University life has gone digital: Influences of institutional mobile social network use during the Covid-19 emergency

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Design/methodology/approach – Students from across a large university were invited to participate in a survey. Responses from 915 students who reported using the app were analyzed using a maximum likelihood covariance-based structural equation model. Analysis was conducted using the R programming language's psych, lavaan, and semTools packages.

Purpose – Many universities implemented institutional social networking apps as an alternative to in-person social experiences during the Covid-19 pandemic. We explored previously identified factors that influenced intentions to form collective actions, also known as we-intentions, on such social networking apps and their influence on student satisfaction with the app artifact.

Findings – We found that we-intentions are positively associated with recent app use and with student satisfaction with the app. Group norms were found to significantly influence the formation of we-intentions, while social identity is positively associated with both we-intentions and satisfaction.

Originality/value – The paper provides evidence that past research generalizes to the context of university mobile social networks and identifies a relationship between we-intentions and satisfaction in this context. It also provides practical insight into factors that influence we-intentions, and subsequently students' online education experience, in the context of a university's institutional mobile social network.

Keywords: Online communities, User behavior, Distance learning, Emergency remote education, Social networks, Covid-19

Paper type: Research paper

1. Introduction

During the Covid-19 pandemic, universities around the world found themselves in the unprecedented situation of having to implement social distancing. In Canada specifically, most universities had to abruptly transition from a largely in-person learning environment to one that was entirely contactless (Houlden and Valesianos, 2020). As it became apparent that social distancing measures would continue for months and years, university administrators took steps to prepare for an extended period of remote education (Myrick *et al.*, 2020). Though many stakeholders faced adverse effects, the transition to socially distant teaching was particularly impactful on students, and it became apparent that the loss of the university social experience harmed their mental health (Copeland *et al.*, 2021). In a socially distanced remote learning environment, students were unable to meet new people, socialize, and form friendships with their peers as they normally would in a physical education setting.

How can universities encourage students to have positive social experiences in such a remote education environment? One possible solution is to develop an institutional social network, which can encourage remote social interactions and friendships. Though there is now emerging evidence that emergency online teaching environments caused excessive social media use (Brailovskaia and Margraf, 2021), there is also past evidence to suggest that social network participation can have a positive impact on people suffering from anxiety (Indian and Grieve, 2014), and may even contribute to the well-being of university students (Manago *et al.*, 2012). Though social networks cannot replace the traditional university experience, administrators may wish to consider their potential for facilitating meaningful social interactions among students when they have a remote offering. By digitizing an institution's existing physical social network with a social networking application, stakeholders

might create a space for meaningful social interactions, which could improve students' experience with remote education.

This paper describes a study of an online community supported by an institutional mobile social network. The mobile social network was implemented by a large Canadian university to facilitate social interactions among students in a remote education environment starting in September 2020. Among the technologies employed was a customizable university mobile social networking application developed by READY Education (READY Education, 2021). This application was designed to develop and facilitate a social online community for students given the absence of in-person social interactions, by facilitating content creation, reactions to content, and allowing students to log the contact information of other students through a Facebook-like "friends" feature. The application integrated with the university's central identification service to register all students with the application, though students were not required to use the app. Like contexts explored in past literature (Tsai and Bagozzi, 2014; Chen *et al.*, 2020), the goal of the application was to facilitate collective social actions among peers (often called "we-intentions").

The unique circumstances presented an opportunity to study innovations in the educational experience at a time of great uncertainty for students. Educational institutions need to understand whether investments in social technologies translate to positive student outcomes and if so, which factors lead to such positive outcomes. Our underlying research objectives were to identify the factors that influenced the desire to participate in university online communities and determine whether this influenced engagement, as expressed by the formation of we-intentions. Our study makes three contributions. First, it corroborates past research and replicates the results of past studies (Tsai and Bagozzi, 2014; *Chen et al.*, 2020) in the novel context

of an educational institution's social mobile network. Second, we discover relationships between university social identity, we-intentions, and mobile social network application technology satisfaction. This adds new theoretical insight as well as insight into successful adaptations that universities made to facilitate social capital and information sharing during the Covid-19 pandemic (Leung *et al.*, 2022; Meng *et al.*, 2021; Soares *et al.*, 2022). Finally, the paper offers practical insights into factors that influence we-intentions and suggests that institutions can support their mobile social networks by fostering a strong sense of university social identity online. Taken together, this offers both theoretical and practical contributions that can help pedagogues design effective remote social technologies.

