

## Information sharing on Facebook by Alone, Single and Lonely Female Users

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### ABSTRACT

The aim of this study was to determine whether Loneliness, Relationship Status and Profile Image are related to self-disclosure of Sensitive and Non-Sensitive Information on Facebook. To this end, 269 personal profiles of women who reported being Lonely and 269 profiles of women who reported not being Lonely were analyzed. Sensitive Information was analyzed using Poisson regressions. Non-Sensitive information was analyzed using negative binomial regressions. The results confirmed that more Lonely users revealed Sensitive and Non-Sensitive Information on Facebook than Not-Lonely users. The results also confirmed the existence of a relationship between Loneliness and Relationship Status in that more users who indicated in their Relationship Status that they were Single were Lonely than Not-Lonely. Similarly, the results also confirmed the existence of a relationship between Loneliness and Profile Image in that more users who appeared Alone in their Profile Image were Lonely than Not-Lonely. These associations encouraged the exploration of the associations between Relationship Status and Profile Image and Sensitive/Non-Sensitive Information. With regards to Relationship Status, more users who did not indicate their Relationship Status revealed more Sensitive and Non-Sensitive Information compared to those who were Single or those who were in a relationship. Regarding the Profile Image, more users who appeared Alone in their Profile Image revealed Sensitive Information compared to users who presented themselves with others in their Profile Image. For Non-Sensitive Information, no differences were found between users who appeared in their Profile Image Alone compared to those who appeared with a partner or friends, or to those who did not have a Profile Image. Overall, these findings suggest that disclosing Sensitive Information could put users at risk of becoming victims of cybercrimes such as identity theft, harassment, cyber-stalking, and cyber scams.

**Keywords:** Loneliness; self-disclosure; Relationship Status; Profile Image; Facebook

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### 1. INTRODUCTION

Social Network Sites (SNS) are among the most popular sites on the web. According to recent rankings from Alexa.com<sup>1</sup> of the top 500 sites on the web, Facebook is ranked second from the top followed by YouTube in third place and Twitter in ninth

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<sup>1</sup><http://www.alexa.com/topsites>, last accessed August 9, 2015

place. With 1.49 billion monthly active users on Facebook<sup>2</sup>, this and the above statistic suggests that social networking is one of the most favoured activities among the 3.17<sup>3</sup> billion worldwide internet users.

The use of SNS has brought about many advantages including users' ability to share with friends and strangers up to the minute updates of what is new in their lives or the status of their feelings and thoughts (Al-Saggaf & Islam, 2015); citizens' ability to participate and engage in the public affairs of their countries; and volunteers' ability to coordinate the rescue, response and recovery efforts during a crisis (Al-Saggaf & Simmons, 2015). However, SNS is not without its drawbacks. Recent studies show that crimes associated with SNS usage, such as identity theft, cyber-stalking, harassment and cyber scams, are on the rise (Al-Saggaf & Islam, 2012). The findings of a study conducted by Symantec in 2013 showed that 29% of incidents of data breach were caused by information made accidentally public by users.<sup>4</sup> In addition, the Pew Research Centre<sup>5</sup> report on online harassment has found that 40% of online users have personally experienced online harassment. Of these, 23% of women between the ages of 18-24 were physically threatened, 18% were harassed for a sustained period of time, 26% were stalked and 25% were sexually harassed. These statistics are alarming.

In Australia, for example, more than 39,491 cybercrime incidents have been reported to the Australian Cybercrime Online Reporting Network (ACORN) in 2015 (ACORN, 2016). Between 1 January 2015 and 31 March 2015, 9,679 incidents were reported to ACORN. This number had risen to 11,181 during the period 1 April 2015 to 30 June 2015 suggesting that cybercrime incidents are on the rise. In both reporting periods scams and fraud were at the top of the list of the reported cybercrime incidents. Scams and fraud accounted for 49% of the reported cybercrime incidents in the first period and 53% in the second period. Interestingly in both reporting periods, the majority of victims, 41% in the first period and 45% in the second period were aged between 20-40 years. In both reporting periods, SNS were one of the top three targets of cybercriminals.

One of the main reasons for the increase in the rate of the above mentioned crimes is users' tendency to reveal too much personal information about themselves in SNS<sup>6</sup>. The revelation of personal information is associated with a desire to engage in self-disclosure online (Al-Saggaf & Islam, 2015). SNS users are also often unaware of unintentionally releasing information such as the exact time and date of photos when they willingly share information.

