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Privacy paradox among romantic couples: the use of location sharing apps

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The proliferation of smartphones has elevated privacy concerns, particularly regarding the easy access to geolocation information. Scholars have attempted to find a balance between location sharing and privacy protection; however, such a balance seems less relevant in the use of location-sharing apps among romantic couples. This study aims to explore the role of location-sharing apps in romantic relationships and examines whether privacy still matters in this context. The couple and family technology framework as well as sociotechnological family framework were incorporated to develop a theoretical framework for the current study. A survey was applied and the sample size was 434. The findings reveal that acceptance of monitoring negatively associates with perceived intrusion while scope positively associates with perceived intrusion. Scope is positively associated with mate-guarding. Perceived intrusion negatively associates with relationship satisfaction whereas mate-guarding positively associates with relationship satisfaction. Theoretical implications were discussed.

KEYWORDS

romantic partners, location sharing apps, acceptance of monitoring, perceived intrusion, mate-guarding, relationship satisfaction

Introduction

With the proliferation of smartphone technology, people's awareness of privacy issues has been raised to a certain level. However, when facing intimate relationships, such as family members, close friends and romantic partners, many assumptions of privacy become inapplicable (Levy and Schneier, 2020). It is especially true when privacy issues confront romantic relationships, because online surveillance plays a key role in driving romantic partners to apply social media (Whiting and Williams, 2013) yet it helps to maintain relationships between couples. Such behavior has become prevalent among couples, and due to the development of mobile technology-specifically location sharing apps-monitoring has evolved to a different level.

Monitoring in the current study refers to horizontal surveillance, which means individuals can both watch and be watched at the same time. It differs from vertical surveillance, which means individuals were watched by the state, the military and the major Internet industries (Hermida and Hernández-Santaolalla, 2020). Horizontal surveillance has become pervasive due to the rapid development of social media and is especially significant among romantic relationships (Rus and Tiemensma, 2017). Scholars have not reached a consensus regarding the definition of surveillance among romantic partners, because romantic partner surveillance can be neutral as well as negative. For example, partner monitoring (Muise et al., 2014), which refers to repeatedly checking of a romantic partner's SNS profile, can be neutral, whereas intimate partner cyberstalking has a negative impact on romantic relationships (Smoker and March, 2017). The current study proposes a definition of online monitoring in romantic relationships namely "the monitoring of a partner's digital footprint, varying from passive

observation to intrusive actions and potentially being mutually agreed upon.” Based on this, social location sharing apps pave the way for online monitoring to the next level.

Social location sharing apps here refers to apps such as Google Maps, Zenly and so on. These apps incorporate location sharing with social media functions. They allow users to constantly monitor others' whereabouts not only in terms of recent movement history, but also in real time. Although social media provides multiple types of information and data, it is not necessary to allow others to be aware of one's geolocation unless one actively tags it. Sharing one's location can be considered as an extremely sensitive form of revealing information. This is because it not only affects the digital privacy and security of users, but also has implications for their physical safety (Wisniewski et al., 2020). Through observing location sharing apps, one's patterns of use and their behaviors could be revealed (Michael and Michael, 2011), hence the privacy may be violated. Regarding location sharing, turning off data sharing ensures absolute protection of privacy. Previous studies have attempted to find a balance between sharing data and protecting privacy such as setup time limitation and selecting an audience (Consolvo et al., 2005; Toch et al., 2010). However, such balance seems less applicable to romantic relationships. For couples, continuous location sharing represents intimacy and when this configuration changes, it leads to suspicion regarding questioning their motivations (Schneegass et al., 2021). Actually, couples usually share sensitive information, such as passwords (Singh et al., 2007), online accounts (Park et al., 2018), and online calendars (Neustaedter et al., 2009), which indicates privacy issues are less significant in romantic relationships. People may not perceive online monitoring in romantic relationships as harmful, and sometimes it represents “being concerned” by their romantic partners (Lucero et al., 2014; Smith-Darden et al., 2017). Yet, online monitoring may be the result of unhealthy attachment (Beeney et al., 2019), a lack of trust issue (Arikewuyo et al., 2021), and even shape the power relationships between couples (Schildt et al., 2016). These affect the quality of relationships between couples. Worth noticing, a specific cultural value in Taiwan namely harmony was emphasized among romantic couples and it may contribute to the perception of online monitoring (Chang et al., 2020). These cultural dynamics may shape both the acceptability and interpretation of location-sharing behaviors. When it comes to the situation where romantic couples constantly watch their partners by using location sharing apps, privacy issues are supposed to be scrutinized, because the possible violation of privacy is not only limited to online, but also offline behavior.

