity 2016;3(2):343–362.

33. Kraut R, Patterson M, Lundmark V, et al. Internet paradox: A social technology that reduces social involvement and psychological well being? Am Psychol 1998;53(9):1017–1031.

34. Valkenburg PM, Peter J. Online communication and adolescent well-being: Testing the stimulation versus the displacement hypothesis. J Comput Mediat Commun 2007; 12(4):1169–1182.

35. Kwak KT, Choi SK, Lee BG, et al. SNS flow, SNS self-disclosure and post hoc interpersonal relations change: Focused on Korean Facebook user. Comput Hum Behav 2014;31:294–304.

36. Andreassen CS, Torsheim T, Brunborg GS, et al. Development of a Facebook addiction scale. Psychol Rep 2012; 110(2):501–517; doi: 10.2466/02.09.18.PRO.110.2.501–517

37. Litman L, Robinson J, Abberbock T. TurkPrime.com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. Behav Res 2017;49:433–442.

38. Przybylski AK, Murayama K, DeHaan CR, et al. Motivational, emotional, and behavioral correlates of fear of missing out. Comput Hum Behav 2013;29:1841–1848.

39. Carriere JSA, Seli P, Smilek D. Wandering in both mind and body: Individual differences in mind wandering and inattention predict fidgeting. Can J Exp Psychol 2013;67(1): 19–31.

40. David ME, Roberts JA, Christenson B. Too much of a good thing: Investigating the association between actual smartphone use and individual well-being. Int J Hum Comput Interact 2018;34(3):265–275.

41. Kroenke K, Spitzer RL, Williams JB, et al. An ultra-brief Screening Scale for Anxiety and depression: The PHQ-4. Psychosomatics 2009;50:613–621.

42. David ME, Roberts JA. Phubbed and alone: Phone snubbing, social exclusion, and attachment to social media. J Assoc Consum Res 2017;2:155–163.

43. David ME, Roberts JA. Smartphone use during the COVID-19 pandemic: Social versus physical distancing. Int J Environ Res Public Health 2021;18(3):1–8.

44. Hayashi Y, Washio Y. Text-message dependency, executive function, and impulsivity in college students: A cluster analysis. Cyberpsychol Behav Soc Netw 2020;23(11):794–799; doi: 10.1089/cyber.2019.0743

45. Yim O, Ramdeen KT. Hierarchical cluster analysis: Comparison of three linkage measures and application to psychological data. Quant Methods Psychol 2015;11:8–21.

46. Omar B, Dequan W. Watch, share or create: The influence of personality traits and user motivation on TikTok mobile video usage. International Association of Online Engineering; 2020. Available from: https://www.learntechlib.org/p/216454 [Last accessed: October 25, 2022].

47. Brailovskaia J, Schillack H, Margraf J. Tell me why are you using social media (SM)! Relationship between reasons for use of SM, SM flow, daily stress, depression, anxiety, and addictive SM use—An exploratory investigation of young adults in Germany. Comput Hum Behav 2020;113:106511.

48. Brailovskaia J, Margraf J. The relationship between active and passive Facebook use, Facebook flow, depression symptoms and Facebook addiction: A three-month investigation. J Affect Disord Rep 2022;10:100374.

49. Brailovskaia J, Bierhoff H-W, Rohmann E, et al. The relationship between narcissism, intensity of Facebook use, Facebook flow and Facebook addiction. Addict Behav Rep 2020;11:100265; doi: 10.1016/j.abrep.2020.100265

50. Odgers CL, Jensen MR. Annual research review: Adolescent mental health in the digital age: Facts, fears, and future directions. J Child Psychol Psychiatry 2020;61(3):336–348.

Address correspondence to:
Dr. James A. Roberts
Hankamer School of Business
Marketing Department
Baylor University
1 Bear Place No. 98007
Waco, TX 76798
USA

E-mail: jim_roberts@baylor.edu