2. Related Works

2.1 Social Media and Universities

Social networking sites (SNS), such as Facebook or Twitter are popular means of communicating and connecting with others. SNSs are now often accessed using mobile apps, rather than through web browsers, which has led many researchers to distinguish SNS apps such as Snapchat or Instagram as mobile social networks (Wu *et al.*, 2020). Online communities refer to networks and relationships among individuals that often rely on text, image, and video-based communication accessed through SNS or mobile social networks (Bagozzi and Dholakia, 2002; Rosenbaum and Shachaf, 2010; Masciantonio *et al.*, 2021).

Online communities are often developed to serve varying purposes, such as mental support, information/knowledge exchange, and entertainment, with the goal of establishing shared social identities (Bargh and McKenna; Cheung and Lee, 2009). While actively use of SNSs (i.e., engaging with other users in the online community,

often by liking, commenting, or sharing) has been shown to positively contribute to an individual's well-being (Kim and Yang, 2017; Dang, 2020), passive use of SNSs (i.e., viewing content posted by other users without engaging) has been shown to negatively contribute to well-being (Masciantonio *et al.*, 2021). People who experience gratification from an SNS through content sharing with their peers are more likely to indicate a preference for that network (Hwang and Cho, 2018).

Prior research concerning the effect of SNS use on university students' well-being is mixed. SNSs help young people satisfy their psychosocial needs in an online-saturated world (Manago *et al.*, 2012) and the use of SNSs have been associated with the effective use of educational technologies (Eger *et al.*, 2020) as well as an increase in student engagement with online learning (Heiberger and Harper, 2008). However, an increase in time spent using SNSs has also been found to be associated with a decrease in overall student engagement in the classroom and an increase in time spent participating in co-curricular activities (Junco, 2012). A possible explanation for these contradictory findings was suggested by Mao (2014), who found that students' affordances of social media shape their ability to understand its potential for facilitating learning experiences, positive learning environments, and engagement. Later during the Covid-19 pandemic, Soares *et al.* (2022) found that the degree of students' emotional reaction to social media was the most significant factor in determining student engagement with the platform. These together suggest that intentional action by universities to create their online social community could be an important step towards improving the student experience and that by creating a unique technical artifact, they might facilitate productive social media use.

In addition to the literature on engagement, there is emerging work about factors that influence social media use, online community participation, and positive

learning outcomes. A university's social media presence was found to be important for facilitating first-year undergraduates' transition to university life and consequent success (Thomas *et al.*, 2017). Ask and Abidin (2018) extended these findings by observing persistent meme posting behavior among students on a Facebook higher education group. They ultimately found that while such behavior benefits students by creating a safe space for expression, such posts are often expressions of deeper areas of concern that merit action by universities (Ask and Abidin, 2018). This was corroborated by Wakefield and Frawley (2020), who demonstrated that the negative implications of SNS use are mitigated by a student's general academic achievement, as the performance of higher-achieving university students is not significantly impacted by SNS use. Other work has found that social media environments are becoming increasingly important for supporting students in their efforts to form social relationships, while physical spaces such as libraries are becoming increasingly less important for this goal (Leung *et al.*, 2022). As such, we can expect social media to play an increasingly important role in positive university experiences, especially in an environment where online learning plays a central role.

2.2 We-intentions

Though there are many ways to envision online community participation, researchers have found it useful to envision participation as intentional collective social action, also known as a "we-intention" (Bagozzi and Dholaki, 2002; Chen *et al.*, 2020; Cheung and Lee, 2010; Cheung *et al.*, 2011; Tsai and Bagozzi, 2014). A we-intention has been defined as a "commitment of an individual to engage in joint action and involves an implicit or explicit agreement between the participants to engage in that joint action" (Tuomela, 1995, p.9) or as an intention to use social technology, such as an SNS, for a collective action (Bagozzi and Dohlakia, 2002; Tsai and Bagozzi, 2014; Chen *et al.*,

2020). Research has demonstrated that we-intentions, especially when expressed through explicit actions on an SNS platform, are strong drivers of online community participation (Bagozzi and Dholakia, 2002; Cheung and Lee, 2010; Tsai and Bagozzi, 2014).