Online monitoring in romantic relationships is a relatively new topic for scholars and could be roughly divided into two trends: motivations and problems. In terms of motivations in romantic partner monitoring, studies identified low self-control (Marcum et al., 2017), self-efficacy and commitment (Ruggieri et al., 2021), attachment style (Marshall et al., 2013), and low-quality relationships (Tokunaga, 2016). Regarding problems and consequences, scholars examined intention to break up (Arikewuyo et al., 2021) and other negative implications (Hernández-Santaolalla and Hermida, 2020). Meanwhile, scholars mainly paid attention to a specific point which is post-breakup (Fox and Tokunaga, 2015; Lukacs and Quan-Haase, 2015). However, few scholars move their focus to the use of social location sharing apps. Applying social location sharing apps in romantic relationships represents a willingness to forfeit privacy and blur the boundary between couples. Insights into this behavior allows

academics to extend the understanding of online monitoring, especially the adoption process. Hence the current study proposes a research question “How does the application of social location sharing apps shape the relationships of romantic partners?” and “What is the role of privacy in such monitoring behavior?”

In order to answer the research questions, the current study incorporates the couple and family technology framework as well as sociotechnological family framework into the development of a theoretical framework for the current study. The couple and family technology framework describes the influence of technology in shaping relationships while the sociotechnological family framework describes the influential role of technology among family members. Both frameworks share the same elements yet meanwhile exhibit independent characteristics. Based on these two frameworks, constructs such as acceptance of monitoring, scope, perceived intrusion, mate-guarding, and relationship satisfaction are organized into the development of the theoretical framework. The order of the current study in the following sections are literature review, method, findings, discussion and conclusion.

Literature review

Monitoring and location sharing in romantic relationships

Monitoring in intimate relationships occurs very often, with one third of couples engaging in such activities (Helsper and Whitty, 2010). Scholars have employed various terms to describe this phenomenon, such as interpersonal electronic surveillance (IES) (Tokunaga, 2011), mobile surveillance (Ngongo, 2016), online intrusion (Norton et al., 2018), cyberstalking (Marcum et al., 2017), cell phone snooping (Arikewuyo et al., 2021), and intimate monitoring (Levy and Schneier, 2020). The definitions of such behavior in various terms are similar, which emphasizes the unawareness by counter parties and monitoring targets' activities. For example, IES is defined as “surreptitious strategies individuals use over communication technologies to gain awareness of another user's offline and/or online behaviors.” (Tokunaga, 2011). Noticeably, most scholars link such behavior with negative associations, even to the level of crime (Marcum et al., 2017), because it is usually derived from anxiety, hurt, betrayal, and/or suspicion (Fox and Warber, 2013). However, this kind of information sharing in romantic relationships is not always negative, because it can be seen as a sign of commitment and trust (Bevan, 2018) as well as for convenience and safety (Levy and Schneier, 2020). This is to say that monitoring behavior should be viewed as a spectrum where the levels of such behavior are from socially acceptable to criminal. In addition, previous studies specifically focused on the idea of unawareness of subject (Morrongiello et al., 2019) and this resonates with the definition of IES which is a surreptitious strategy. However, when such behavior meets location sharing apps, the unawareness may not exist. Based on previous studies, the current study attempts to establish a definition of online monitoring in romantic relationships, which finds a balance between neutral and negative viewpoints. The definition refers to “Online monitoring in romantic relationships is the monitoring of a partner's digital footprint, varying from passive observation to intrusive actions and potentially being mutually agreed upon.”

According to the definition, a useful technology for online monitoring is location sharing apps.

Location sharing apps are designed to track users' physical location and movements. Recently, it has been implemented to curb the spread of Covid-19, however, scholars found that individuals resisted using these apps because of their perceived severity (Rodríguez-Priego and Porcu, 2022). Intriguingly, not all location sharing apps faced resistance, and one type of location sharing app for social connections is embraced by young adults, which includes Google Maps and Zenly, known by most people. The functions of these apps not only allow users to be aware of others' location and movements, but also serves as social media. Given the social media nature of these apps, users actively add people to their network. In other words, individuals voluntarily share their location information with others, and their monitoring behavior may differ from previous definitions. From a spectrum perspective, online monitoring in romantic relationships not only helps to build trust and commitment, but also can be a precursor to physical, emotional, and sexual abuse (Freed et al., 2017). When location sharing apps are employed for online monitoring, well-intentioned monitoring may lead to a slippery slope of acceptability, causing users to accepting surveillance as a form of social control (Levy, 2013). Based on this, the current study views using location sharing apps in monitoring behavior among couples as a way of maintaining romantic relationships and this behavior fluctuates on the spectrum from socially acceptable to criminal level.