<sup>2</sup><http://newsroom.fb.com/company-info/>, last accessed August 9, 2015

<sup>3</sup><http://www.statista.com/statistics/273018/number-of-internet-users-worldwide/>, last accessed August 9, 2015

<sup>4</sup>[http://www.symantec.com/content/en/us/enterprise/other\\_resources/b-istr\\_main\\_report\\_v19\\_21291018\\_en-us.pdf](http://www.symantec.com/content/en/us/enterprise/other_resources/b-istr_main_report_v19_21291018_en-us.pdf), last accessed December 24, 2014

<sup>5</sup>Pew Research Center, October 2014, "Online Harassment" Available at: <http://www.pewinternet.org/2014/10/22/online-harassment/>

<sup>6</sup>Australian Capital Territory. Australian Institute of Criminology. (2009). *Online child grooming: a literature review on the misuse of social networking sites for grooming children for sexual offences*. Retrieved from <http://aic.gov.au/documents/3/C/1/1%7b3C162CF7-94B1-4203-8C57-79F827168DD8%7drpp103.pdf>

As the section titled 'Self-disclosure' below shows, self-disclosure has been studied extensively, but research that investigates a direct relationship between self-disclosure and how users describe themselves in SNS, such as 'reporting feeling lonely' in their status updates or 'single' in their relationship status or 'alone' in their profile image is scarce. The aim of this study is to examine the existence of relationships between Loneliness, Relationship Status and Profile Image, on one hand, and self-disclosure of Sensitive and Non-Sensitive Information on Facebook on the other.

The current study builds on Lee, Noh & Koo's (2013) and Al-Saggaf & Nielsen's (2014) studies and is similar to Al-Saggaf & Nielsen's (2014) study in two ways: (1) in both studies, self-disclosure was the criterion variable and Loneliness was the predictor variable and (2) in both the focus was on females. The reason for the focus on females in this study was because it was part of a larger project that aimed at examining the threats of data mining to the privacy of female SNS users. However, the current study differs from Al-Saggaf & Nielsen's (2014) in two significant ways. First, Al-Saggaf & Nielsen's study looked only at Loneliness as the predictor variable; the current study, in addition to Loneliness as the predictor variable, investigates also the relationship between Relationship Status and Profile Image and self-disclosure. Second, Al-Saggaf & Nielsen's study grouped the 45 attributes that represented the pieces of information they gathered from the selected public profiles into 11 categories without specifying which information is sensitive and which information is not sensitive. Following Nosko's et al. (2010) classification, specifically in line with their second study, the current study grouped the pieces of information (or attributes) into either Sensitive or Non-Sensitive. That said, the current study extends Al-Saggaf & Nielsen's (2014) study in a novel way. The current study not only investigates the relationship between Loneliness and self-disclosure but also investigates the relationships between self-disclosure and other Loneliness related aspects; specifically being Single (Relationship Status) and appearing Alone in the Profile Image.

This study is also significant because it seeks to address the imbalance in the literature by focusing on the relationships between important variables (Loneliness, Relationship Status, Profile Image and Sensitive and Non-Sensitive Information), which have not been previously explicitly examined. In addition, the studies that explored Loneliness and SNS use, including those mentioned, focused on the student group of users and measured Loneliness and SNS use using Likert scale questionnaires. Using a content analysis of the profiles of 269 females who reported being Lonely and 269 females who did not report being Lonely, this study focuses on an international sample of females (female users from all walks of lives and locations) to explore the association between Loneliness and the sharing of Sensitive and Non-Sensitive Information. Sensitive Information was classified according to Nosko's et al. (2010) classification, which has not been examined further before. In their review of the literature on Facebook, Wilson, Gosling & Graham (2012) note that studying how users choose to portray themselves in their profiles presents an excellent opportunity for social scientists to study because these profiles elicit accurate impressions calling for social scientists who underappreciated Facebook profile as a source of data to take

advantage of this unprecedented opportunity to study the social phenomenon in its natural setting where it occurs. This study answers this call.