There are a variety of factors that can influence we-intentions in an online community, including anticipated emotions, social identity (Bagozzi and Dholaki, 2002; Tsai and Bagozzi, 2014), social responsibility (Chen *et al.*, 2020), and social affirmation (Kende *et al.*, 2016). While positive anticipated emotions have been shown to strengthen users' we-intentions, negative anticipated emotions have been shown to have the opposite effect (Tsai and Bagozzi, 2014; Casaló *et al.*, 2021). Social identity, which can be defined as an individual's sense of self concerning belonging to a particular group (Tajfel and Turner, 1986), has been shown to have a positive effect on we-intention, as has perceived social responsibility (Chen *et al.*, 2020). Social affirmation (i.e., participating in SNSs to build social capital) has been shown to have a positive effect on we-intention and motivate individuals to engage in collective action (Kende *et al.*, 2016). Recent research has expanded on these models and has identified other factors that affect engagement such as media richness (Mirzaei and Esmaeilzadeh, 2021) and hedonic use habits (Li and Suh, 2021).

Given the design and goals of a university's mobile social network, it is reasonable to assume that university online communities would share relationships that were identified by past research. However, our primary goal was not just to replicate the results of past studies, but instead to investigate whether the formation of we-intentions positively influenced student experience during remote teaching. University student outcomes are shaped by their ability to form high-quality relationships (Buote *et al.*, 2007), and university online communities might be adopted

to meet this need. We would expect that the relationship between we-intentions and community participation would hold similarly to past findings (Tsai and Bagozzi, 2014), and would generalize to expressed recent use of the university's mobile social network. We thus adopt a conceptualization of we-intentions similarly to Tsai and Bagozzi (2014) and Chen *et al.* (2020), which emphasized a willingness to take a collective action on the social network within the next two weeks. This led us to the following hypothesis:

> *H1.* Intention to use the university's mobile social network for a collective action will be positively associated with recent app use.

2.3 Information Technology Satisfaction

Though there are many ways that education technology and information systems researchers have measured successful outcomes, satisfaction is among the most common (Cheng *et al.*, 2017; Al-Fraihat *et al.*, 2020). In the context of information systems, researchers have studied satisfaction since the nascent days of the field (Cyert and March, 1992) and continue to do so to this day. Satisfaction is often measured as a single comprehensive construct that is predicted by information systems quality and information quality, concerning the Information Systems Success model originally outlined by DeLone and McLean (1992). Studies that have been conducted since often employ technology design factors to predict user satisfaction (Landrum *et al.*, 2010; Salam and Farooq, 2020), perhaps most notably with mobile technologies (Wang and Liao, 2007).

The study of user satisfaction is particularly interesting in the context of education technologies because it is a predictor of benefits and positive learning outcomes (Salam and Farooq, 2020). Satisfaction has been studied as a determinant

of outcomes such as intention to use a social network (Cheung and Lee, 2009), as a factor in an overall outcome measure (Keramati *et al.*, 2011), and as a dependent variable in relation to user experiences with education technologies (Sun *et al.*, 2008; Selim, 2009; Navimipour and Zareie, 2015). Though many studies have investigated satisfaction as a determinant of technology use, the latter conceptualization of satisfaction as a measure of a learner's user experience is common in the context of education technologies, as it reflects users' attitudes towards its wider role in forming their educational experience (Sun *et al.*, 2008). In the case of a mobile social network, we can similarly conceptualize satisfaction as a dependent variable, as it reflects students' experience with education technology, specifically one designed to facilitate interaction with an online community and support a positive learning experience.

We opted to extend the Tsai and Bagozzi (2014) model by also investigating a relationship between we-intentions and app satisfaction. Satisfaction is a broad and multifaceted concept that has been employed extensively in the literature to measure a range of student outcomes with e-learning technologies (Arbaugh, 2000; Sun *et al.*, 2008; Selim, 2009; Navimipour and Zareie, 2015), as well as virtual communities in a teaching context (Cheung and Lee, 2009). The satisfaction measure employed by Sun *et al.* (2008), for instance, was used to investigate the impact of multiple design factors on a broad-reaching of satisfaction measure. In this case, e-learning satisfaction served as a measure of students' perception of congruence with the goals of the e-learning course. Similarly, if we-intentions were an important factor in driving student satisfaction with the mobile application, we could conclude that there is congruence between the formation of collective behaviors and whether students perceive themselves benefitting from the platform. This led us to the following hypothesis:

H2. Intention to use the university's mobile social network for a collective action will be positively associated with app satisfaction.