Theory

As mentioned above, previous studies associated romantic relationship monitoring with negativities, and theories employed by scholars such as attachment theory (Marshall et al., 2013; Beeney et al., 2019), uses and gratification theory as well as technology acceptance model (Ruggieri et al., 2021), and negative relational maintenance theory (Tokunaga, 2016) were thus from a negative perspective. However, the current study views romantic relationship monitoring through social location sharing apps as neutral, therefore, the current study would incorporate couple and family technology with sociotechnological family framework to develop a theoretical framework.

Couple and family technology framework

Based on Social Penetration Theory, Social Presence Theory, and Media Richness Theory, Hertlein (2012) proposed the Couple and Family Technology (CFT) framework. The CFT framework noted that characteristics of technology influence the structure and process of relationships, specifically family relationships and romantic relationships. This framework consists of three domains, which are ecological elements of technology (domain 1), structural influences (domain 2), and process influences (domain 3) (Curtis et al., 2017; Norton et al., 2018). Ecological elements include accessibility, affordability, anonymity, acceptability, approximation, ambiguity, and accommodation (Hertlein and Stevenson, 2010). Structural influence mainly deals with the roles, rules, and boundaries that couples and families create to maintain their relationships (Hertlein and Blumer, 2014). The structural influences include redefinition of relational rules, redefinition of boundaries, and redefinition of roles (Hertlein, 2012). Process influences refer to the interaction between couples, the

relationship development across time, and meaning construction according to their rituals and behaviors. It is relevant to relationship satisfaction.

Sociotechnological family framework

Similar to the CFT framework, Lanigan (2009) proposed the sociotechnological family model to explain how communication technology influences family life. This model addresses mutual interactions among three factors, namely: technology characteristics, individual traits, and family factors. In addition to these three partially overlapping factors, this model also noticed extrafamilial influences, but it is less relevant to the current study. Technology factors include accessibility, scope, obtrusiveness, resource demand and gratification potential. Individual factors are personality, goals, attitudes, processing styles, and demographics. As for family factors, Hertlein and van Dyck (2020) has modified this to relational factors in order to better understand romantic relationships.

The current study

Both the CFT and sociotechnological family frameworks have something in common which are the influence of technology per se, although terminology differs. The current study incorporates these two frameworks to develop a theoretical framework to examine romantic relationship monitoring (See Figure 1). The aim of this theoretical framework is to align their parallel constructs into a single, processual flow. The development of a conceptual pathway was done against the backdrop of technology which makes monitoring possible, and then bridges CFT and sociotechnological family frameworks through relational perceptions. In other words, technological features form the monitoring behavior, which requires restructuring of boundaries and it in turn leads to relational perception as well as relationship satisfaction. The development of hypotheses is based on this argument. When romantic couples employ location sharing apps in their relationships, one of the key factors relevant to ecological elements would be acceptability. Acceptability refers to the approved use and role of technology in couple relationships, even to the level on which possible inappropriate behavior is accepted on the internet (Hertlein and Stevenson, 2010). The application of location sharing apps basically requires the approval of each party in romantic relationships, and here in the current study refers to acceptance of monitoring. People in romantic relationships may reluctantly accept the use of location sharing apps for the purpose of exhibiting intimacy, hence acceptance of monitoring is crucial to examine this behavior. Meanwhile, from the perspective of the sociotechnological family framework, scope should be relevant to the current study. Scope refers to the range of tasks in romantic relationships that information technology can perform as well as its ability to adapt and be flexible as a technology. In the scenario of romantic relationship monitoring, these levels at which location sharing apps can support couple functioning is significant. For example, location sharing apps can provide individuals to identify their romantic partners' pattern of travel history and then infer that their partners' behavior as suspicious.

From the perspective of the CFT framework, structural influences refer to the redefinition of relational rules, boundaries, and roles (Hertlein and Chan, 2020). When couples apply location sharing apps to monitor their partners, their relational rules, boundaries and roles

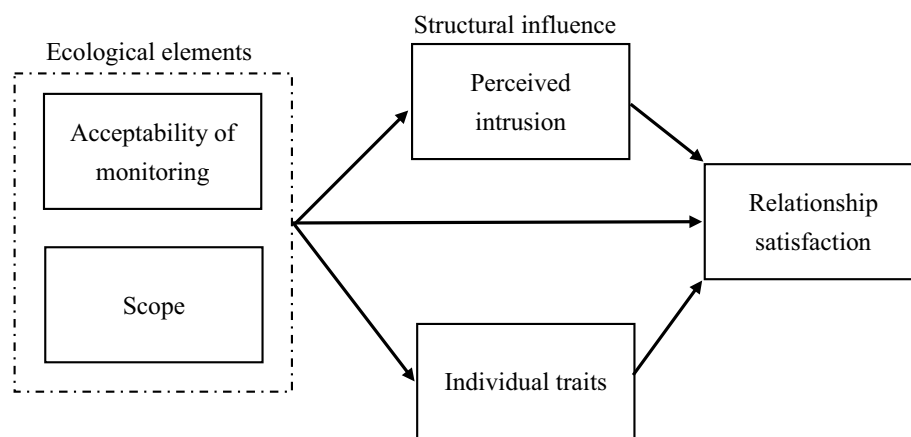


FIGURE 1
The theoretical framework of the current study.