### **1.1 SNS: a quick overview**

The literature on SNS indicates that the main reason why individuals join SNS is often to maintain social ties; particularly existing ones, to gain emotional support and fellowship from these relationships (boyd & Ellison 2007; Jones et al. 2008; Valenzuela, Park & Kee 2009; Young 2009) or to hide their weaknesses Salleh et al. (2010). To increase their social capital members need to accumulate more friends (Jones et al. 2008), and one way to make friends on SNS is by viewing and linking members' profiles (Lange 2007).

But friendship on SNS is different from friendship in the real world (Jones et al., 2008). Indeed, adding a new friend to a contact list does not necessarily mean that this is a sign of feelings for that friend. Rather, it is seen as an expansion of one's social network (Jones et al. 2008). This view has enjoyed support from a British judge who made this distinction official when he ruled that friendship on Facebook could not be defined as "friendship in the traditional sense" (Emerson 2008). boyd (2006, np) also concurs with this view when she distinguished 'friendship' from 'Friendship'. boyd argued that 'friendship' refers to a close relationship between two people, while 'Friendship' refers to an online tie that connects people on an SNS. boyd and Ellison (2007) further elaborated on this by adding that friends on SNS are not the same as friends in the "everyday sense" as friends on SNS are at best "provide context by offering users an imagined audience to guide behavioural norms" (boyd & Ellison 2007: np).

In addition to joining SNS to develop new relationships or socialize with existing friends, individuals come to SNS also to relax and to have fun (Al-Saggaf 2011). Freedom of expression has been reported as another factor that explains why people go to SNS (Al-Saggaf, 2011). While the participants in Valenzuela, Park & Kee's (2009) study did not identify this as a reason to join SNS, their study has found a positive relationship between intensity of Facebook use and political participation. Indeed, for people, whose freedom of expression, particularly in relation to political views, is not unrestricted, online environments are good channels through which they can express themselves intellectually (Al-Saggaf 2011) as well as share with others their feelings and emotions about the events of their day (Al-Saggaf & Simmons, 2014).

While for some SNS users freedom of expression can be considered a major advantage the literature reports other important benefits such as another avenue for younger people to interact with their peers (Young 2009). Young (2009) found a positive outcome from spending an extensive amount of time online namely the opportunity for greater skill development particularly in the area of online socialization. Another major advantage that can be gained from participating in SNS is in making people learn about themselves (Al-Saggaf, 2004). Online people tend to experiment with their personalities, which may give them a chance to discover new aspects in/about their personalities (Al-Saggaf, 2004). Similarly, people online engage in many relationships

and get involved in many experiences. Through self-reflection they can learn a great deal about their personalities (Al-Saggaf, 2004). Another advantage is enhancing self-esteem through the positive feedback and emotional support that users receive from others via their profiles (Jones et al., 2008). It would appear for those who are shy by nature the ability of the technology to reduce their fear of rejection and lower their inhibitions, made it easier for them to connect with others from all over the world (Al-Saggaf, 2004). This in turn has also enhanced their self-esteem (Al-Saggaf, 2004).

On the negative side, participation in SNS is blamed for participants wasting too much time online (Young 2009), thereby neglecting their family and real friends commitments (Al-Saggaf, 2004). Jones et al. (2008) note that one of the reasons why this occurs is because, online, participants gain a great deal of emotional support from their online friends, which suggests that the support that real friends provide is not as important as once had been. Meanwhile, spending too much time online has also caused some participants to neglect their studies (Karpinski & Duberstein 2009). In a landmark study, Karpinski and Duberstein (2009) found a link between lower grades and Facebook. They found that Facebook use did not only impact upon undergraduate students, but also upon graduate students. According to the results of their study, graduate students who initially had Grade Point Averages (GPAs) as high as 3.5 and above (out of four), received lower GPAs when they started using Facebook (Karpinski & Duberstein, 2009).

### **1.2 Self-disclosure and loneliness**

Self-disclosure is increasingly becoming widespread on SNS (Sar & Al-Saggaf, 2014). While on one hand, users are more than ever concerned about their safety (Young, 2009; Al-Saggaf, 2011), on the other hand, users are finding it difficult to stop themselves from disclosing their personal information online (Edwards & Brown, 2009). In recognition of the pervasiveness of this phenomenon, Chambers Dictionary selected 'Overshare' as its 'word of the year' for 2014. Chambers Dictionary defined 'Overshare' as "to be unacceptably forthcoming with information about one's personal life"<sup>7</sup>.