2.4 Group Norms

Group norms represent the adoption of a decision based on goals shared with other group members, which plays a critical role in continued participation in an online community (Cheung and Lee, 2009, p. 281; Shen et al., 2011). Recent research has found that group norms related to positive social identities (Fen *et al.*, 2021) and community cohesiveness (Kim *et al.*, 2022) are significant factors in improving engagement on social platforms. Group norms can thus be expected to play a role in the formation of we-intentions in the context of university online communities.

Many of the past studies on we-intentions drew from frameworks grounded in the Theory of Planned Behavior (Azjen, 1991), which asserted that attitudes, subjective norms, and perceived behavioral control influence intentions and behaviors. While some authors have expanded this model to further incorporate the impact of desires (Tsai and Bagozzi, 2014; Chen *et al.*, 2020), others have noted the impact of various expanded antecedents on we-intentions directly (Shen *et al.*, 2010; Chen *et al.*, 2020). For example, in the context of social networked team collaboration, Shen *et al.* (2010) demonstrated the moderating effect of gender on the relationship between group norms, social identity, and we-intentions.

Though the theory of planned behavior describes subjective norms (i.e., beliefs about people who are important to me) as an antecedent of intentions, the literature on we-intentions has consistently highlighted the importance of group norms (i.e., the degree of my perception of my peers sharing the we-intention goal) instead. Studies have consistently identified significant relationships between group norms

and we-intentions and have not found significant relationships between subjective norms and we-intentions (Shen *et al.*, 2010; Tsai and Bagozzi, 2014; Chen *et al.*, 2020). We were thus led to propose the following hypothesis:

H3. Group norms will be positively associated with the intention to use the university's mobile social network for a collective action.

2.5 Social Identity

As mentioned above, social identity can be broadly defined as an individual's sense of self and identity with a particular group (Tajfel and Turner, 1986). Students' social identities are often intertwined with a university's online social media presence, which can in turn influence their ability to participate in meaningful communities or develop professionally (Thomas *et al.*, 2017). In the context of a university mobile social network community, we can likewise expect that possessing strong social identities with the community would encourage collective actions.

However, in addition to we-intentions, we have reasons to believe that social identity would also affect the student experience. In the case of e-learning, there is evidence to suggest that social identity plays a role in shaping student satisfaction factors (Baxter and Haycock, 2014). When confronted with an online community and technological artifact that is explicitly designed for a university, we could expect that students' identities might similarly inform their satisfaction. This leads us to the following hypotheses:

H4a. Social identity will be positively associated with the intention to use the university's mobile social network for a collective action.

H4b. Social identity will be positively associated with app satisfaction.

3. Materials and Methods

3.1 Instrument development

Building on the work of Tsai and Bagozzi (2014) and Chen *et al.* (2020), we constructed a research model to guide our investigation. The we-intentions model described by Tsai and Bagozzi (2014) explored the role of social identity and group norms in determining contribution behavior to the university online community. The model drew from the theory of planned behavior (Ajzen, 1991) and the model of goal-directed behavior (Perugini and Bagozzi, 2001) to create an operationalization of the we-intentions concept. We simplified prior models to investigate the effects of group norms and social identity specifically, while also incorporating new information about preferences for other social applications and whether the ability to form we-intentions influenced reported recent app use and satisfaction with the application. Figure 1 summarizes our research model.
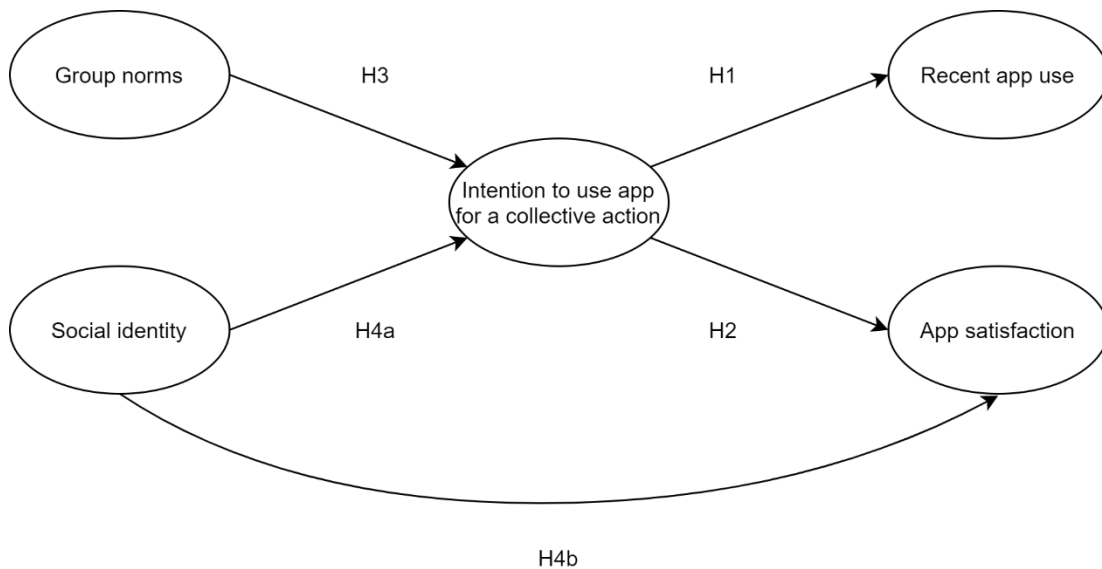