may be affected. Online intrusion represents a monitoring behavior an individual employs to be aware of his/her partner's digital footprint (Reed et al., 2015). Although in the case where individuals accept their romantic partners to monitor their movements and activities, they can still perceive it as an intrusion. Hence the hypothesis,

H1-1: One's acceptance of monitoring negatively influences one's perceived intrusion.

Meanwhile, people in romantic relationships employ location sharing apps to support the functioning as couples, which refers to individual traits. According to the sociotechnological family framework, scope can be seen as part of an ecological element of technology, hence the hypothesis,

H1-2: One's scope positively influences one's perceived intrusion.

From the perspective of sociotechnological family framework, technology characteristics impact individual traits (Hertlein and van Dyck, 2020). Individual traits mean a person employs technology to fulfill his/her needs. Lanigan (2009) divided this construct into sub-constructs, however, whether it is personality, attitude, goals or demographics, when applying in romantic relationships, it reflects the nature of mate-guarding (Hertlein and Chan, 2020). According to Buss (2002), mate-guarding refers to maintaining relationships, getting rid of possible competitors and preventing break-up. In the scenario of using location sharing apps, romantic partners may expect to have full knowledge of their counterparties' movements and activities. When individuals have full knowledge of their partners, it allows them to lower their suspicion and increase their sense of security. Meanwhile, controlling behavior is associated with mate-guarding (Graham-Kevan and Archer, 2009), and the acceptance of monitoring and scope can be seen as lowering the barrier for controlling partners, hence the hypotheses,

H2-1: One's acceptance of monitoring negatively influences one's mate-guarding.

H2-2: One's scope positively influences one's mate-guarding.

Based on the CFT framework, the structural influences have an impact on the process influences, and in the current study, these are perceived intrusion and relationship satisfaction. Meanwhile, individual traits also influence relational factors, according to sociotechnological family framework. In the scenario of romantic relationships, perceived intrusion may lead to discomfort of the monitoring target, especially as in most cases, the location sharing function is always on. However, this is not always negotiable between partners in romantic relationships, because one party would expect to fulfill his/her goal of mate-guarding. This is to say that the perception of mate-guarding may contribute to relationship satisfaction. Hence the hypotheses,

H3: One's perceived intrusion negatively influences relationship satisfaction.

H4: One's mate-guarding positively influences relationship satisfaction.

Method

A quantitative survey was applied to collect empirical data, and the population of the current study is people who employ location sharing apps in their romantic relationships. This study received the IRB approval from Research Ethics Committee, and the serial number is 202205ES090. All participants provided informed consent prior to participation in the online survey. Advertisements were presented on social media pages and online forums. Given the specific situation of prospective participants, the current study employed purposive sampling and filter questions were presented at the very beginning of the questionnaire. Prospective participants were required to meet the filter criteria; otherwise, their responses were excluded.

Measurement scales

The measurement scales were mostly adopted from existing scales, however, given that the current study aims to explore the

use of location sharing apps among romantic couples, these scales were modified to meet the specific purpose of the current study. Meanwhile, some scales were developed by the author based on the findings of qualitative studies. The detailed measurement scales are in [Appendix 1](#).

The measurement scale of acceptance of monitoring was developed by the author. [Hertlein \(2012\)](#) proposed the construct of acceptability in the CFT framework, but this construct was never applied in any empirical examination. The author of the current study developed scale items according to the definition established by [Hertlein \(2012\)](#) and also took the scenario of applying location sharing apps among couples into consideration. The measurement scale contains four items, such as “I am comfortable when my romantic partner asks me to use location sharing apps” and “I am comfortable when my romantic partner asks me to be constantly visible on location sharing apps.” Meanwhile, the measurement scale of scope was developed through the inspiration of [Tokunaga \(2011\)](#). The construct of scope was from the sociotechnological family framework ([Lanigan, 2009](#)) and this construct was never employed in any quantitative research. [Tokunaga \(2011\)](#) developed an interpersonal electronic surveillance scale for social network sites and this scale provided the author inspiration. Based on the work of Tokunaga, the author developed a seven-item scale for scope.