There is a growing body of literature on self-disclosure in SNS (see, for example, Kolek & Saunders, 2008; Kim & Lee, 2011; Wang & Stefanone, 2013; Van Gool, Ouytsel, Ponnet & Walrave, 2015). Establishing a comprehensive checklist of all the types of information that can be disclosed on Facebook, Nosko et al (2010) drew some general conclusions from this descriptive summary of all Facebook profile content, the first of which was that Facebook users demonstrated a level of discretion in regards to allowing their profile information to be viewable by other users, with, on average, approximately 25% of possible information made publically visible for other users. Users, in general, also showed a level of discretion in regards to what kinds of personal information they were willing to disclose on Facebook.

<sup>7</sup><http://www.theguardian.com/books/2014/oct/23/overshare-word-of-the-year-2014-chambers-dictionary>

Researchers have put forward several reasons as motivations for self-disclosure including low self-esteem (Forest & Wood, 2012), anonymity (Bonetti, Campbell & Gilmore, 2010), narcissism (Mehdizadeh, 2010; Ryan & Xenos 2011; Ong, Ang, Ho, Lim, Goh, Lee & Chua, 2011); to show off (Wang & Stefanone, 2013) and also because doing so is fun, enjoyable and entertaining or to store meaningful information or in order to keep up with trends (Waters & Ackerman, 2011).

There is a limited but increasing body of literature that focuses on Loneliness and SNS use (see, for example, Kim, LaRose, & Peng, 2009; Bonetti, Campbell & Gilmore, 2010; Clayton, Osborne, Miller & Oberle, 2013). Bonetti, Campbell & Gilmore's (2010) study, for example, found that children and adolescents who reported being Lonely communicated online significantly more frequently about personal and intimate topics than did those who did not self-report being Lonely. That said, research that investigates a direct relationship between Loneliness and self-disclosure in SNS is scarce.

Lee, Noh & Koo's (2013) study touched on the relationship between Loneliness and self-disclosure but with self-disclosure as a mediator between Loneliness and well-being, not as a criterion variable as in this study. Their study investigated whether Loneliness has a direct/indirect effect on well-being when mediated by self-disclosure. The findings of their study show that Loneliness positively influences self-disclosure in that Lonely people in real life rely on SNS to compensate for their unsuccessful offline relations. Although self-disclosure has no direct effect on well-being, since engagement in self-disclosure in SNS has been found to reduce feelings of Loneliness, well-being is enhanced as a result of the reduction in Loneliness.

Al-Saggaf & Nielsen (2014) explored the relationship between Loneliness and self-disclosure among female Facebook users. Self-disclosure was measured by the amount of information a user revealed on Facebook. The results of their study have shown that more people who felt 'lonely' in Facebook disclosed their activities, favourite things, their relationship status and their address compared to people who felt 'connected'. On the other hand, more people who felt 'connected' disclosed their views and their wall than people who felt 'lonely'.

The current study builds on Lee, Noh & Koo's (2013) and Al-Saggaf & Nielsen's (2014) studies by examining if a relationship exists between Loneliness and the disclosure of Sensitive and Non-Sensitive Information on Facebook. Lee, Noh & Koo's (2013) findings, combined with Al-Saggaf & Nielsen's (2014) results suggest the following prediction:

1. *More female Facebook users who reported being Lonely would reveal Sensitive and Non-Sensitive Information than those who did not self-report being Lonely.*

### 1.3 Self-disclosure, Relationship Status and Profile Image

The literature highlighted the significance of two other Facebook variables: Relationship Status and Profile Image. With regards to the effect of Relationship Status on self-disclosure, Nosko et al. (2010) found that individuals who are more

likely to disclose sensitive personal information or information that could potentially expose them to threats are those seeking a relationship through SNS. On the other hand, McAndrew & Jeong (2012) found that overall Relationship Status had little effect on the Facebook activity of females compared to the effect it had on males but that females were more interested than males in the Relationship Status of others. However, what is also interesting in the findings of this study is that males and females not In-A-Relationship spent less time looking at the pages of same-sex others and more importantly females not In-A-Relationship showed more Facebook activity including posting and sharing information than those In-A-Relationship.