Figure 1 – Research Model

We thus developed a questionnaire to test this model which measured demographic information, past app use behavior, attitudes towards the university's mobile social network and online community, we-intentions, and overall satisfaction with the application. The specific constructs investigated in this study were adapted from prior measures, as described in Table 1. The items described were administered on a 5-point Likert scale except for the demographic and recent app use questions. All procedures for this study were reviewed and approved by our university's research ethics board and were found to conform to the Canadian Tri-Council Policy Statement on Research Involving Humans.

Table 1 - Survey instrument

Construct	Question
Recent app use	Have you used the university mobile app for any purpose within the last two weeks? (no/yes)
Group norms	Using the university mobile app for a collective action (e.g. to form a study group or run an online social event) can be considered to be a goal. For each of the following people described below, please estimate the strength to which each holds the goal. If you do not wish to answer a question you can leave it blank. (1 = weak to 5 = strong).
GN-1	Strength of self's goal.
GN-2	Average strength of your friends' goals.
GN-3	Average strength of your classmates' goals.
GN-4	Average strength of a university mobile app users' goals.
Social identity	The scale for each of the social identity items was (1 = strongly disagree to 5 = strongly agree).
SID-1	I have a strong sense of attachment to the university mobile app community.
SID-2	I feel a strong sense of belongingness to the university mobile app community.
SID-3	I am a valuable member of the university mobile app community.
SID-4	I am an important member of the university mobile app community.
We-intention	The scale for each of the we-intention items was (1 = strongly disagree to 5 = strongly agree)

WEI-1	I want to use the university mobile app to take a collective action with other app users.
WEI-2	We (i.e., a group of my friends or colleagues at my university) intend to use the university mobile app to take a collective action in the next two weeks.
WEI-3	I believe that I will use the university mobile app to make my own contribution to a collective action in the next two weeks.
WEI-4	I believe that we (i.e., a group of my friends or colleagues at my university) will use the university mobile app to perform a collective action in the next two weeks.
Satisfaction	The scale for each of the satisfaction items was (1 = strongly disagree to 5 = strongly agree)
SAT-1	I am very satisfied with the university mobile app.
SAT-2	I feel that the university mobile app serves my needs well.
SAT-3[1]	I am disappointed with how the university mobile app worked out.
SAT-4[1]	If I had in-person options, I would not participate in the university mobile app community.
SAT-5[1]	It is difficult to socialize with the university mobile app community.

[1]Denotes a reverse item.

The dependent variables for this study were self-described recent app use and app satisfaction. We decided to use a self-described recent use measure to reduce the complexity of our study and help maintain response privacy among the student participants. The app satisfaction measure, by contrast, was adapted from five of the eight items in the e-learning satisfaction measure described by Sun *et al.* (2008). The items selected to measure satisfaction were chosen because of their relevance to the university's mobile social network community, as opposed to the e-learning context. The group norms, affective social identity, and evaluative social identity were derived from the measures described by Tsai and Bagozzi (2014). Desires, and we-intentions measures adapted from Chen *et al.* (2020). Given that the target community was likely

to access the survey on a mobile device, we opted to limit the survey length to preserve data quality, as recommended by Wilson and Djamasbi (2019).