The measurement scale of perceived intrusion was adopted from the work of [Wisniewski et al. \(2020\)](#) as well as [Xu et al. \(2012\)](#) and it contains four items. Example items are “I feel that as a result of my using location sharing apps, my romantic partner knows more about me than I am comfortable with” and “I believe that as a result of my using location sharing apps, information about me that I consider private is now more readily available to my romantic partner than I would want.” The measurement scale of mate-guarding was adopted from the Mate Retention Inventory ([Buss et al., 2008](#)). Although this inventory is a short form, it still contains 38 items. For the purpose of avoiding participant fatigue, the current study modified this scale based on the findings of [Nebl et al. \(2021\)](#), who identified the six most discriminant items of this inventory. Therefore, the mate-guarding scale in the current study contains six items. Regarding the measurement scale of relationship satisfaction, it was from the work of [Hendrick \(1988\)](#) and it contains seven items. Most scales were measured on a seven-point Likert scale from ‘strongly disagree’ to ‘strongly agree’. Exceptions were the scale applied to relationship satisfaction which was from ‘strongly dissatisfied’ to ‘strongly satisfied’. Since the original scales were in English, the wording has been translated into Mandarin before distribution of the questionnaire. For the purpose of clarity, the wording of the translated items were reviewed by two external individuals and some modifications were applied.

Data collection

The questionnaire was distributed through a survey website namely [SurveyCake.com](#). Prospective participants were required to answer the filter questions. The first filter question aimed to establish whether participants were in the romantic relationships and it was “Are you in a stable romantic relationship?” If the answer was NO, the questionnaire was excluded. The second filter question

attempted to ensure participants’ use of location sharing apps with their romantic partners, and it was “Do you use location sharing apps with your romantic partner to know their whereabouts? (Location sharing apps include Znely, Google Maps, Snapchat, ISharing, Life 360 and others).” Following this filter question, the next asked participants “How long do you use location sharing apps in your romantic relationships,” and if the answer was “never used,” then they were excluded. The data collection was between 30 March 2023 and 24 April 2023. The total number of participants was 645 and 211 participants were excluded. The number of valid samples was 434 (valid rate 67.3%). The detailed sample profile is shown in [Table 1](#). The gender distribution of participants shows a fair reflection of reality, and regarding the age distribution, although the majority of participants are between 26 and 30 years old, the gaps

TABLE 1 Sample profile.

Gender	
Male	46.8% (N = 203)
Female	53.0% (N = 230)
Other	0.2% (N = 1)
Age	
Between 18 and 20	8.1% (N = 35)
Between 21 and 25	21.0% (N = 91)
Between 26 and 30	33.2% (N = 144)
Between 31 and 40	21.2% (N = 92)
Over 41	16.6% (N = 72)
Relational status	
Unmarried couples not living together	51.4% (N = 223)
Unmarried couples living together	21.9% (N = 95)
Married couples living together	25.3% (N = 110)
Married couples not living together	1.4% (N = 6)
Relational type	
Same-sex partner	9.7% (N = 42)
Heterosexuality	90.3% (N = 392)
Duration of romantic relationship	
Under 3 months	4.1% (N = 18)
Between 3 and 6 months	6.7% (N = 29)
Between 7 and 12 months	11.8% (N = 51)
Between 1 and 2 years	19.8% (N = 86)
Between 2 and 3 years	13.6% (N = 59)
More than 3 years	44.4% (N = 191)
Duration of using location sharing apps	
Under 3 months	19.6% (N = 85)
Between 3 and 6 months	20.0% (N = 87)
Between 7 and 12 months	20.5% (N = 89)
Between 1 and 2 years	17.5% (N = 76)
More than 2 years	22.4% (N = 97)

among other age groups remain small. In summary, the participants in the current study tend to be unmarried and not living together couples, and the duration of their relationships was mostly more than 3 years.

Results

Exploratory factor analysis

Given that some measurement scales of the current study were developed based on qualitative studies, an exploratory factor analysis (EFA) was conducted to determine if the items actually aligned with the same underlying structure. The Kaiser-Meyer-Olkin (KMO) test value was 0.867 and Bartlett's Test of Sphericity was significant at $p < 0.001$, indicating the sample was suitable for factor analysis. A KMO value of 0.6 or higher is generally considered acceptable whereas a significant Bartlett's Test of Sphericity indicates that the correlation matrix is factorable. After removing variables with a loading of less than 0.5, four factors were identified. However, in this initial EFA, three items (Scope 6: I am generally aware of my partner's activities and movements; Mate-guarding 1: Became angry when my partner flirted too much; and Mate-guarding 4: Threatened to break-up if my partner ever cheated on me.) failed to load significantly on any dimension. Hence these three items were removed from further analysis. The author repeated the EFA without including these items and the results confirmed the four dimensional structure defined in the current study (see Table 2). The KMO value was 0.868 and Bartlett's Test of Sphericity was significant at $p < 0.001$.

TABLE 2 EFA results.