In terms of the effect of Profile Image on self-disclosure, McAndrew & Jeong (2012) found that females expended more effort in using Profile Image for impression management. Ong, Ang, Ho, Lim, Goh, Lee & Chua's study (2011) found that narcissism significantly predicted the Facebook Profile Image ratings in that more narcissistic adolescents rated their Facebook Profile Image as physically appealing than their less narcissistic peers suggesting narcissistic users select Profile Image that make them look physically appealing. This finding has also been reported by DeWall, Buffardi, Bonser & Campbell (2011) who explained this behaviour by arguing that narcissistic users selected appealing Profile Images because they wanted to draw attention to themselves.

The above findings relating to Relationship Status and Profile Image, combined with behaviours one would expect from a Single person or a user who appears Alone in their Profile Image, suggest the following predictions:

2. *More female Facebook users who reported being Single would reveal Sensitive and Non-Sensitive Information than those who did not self-report being Single.*
3. *More female Facebook users who appeared Alone in their Profile Image would reveal Sensitive and Non-Sensitive Information than those who did not appear Alone in their Profile Image.*

## 2. METHOD

### 2.1 Content Analysis

As explained in Al-Saggaf & Nielsen (2014), prior to data collection, the ethics approval for the study was obtained from the University's Human Research Ethics Committee. Next, two raters typed a single word each, 'Lonely' and 'Connected', in the search area of <http://youropenbook.org><sup>8</sup>, selected 'female' and then clicked on the search button. This caused all publicly available Facebook profiles for females who reported being Lonely or Connected in their latest Status Update to be returned.

<sup>8</sup>In May 2012, the website was moved from its original domain [youropenbook.org](http://youropenbook.org) to [openbook.org](http://openbook.org). In July 2012, Openbook was shut down due to legal reasons, and [openbook.org](http://openbook.org) has reverted to a foreign exchange website." Taken from Wikipedia –for more information see this link; [https://en.wikipedia.org/wiki/Openbook\\_\(website\)](https://en.wikipedia.org/wiki/Openbook_(website))

The site, which no longer exists, was a specialised search engine that allowed all publicly available Facebook profiles to be accessed when there was a match between the search criterion and the latest Facebook Status Update. As mentioned above, the reason for the focus on females was because this study was part of a larger project that aimed at examining the threats of data mining to the privacy of female SNS users. The reason for searching two opposing feelings ‘Lonely’ and ‘Connected’ in the latest Facebook Status Update, was to allow comparisons to be made between the users who reported these opposing feelings.

After a blank Facebook profile was studied to decide on the pieces of information to be included in the content analysis (Nosko et al., 2010), a total of 45 attributes were inserted in an Excel spreadsheet (in the columns) representing the pieces of information to be gathered from the selected public profiles. Two raters then independently performed content analysis by opening the selected public profiles from within their Facebook accounts and recording the information and the outcome of their analysis in the spreadsheet. While the first rater analysed the Lonely profiles, the second rater analysed the Connected profiles.

Other than the contents of latest Status Update, and the attribute of age, ‘about’, gender, city, Relationship Status, number of friends, likes, photos, interests and Profile Image, all other attributes only recorded the presence or absence of information. That is, only P (present), later given the value of 1, or A (absent), later given the value of 0, under the information cited was recorded. This was done for three ethical considerations: (1) to ensure that no identifying information from these users were collected; (2) to preserve users’ anonymity; and (3) to protect their confidentiality. Another important ethical issue that arose in this study was whether informed consent was needed to be obtained before these Facebook accounts could be viewed. Eysenbach & Till (2001) argued that if these spaces (Facebook accounts) are perceived as ‘private’, an informed consent to collect data is required. However, if data is publicly available researchers can collect this data without obtaining consent (Eysenbach & Till, 2001). Since the accounts in this study were all public then data could be collected without obtaining consent.

The 269 users were categorised as Lonely based on clearly indicating this feeling in their latest Status Update at the time of data collection, such as “*Im so tired of being lonely.*” The same process was followed for the 269 female Facebook users who were categorised as Connected. With regards to Relationship Status, users who indicated in their profiles that they were ‘in a relationship’, ‘engaged’, ‘married’, ‘in an open relationship’, ‘in a civil union’, or ‘in a domestic partnership’ were coded as In-A-Relationship. If they indicated they were ‘single’, ‘widowed’, ‘separated’, or ‘divorced’, they were coded as single. Users who did not indicate their Relationship Status were assigned the value Null. Similarly, with regards to Profile Image, if the Profile Image showed the user ‘alone’, or ‘at a special occasion’ (Alone), or the user was smiling, or in a unique location that is not their hometown, or showed a Face/head shot of the user, or the user was playing or watching sport, the Profile Image was coded as Alone. If the Profile Image showed the user with one or more friends, or the user was with

their romantic partner, or with their family, the Profile Image was coded as Not-Alone. If the Profile Image depicted an object with apparent meaning to the user or displayed a unique visual effect, the Profile Image was coded as Does-Not-Show-User.