3.2 Data collection

We solicited students who were currently taking at least one course at a major Canadian research university to participate in an online survey. Participants were recruited through three bi-weekly messages posted to the mobile platform by a member of our research team, as well as a general message sent to approximately 18 0000 students at the university through the institutional learning management system. All participants who clicked to the end of the survey were entered into a raffle for a chance to win one of four CAD $50 Amazon gift certificates. 2,368 students opted to participate in the survey by opening the survey and answering at least one question. We excluded participants who completed their survey in more than 1,200 seconds and only analyzed data from participants who answered all the survey questions (Galesic and Bosnjak, 2009). We also excluded participants who did not report using the mobile social network. This yielded 915 responses which were studied in our analysis. We provide an overview of our participants' demographics in Table 2.

Table 2 – Summary of demographics, sample size N = 915

Dimension	Classification	Percentage of respondents
Age	Under 18	0.77
	18 - 24	80.77
	25 - 34	14.75
	35 or older	3.61
	Prefer not to disclose	0.1
Gender	Woman	61.20
	Man	35.30
	Non-binary	2.08

	Other	0.66
	Prefer not to disclose	0.76
Location	The university's province	73.22
	Another province in Canada	14.21
	A foreign country	12.02
	Prefer not to disclose	0.55

We administered the study and collected data using the Qualtrics survey platform over 40 days from February 27th to April 8th, 2021. After selecting a link, participants were informed about the study and gave consent by continuing to the survey. Participants were not obligated to answer any questions. Participant identities were not collected and were not identifiable, though participants provided email addresses to enroll in the raffle.

3.3 Data analysis

Analysis was conducted using the R programming language (R Foundation, 2021) using the psych (Revelle, 2017), lavaan (Rosseel, 2012), and *semTools* (Jorgensen *et al.*, 2021) packages. Cronbach's alpha and average variance extracted were used to assess the validity of the SID (α = 0.91; AVE = 0.73) and WEI (α = 0.90; AVE = 0.71) measures. We dropped items GN-4 from the group norms measure as well as SAT-4 and SAT-5 from the satisfaction measure, increasing the values for GN (α = 0.88; AVE = 0.72) and SAT (α = 0.84; AVE = 0.66). All instruments exhibited Cronbach's alpha greater than 0.84 and AVE greater than 0.65, supporting internal consistency. Descriptive statistics of the population are given in Table 2 and descriptive measures used in the structural equation model are provided in Table 3. Given that the theoretical model was designed to test relationships between previously validated measures, the survey data was analyzed using a maximum

likelihood covariance-based structural equation model (CB-SEM) as described by Kline (2015).

4. Results and Discussion

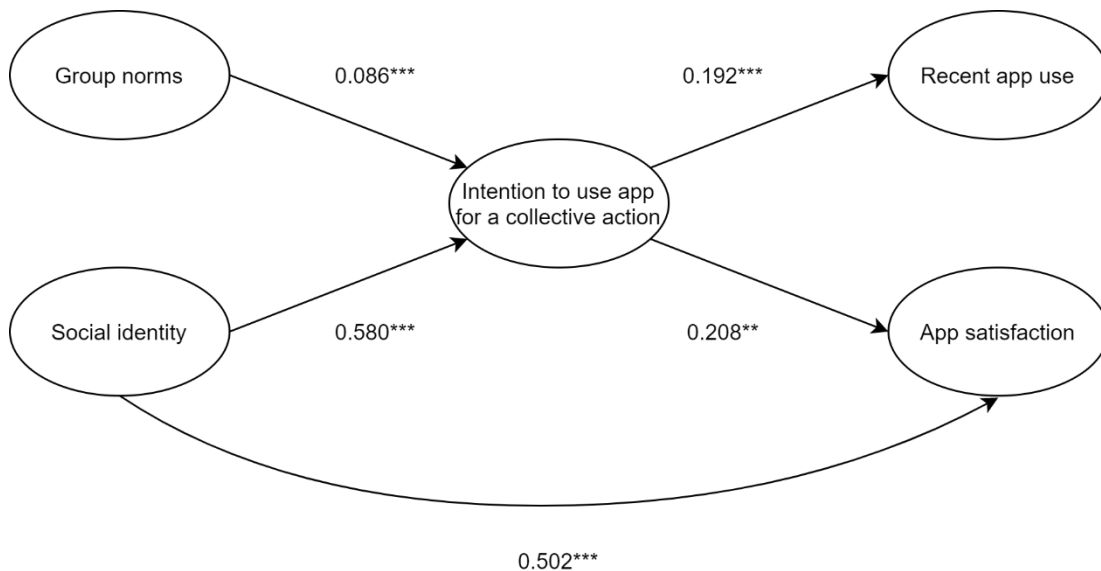**Table 1** - Descriptive statistics of the structural equation model variables