Construct	Items	1	2	3	4
Acceptance of monitoring (AM)	AM1	0.889			
	AM2	0.873			
	AM3	0.774			
	AM4	0.809			
Scope (SC)	SC1		0.732		
	SC2		0.818		
	SC3		0.718		
	SC4		0.744		
	SC5		0.709		
	SC7		0.762		
Perceived intrusion (PI)	PI1			0.628	
	PI2			0.867	
	PI3			0.877	
	PI4			0.812	
Mate-guarding (MG)	MG2				0.727
	MG3				0.682
	MG5				0.772
	MG6				0.856

Reliability and validity

A PLS-SEM algorithm was run using SmartPLS 4.1.1.2 and the validity and reliability as well as CFA are shown as Table 2. Scholars deem the indicators of reliability and validity to be acceptable where the of average variance extracted (AVE) is higher than 0.50 as well as composite reliabilities (CR) and Cronbach's α values are greater than 0.70 (Fornell and Larcker, 1981). In Table 3, the Cronbach's α values of loadings were all higher than 0.8, and the values of CR for each construct were all higher than 0.8. The values of AVE were all higher than 0.5 and hence are acceptable. Meanwhile, the current study performed a discriminant validity to confirm the reflection of constructs. Table 4 shows acceptable results. In addition, the current study employed standardized root mean square residual (SRMR) to verify the model fit and according to Henseler et al. (2014), a value less than 0.10 is considered a good fit. The SRMR in the current model was 0.078, which is less than 0.1.

The structure model

The current study follows the suggestion made by Wetzels et al. (2009) who proposed that the sample size of bootstrapping ought to be at least 500 and the current study performed the bootstrapping procedure with 5,000 samples to generate path estimates and t-statistics in determining the hypothesized relationships.

According to the results, some of the hypotheses were refuted (see Table 5). H1-1 refers to a negative relationship between acceptance of monitoring and perceived intrusion, and the results ($\beta = -0.421$ t-stat = 8.734) support the hypothesis. H1-2 states to scope positively influences perceived intrusion, and the evidence ($\beta = 0.383$ t-stat = 7.854) supports the hypothesis. H2-1 suggests acceptance of monitoring having a negative influence on mate-guarding, and it is refuted ($\beta = -0.028$ t-stat = 0.551). H2-2 suggests a positive relationship between scope and mate-guarding, and it is confirmed ($\beta = 0.558$ t-stat = 12.71). H3 assumes that perceived intrusion has a negative influence on relationship satisfaction, and it is confirmed ($\beta = -0.248$ t-stat = 4.580). H4 refers to a positive relationship between mate-guarding and relationship satisfaction, and the results ($\beta = 0.204$ t-stat = 3.407) support the hypothesis.

Discussion

As expected, acceptance of monitoring is negatively associated with perceived intrusion. The CFT framework states that the application of technology in romantic relationships could lead to a change in relational rules and roles (Hertlein and Chan, 2020), and hence affect the level of perceived intrusion. The results of H1-1 show that individuals who accept applying location sharing apps in their romantic relationships tend to experience less intrusion. In other words, although it is possible that people in their romantic relationships are forced to apply location sharing apps, the results of the current study exhibit that the initial unwillingness can be reduced. From the viewpoint of trust and commitment, romantic monitoring is not always seen as negative (Bevan, 2018). People who accept monitoring may view it as necessary or beneficial, hence the level of perceived intrusion reduces, as privacy calculus theory postulates (Lee

TABLE 3 Validity and reliability of the constructs.

Construct	Items	Loadings	α	rho_A	CR	AVE
Acceptability of monitoring (AM)	AM1	0.859	0.892	0.899	0.925	0.756
	AM2	0.892				
	AM3	0.837				
	AM4	0.888				
Mate-guarding (MG)	MG2	0.797	0.835	0.837	0.891	0.671
	MG3	0.779				
	MG5	0.803				
	MG6	0.893				
Perceived intrusion (PI)	PI1	0.798	0.867	0.868	0.909	0.715
	PI2	0.884				
	PI3	0.847				
	PI4	0.852				
Relationship satisfaction (RS)	RS1	0.702	0.877	0.892	0.904	0.575
	RS2	0.755				
	RS3	0.722				
	RS4	0.815				
	RS5	0.824				
	RS6	0.643				
	RS7	0.839				
Scope (SC)	SC1	0.730	0.880	0.887	0.908	0.624
	SC2	0.851				
	SC3	0.781				
	SC4	0.805				
	SC5	0.760				
	SC7	0.805				

TABLE 4 Discriminant validity.