Construct	Item	M	SD	Skewness	Kurtosis	α	AVE
Recent app use	USE	0.26	0.45	-0.91	-0.86		
Group Norms	GN-1	3.11	1.16	-0.30	-0.65	0.88	0.72
	GN-2	2.96	1.08	-0.31	-0.48		
	GN-3	3.06	1.06	-0.35	-0.34		
	GN-4[1]	3.14	1.02	-0.42	-0.18		
Social Identity	SID-1	2.22	1.13	0.55	-0.65	0.91	0.73
	SID-2	2.37	1.13	0.36	-0.79		
	SID-3	2.29	1.11	0.39	-0.70		
	SID-4	2.17	1.11	0.55	-0.59		
We-intentions	WEI-1	2.73	1.19	-0.03	-0.97	0.90	0.71
	WEI-2	1.95	1.08	0.84	-0.20		
	WEI-3	2.06	1.13	0.72	-0.50		
	WEI-4	2.05	1.14	0.73	-0.51		
Satisfaction	SAT-1	3.10	1.07	-0.37	-0.56	0.84	0.66
	SAT-2	3.01	1.13	-0.21	-0.83		
	SAT-3[2]	5.19	1.17	-0.21	-0.85		
	SAT-4[1,2]	4.81	1.30	0.14	-1.09		
	SAT-5[1,2]	4.47	1.13	0.42	-0.60		

[1]*Denotes a dropped item.* [2]*Denotes a reversed item.*

Of the 915 participants who responded to all the survey questions and reported having used the app at some point in time, only 242 (26.4%) reported having used the app in the last two weeks. The resulting CB-SEM model yielded a significant chi-square χ^2 measure (df = 84; N = 915; χ^2 = 623.745; $p < 0.001$). Overall fit statistics suggested a sufficient fit (CFI = 0.947; TLI = 0.933; RMSEA = 0.084; SRMR = 0.067). All

standardized factor loadings were acceptable and significant (loadings > 0.741; $p <$ 0.001).

Analysis of the relationship between the various constructs also provided evidence to support our hypotheses. We-intentions were positively associated with reported recent app use (β = 0.192; $p < 0.001$) and positively associated with app satisfaction (β = 0.208; p = 0.002), supporting H1 and H2. The observed antecedents of we-intentions also supported our hypotheses: group norms (β = 0.086; $p < 0.001$) and social identity (β = 0.580; $p < 0.001$) were positive predictors of intention to take collective actions, as well as app satisfaction (β = 0.502; $p < 0.001$). These results support H3, H4a, and H4b respectively. Figure 2 summarizes these findings.

*** denotes $p < 0.001$; ** denotes $p < 0.01$

Figure 2 – Research Model Results

4.1 Theoretical implications

The findings contribute to an extant understanding of the role of we-intentions in driving community participation. We replicated past findings (Tsai and Bagozzi, 2014;

Chen *et al.,* 2020) that group norms and social identity influence we-intentions, and we-intentions in turn influence community participation. While we drew from the reference studies for measures of group norms, social identity, and we-intentions, we departed from the reference studies in our measure of contribution behavior and app satisfaction. We also applied the theory of we-intentions in a new context, namely that of a university mobile application. The fact that we observed a positive relationship between we-intentions and recent app use suggests that the impact of we-intentions extends beyond contribution behavior itself. Our findings provide evidence that we-intentions do not just concern conventional social networking sites described by Tsai and Bagozzi (2014) and Chen *et al.* (2020)., but also the entire social life of a modern technology-enabled university.

The second theoretical contribution is the discovery of a relationship between we-intentions, social identity, and app satisfaction. Though our instrument drew from studies in e-learning technology (Sun *et al.*, 2008), there is much wider literature on information systems satisfaction and its relationship with technology acceptance, task success, and information technology use (Al-Fraihat *et al.*, 2020). This finding builds on that literature and suggests that social identity plays an important role in the adoption decision process for university mobile social networks. This trend may generalize to social media broadly. Though we cannot conclude definitively from a single study, future work might benefit by incorporating social identity factors in studies about the design of university mobile applications. Researchers may also benefit from investigating the relationship between identity and app satisfaction.

4.2 Practical implications for universities

In the early days of the Covid-19 restrictions, universities often rushed to implement innovative technological solutions. However, many of these solutions did not live up

to their promise. In the case of the application described in this study, it had been available for nearly 7 months and had witnessed a decline in use since its launch. While 65% of our respondents reported using the application at some point, only 26.4% of respondents indicated that they used the application in the last two weeks.

Today, many universities face similar challenges in leveraging social technology and developing a satisfactory online community. Our findings suggest that there are strategies that universities can employ to prevent this decline, by taking steps to foster strong brand awareness and a perceived affiliation with the institution. Examples of useful tactics include holding live video events with influencers, streaming sports games, or facilitating meme sharing using the platform. If administrators can foster a stronger sense of social identity among students, students will not only be more engaged on the social networking platform but also more satisfied with their experience.

Another lesson from these findings is that an effective university application should incorporate design features that encourage networking with new peers, rather than simply connecting with people the students already know. Well-designed apps should thus facilitate information discovery. For example, past studies have suggested that students use image-sharing features such as those provided by Instagram for discovering new and interesting ideas (Hwang and Cho, 2018), but do not use Facebook for this task (Shane-Simpson *et al.*, 2018). University administrators may benefit by ensuring that their mobile applications leverage features of Instagram or other mobile-centered networks, which encourage public image or video sharing across the university network, rather than a closed network of peers like Facebook. Such apps could go even further to facilitate ease of use by leveraging equity-enhancing technology. For example, by implementing automatic video subtitles or

optional colorblind interfaces, universities could engage an even broader range of students.

Finally, administrators should take a supportive, rather than an authoritative role in curating their social networks. Though many universities may fear the implications of negative content posted on the platform, such as criticism of the institution or grievances about courses, critical expressions can be important for building a student's identity and sense of cohesiveness with others (Ask and Abidin, 2018). While institutions should ensure student safety, they should avoid the temptation to create a space that becomes too professional, as it will inhibit the formation of social identity in the social network space.

5. Conclusion

The Covid-19 pandemic was and remains an unprecedented crisis. Though it has brought unquestionably negative circumstances to universities and their students, crises such as this also present opportunities for innovation. In this paper, we investigated the use of a digital tool to supplement student social experience, which has the potential to improve student outcomes during challenging times and improve student experience moving forward. We presented evidence that the ability to form intentions for collective action (we-intentions) contributes to use and satisfaction with these apps. We also built on past literature to demonstrate that group norms and social identity influence these intentions. The latter of these is also a strong factor in predicting satisfaction with such tools. As universities transition to a post-pandemic environment, they might benefit from the continued use of such institutional social networks. If they opt to do so, they should consider app design factors that facilitate the formation of strong social identities without impeding collective actions.

Like any research, our results have some limitations. First, our study is restricted to one new mobile social network community implemented at a large Canadian university under the unique circumstances of emergency remote education during the global Covid-19 pandemic. There may be unique factors that affected the generalizability of our results. Though many of our findings are corroborated by prior work (Tsai and Bagozzi 2014; Chen *et al.*, 2020), the relationships between we-intentions, social identity, and app satisfaction may be shaped by the circumstances of the app implementation. Second, our study observed one articulation of we-intentions, understood as "fully cooperative group action" (Bagozzi and Dholakia, 2002), as opposed to another conceptualization, such as minimally cooperative group action (Tuomela, 1995). We-intentions, by their nature as a collective intention, are difficult to conceptualize and operationalize. By asking individual participants about their we-intentions, we in fact measured something analogous to an individual perception of a fully cooperative collective action. Finally, a live question remains about the affordances of the application. Students' perceptions of the purpose of a social networking platform are known to affect their preference for it (Shane-Simpson *et al.*, 2018) as well as their ability to successfully learn using it (Mao, 2014). In this circumstance in which a university sanctioned and constructed its own mobile social networking platform in the absence of physical interactions, it is unclear whether students perceived the app as a primarily utilitarian social networking site, a primarily professional social network, or an e-learning tool. Future work can nonetheless build on these findings and replicate the results in a different context, such as a routine and non-emergency implementation. If future studies observe similar relationships, we can conclude that social activity on university mobile applications plays a critical role in whether they will be adopted by a university's wider student body.

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7. References

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