Constructs	AM	MG	PI	RS	SC
AM	0.870				
MG	0.154	0.819			
PI	−0.296	0.411	0.846		
RS	0.463	0.102	−0.164	0.758	
SC	0.326	0.549	0.246	0.095	0.790

and Kwon, 2015). Meanwhile, it is possible that individuals who enter romantic relationships form social norms of monitoring. In the Taiwanese cultural environment, individuals may accept monitoring behaviors to align with social expectations. They accept such social norms, and therefore, do not feel intruded upon.

The confirmation of H1-2 shows that the more the information technology can perform tasks in romantic relationships, the higher the level of intrusion that is perceived. In the scenario of applying location sharing apps, the intensity of employing it can be varying. For example, an individual may frequently check their partner's status, e.g., on an hourly basis, and constantly check up on the partner. Even though the partner may have accepted the monitoring beforehand, it could lead to negative responses, because the motivations of online

monitoring can be associated with negativities (Hernández-Santaolalla and Hermida, 2020). Although previous studies ignored perceived intrusion, due to the emphasis having been the subject being unaware (Morrongiello et al., 2019), the association between scope and perceived intrusion represents a way of people in romantic relationships to maintain relationships. The findings also indicate that privacy issues may play a role in the romantic relationships. Scholars viewed privacy concerns as less applicable to intimate relationships (Levy and Schneier, 2020), but the results show that the level of perceived intrusion is influenced by scope, which indicates the role of privacy boundaries. In other words, privacy does matter in romantic relationships when people employ technology to manage their relationships to an extreme intensity. The paradoxical coexistence of high acceptance of monitoring and high perceived intrusion may reflect the Taiwanese cultural tension between maintaining harmony and preserving autonomy. In particular, the cultural imperative to avoid confrontation may result in superficial compliance with monitoring practices that are internally resented.

The refutation of H2-1 indicates to that acceptance of monitoring and mate-guarding are independent factors in the application of location sharing apps among romantic couples. Acceptability refers to the inappropriate behavior through use of location sharing apps (Hertlein and Stevenson, 2010), and people, who are willing to accept

TABLE 5 The results of hypotheses examination.

Hypotheses	Path	β	SE	t-sta	p	Support
H1-1	Acceptance of monitoring → Perceived intrusion	−0.421	0.048	8.734	0***	Yes
H1-2	Scope → Perceived intrusion	0.383	0.049	7.854	0***	Yes
H2-1	Acceptance of monitoring → Mate-guarding	−0.028	0.051	0.551	0.582	No
H2-2	Scope → Mate-guarding	0.558	0.044	12.71	0***	Yes
H3	Perceived intrusion → Relationship satisfaction	−0.248	0.054	4.580	0***	Yes
H4	Mate-guarding → Relationship satisfaction	0.204	0.060	3.407	0.001**	Yes

$p < 0.1$; $p < 0.05^*$; $p < 0.01^{**}$; $p < 0.001^{***}$.

being monitored in romantic relationships, have stronger tendencies to feel connected (Leggett and Rossouw, 2014), however, it might lead to relational distress as well (McDaniel and Coyne, 2016). Actually, scholars found that acceptance of monitoring can be seen as sign of trust and commitment to their romantic partners (Bevan, 2018). Given that there is no significant relationship between mate-guarding and acceptance of monitoring, one could argue that mate-guarding is not necessarily associated with a lack of trust and commitment. The Sociotechnological family framework postulates that individual traits are supposed to be influenced by technology characteristics (Hertlein and van Dyck, 2020), and the current study views individual traits as mate-guarding which refers to actions taken by individuals to maintain romantic relationships as well as keep potential rivals away from their partners (Buss, 2002). In the scenario of romantic couples adopting location sharing apps, the partner who accepts being monitored, may invest themselves to maintain their relationships and protect it from possible threats, because mate-guarding may represents a natural response to protect important social bond (Haselton et al., 2016).

H2-2 confirms a positive association between scope and mate-guarding behavior, and this is to say that individuals employ location sharing apps as a tool to exclude competitors and retain their romantic relationships. The results reflect the findings of previous studies (Schneegass et al., 2021). Schneegass et al. (2021) found that the change of configuration on location sharing apps could lead to suspicion by romantic partners, and this refers to employing location sharing apps to achieve mate-guarding behavior. Regarding relationship satisfaction, H3 confirms that perceived intrusion negatively associates with relationship satisfaction while H4 confirms that mate-guarding positively associates with relationship satisfaction. Perceived intrusion is derived from privacy concerns and a lack of privacy control (Feng and Xie, 2019). In other words, the negative association with relationship satisfaction can be seen as the role of privacy concerns kicking in. Meanwhile, the positive association between mate-guarding and relationship satisfaction can be interpreted as the use of location sharing apps allowing individuals to have a sense of control in the romantic relationships, hence they are satisfied. This finding also reflects the previous studies, which uncovered the role of attachment style (Marshall et al., 2013). When an individual engages in mate-guarding, it shows the commitment and investment in the relationship, hence it increases the sense of security and satisfies the need of attachment. Initially, the finding that mate-guarding was positively associated with relationship satisfaction contrasts with the original

hypothesis, which predicted a negative relationship. This unexpected result prompted a re-examination of relevant literature, which suggests that in mutually accepted location-sharing contexts, mate-guarding behaviors may be perceived as expressions of care, commitment, or relational investment, rather than control or distrust. In light of this, the hypothesis was revised during the manuscript revision process to better reflect these alternative theoretical perspectives. While this constitutes a *post hoc* adjustment, it is reported here transparently and grounded in emerging scholarship. As Baruch (2024) notes, such theoretically informed revisions can still contribute meaningfully to scientific understanding when clearly acknowledged.

Beyond the individual hypothesis findings, these results contribute to a broader theoretical conversation about how privacy, mate-guarding, and technology intersect in romantic relationships. Prior privacy research often frames the “privacy paradox” as a trade-off between disclosing information for relational benefits and the potential for intrusion (Levy and Schneier, 2020; Wisniewski et al., 2020). In our data, high acceptance of monitoring coexisted with elevated perceived intrusion when scope was extensive, suggesting that location-sharing technologies do not eliminate privacy concerns but instead transform them. This aligns with recent scholarship arguing that the privacy paradox in intimate relationships is not a simple binary but a dynamic negotiation shaped by technological affordances and relational norms (Feng and Xie, 2019).

In mate-guarding literature, the prevailing assumption in Western contexts is that these behaviors, particularly when technologically mediated, signal distrust and thus undermine satisfaction (Tokunaga, 2016). Our findings nuance this by showing that in mutually accepted monitoring contexts, mate-guarding can enhance relationship satisfaction—possibly because it is reframed as care, commitment, or relational investment. This reframing aligns with attachment theory’s notion that protective behaviors can be interpreted positively when congruent with the couple’s norms (Marshall et al., 2013).

The results also offer refinements to both the Couple and Family Technology Framework (Hertlein, 2012) and the Sociotechnological Family Framework (Lanigan, 2009). While both frameworks emphasize how technological characteristics influence relational rules and processes, our findings indicate that these influences are mediated by socio-cultural values. In Taiwan’s harmony-oriented culture, compliance with monitoring requests may be motivated less by personal negotiation and more by conformity to implicit expectations to avoid conflict (Chang et al., 2020). This cultural layer complicates

the CFTF and STFF assumption that boundary renegotiation is primarily dyadic, pointing instead to a need for incorporating collective cultural norms as moderators.

Conclusion

The results of the current study provide answers to the research questions. Firstly, the relationship of romantic partners is influenced by the application of location sharing apps, because the acceptance of monitoring negatively associates with perceived intrusion. This means an individual forfeits the privacy concerns in romantic relationships. Meanwhile, the confirmation of association between scope and perceived intrusion demonstrates the significance of privacy issues in romantic relationships, even though previous studies viewed it as less significant (Levy and Schneier, 2020). In other words, the role of privacy concerns still matters, but the level is flexible. Regarding the use of location sharing apps in romantic relationships, the findings exhibit that romantic couples manage to find a balance between privacy concerns and mate-guarding, because both factors contribute to relationship satisfaction.

The current study carries some inherent limitations. The use of location sharing apps among romantic couples is more likely a private issue and not everyone would like to reveal this to others. The current study can only rely on self-report questionnaires with filter questions. Although the current study has managed to reach a variety of groups during data collection, there remain more potential participants to reach. A notable methodological limitation lies in the author-developed measures for “acceptance of monitoring” and “scope.” While both scales demonstrated strong psychometric properties through exploratory factor analysis (EFA) and confirmatory composite analysis (CCA), they have not undergone formal expert review or systematic cross-cultural validation. The absence of expert review means that some nuances—particularly in distinguishing between benign and controlling forms of monitoring—may not have been fully captured in item wording. While the current findings provide valuable insight into the interplay of privacy and mate-guarding in Taiwan, caution should be exercised when generalizing them to other cultural or relational environments. Future research should subject these measures to expert panel review and validation across diverse cultural samples to ensure construct equivalence and improve the comparability of results across studies. In addition, the current study focuses on uncovering the perceptions of participants, however, the survey was not able to identify the actual use of location sharing apps. Further research may focus on collecting data from location sharing apps to examine its role in romantic relationships.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and

institutional requirements. Written informed consent from the [patients/ participants OR patients/participants legal guardian/ next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements. The current research was approved by Research Ethics Committee, National Taiwan University, NTU-REC No.202205ES090.

Author contributions

CL: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fhumd.2025.1553619/full#supplementary-material>

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