To limit subjectivity in the analysis, reliability was conducted on 62 profiles (31 profiles from the ‘lonely’ group and a further 31 profiles from the ‘connected’ group), representing 10% of the sample. Percent Agreement of 95.2% (N Agreements = 59) was recorded and a Cohen’s Kappa score of 0.903 was returned indicating high inter-coder reliability. Disagreement between coders was resolved through discussion until a consensus was reached. It should be noted that the author replaced the code Connected with Not-Lonely as connectedness is not a focus of this study.

The attributes described in Table 1 below list the pieces of information that were collected from the individual Facebook profiles. The pieces of information (or attributes) were grouped in accordance with the classification developed by Nosko et al. (2010) of the Facebook attributes, specifically in line with their second study. Table 1 below depicts the grouping of attributes followed in this study with the minor change from Nosko et al. (2010) where the attributes were no longer available on Facebook and where additional but similar attributes were introduced.

**Table 1.** The grouping of information collected from the individual Facebook profiles.

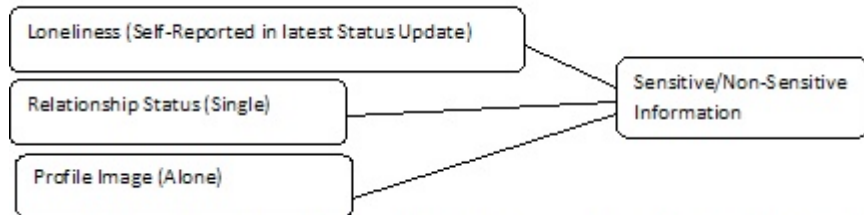
Group	Attributes within group
Sensitive Information	Email, Works At, Show Date of Birth, Profile Image, Hometown, TimeLine, Photos, Friends, Family on Facebook, Albums
Non-Sensitive Information	Activities, People who inspire you, Favourite Quotation, Music, Books, Movies, TV, Games, Favourite Sports, Favourite Teams, Favourite Athletes, About, Language, Relationship Status, Interested In, Show my sex in my profile, High School, Year Graduated from High School, University/ College, Year Graduated from University/ College, Lives in, Network, Likes, Religion, Political views

**2.2 Statistical Analysis**

The amount of information revealed within each of these groups (i.e. Sensitive and Non-Sensitive Information) can provide clues to the existence of this relationship. The data for each Facebook profile attribute was recorded as a binomial outcome (Present (1)/Absent (0)). Attributes were grouped together according to Nosko et al. (2010) second study categories by totalling these values (0/1) within the two categories as shown in Table 1 above. Since the two categories contained more than one attribute, they can be considered to have data relating to the Poisson distribution, which is often related to count data.

It is appropriate to analyse Poisson data using a Generalised Linear model. The analysis was conducted in SPSS (IBM SPSS Statistics Version 20) with the predictor variables being Loneliness, Relationship Status and Profile Image and the two

categories were considered to be the criterion variables. All of the Poisson model assumptions were satisfied. In the case of Non-Sensitive Information which displayed over-dispersion, a Negative Binomial Distribution was used with this variable. The model used for the analysis is depicted in Figure 1 below:



**Figure 1.** The independent variables with the dependent variables (Sensitive/Non-Sensitive Information)

A Poisson Generalised Linear model was used to analyse the association between Loneliness and Sensitive Information. Unlike Sensitive Information variable which was not over-dispersed, Non-Sensitive Information displayed over-dispersion so to account for this problem, a Negative Binomial Distribution was used with this variable instead of a Poisson Generalised Linear model. Cross-tabulations were also used to gain an insight into the amount of information revealed by those who reported being Lonely (for simplicity will be called here Lonely) and those who reported being Not-Lonely (for simplicity also will be called here Not-Lonely users). In addition, a Chi-Square test ( $\chi^2 = 709.778$ ,  $df = 6$ ,  $p < 0.001$ ) has shown a significant relationship between Loneliness and Relationship Status<sup>9</sup>. More users who indicated in their Relationship Status that they were Single were Lonely than Not-Lonely. For example, 105 of the 269 who indicated they were Single were Lonely compared to only 48 Singles of the 269 Not-Lonely users. Moreover, a Chi-Square test ( $\chi^2 = 672.908$ ,  $df = 6$ ,  $p < 0.001$ ) has shown a significant relationship between Loneliness and Profile Image. More users who appeared Alone in their Profile Image were Lonely than Not-Lonely. For example, 215 of the 269 who appeared Alone in their Profile Image were Lonely compared to only 162 Alones of the 269 Not-Lonely users. Similarly 35 of the 269 whose Profile Image showed the user with a romantic partner or friend(s) were Lonely compared to 81 Not Alones of the 269 Not-Lonely users. These findings further encouraged the exploration of the associations between Relationship Status and Sensitive/Non-Sensitive Information and Profile Image and Sensitive/Non-Sensitive Information. Both criterion variables (i.e. Sensitive/Non-Sensitive Information) showed evidence of relationships with the three predictor variables (i.e. Loneliness, Relationship Status

and Profile Image) ( $P < 0.05$ ). For information on these criterion variables and the attributes they contained, see Table 1 above. Below is a summary of the results of the statistical analysis organised in accordance with the criterion variables Sensitive /Non-Sensitive Information.

### 3. RESULTS

#### 3.1 Sensitive Information

##### 3.1.1 Loneliness

The results of this study have shown that there was evidence of a relationship between Loneliness and Sensitive Information ( $p = 0.024$ ). A Cross-tabulation has shown that more Lonely users revealed Sensitive Information than those Not-Lonely users. For example, 83 Lonely users, of the total 269, revealed a total of 6 Sensitive attributes compared to only 52 Not-Lonely users, of the 269, who revealed a total of 6 Sensitive attributes. This indicates that more Lonely users revealed Sensitive Information compared to those Not-Lonely users. Table 2 below shows the means and standard deviation for the Sensitive Information variable. Table 3 below shows the results of the statistical analysis for the Sensitive Information variable. Tables 6-8 below show the means for the predictor variables.

##### 3.1.2 Relationship Status

The results of this study have shown that there was evidence of a significant relationship between Relationship Status and Sensitive Information ( $p < 0.001$ ). A Cross-tabulation has shown that more users who did not indicate their Relationship Status revealed Sensitive Information than those who indicated they were Single or In-A-Relationship. For example, 58 of the 220 who did not indicate their Relationship Status revealed 5 Sensitive attributes compared to only 18 of the 153 Single group and 27 of the 165 group. This indicates that Singles did not reveal more Sensitive Information compared to those In-A-Relationship.

##### 3.1.3 Profile Image

The results of this study have shown that there was evidence of a significant relationship between Profile Image and Sensitive Information ( $p < 0.007$ ). A Cross-tabulation has shown that more users who appeared Alone in their Profile Image revealed Sensitive Information than those who did not appear at all or appeared with a romantic partner or friend(s) in their Profile Image. For example, 102 of the 377 who appeared Alone in their Profile Image revealed 6 Sensitive attributes compared to only 5 of the 45 whose Profile Image did not show the user and 28 of the 116 whose Profile Image showed the user with a romantic partner or friend(s). This indicates that more of those who appeared Alone in their Profile Image revealed Sensitive Information compared to those who appeared with others in their Profile Image.

<sup>9</sup>Facebook allow its users several choices to describe their current Relationship Status such as 'married', 'Single', 'engaged', etc but for the sake of this study, these choices were recorded into two groups only: those 'In a relationship' and those 'Single'.

**Table 2.** Mean and standard deviation for the Sensitive Information variable

Predictor variables	Mean	Std. Deviation
Loneliness	5.95	1.639
Relationship Status	5.95	1.639
Profile Image	5.95	1.639

**Table 3.** The results of the statistical analysis for the Sensitive Information variable.

Predictor variable	Model used	Residual df	Chi-Square	P Value
Loneliness	Poisson	536	5.117	0.024
Relationship Status	Poisson	535	25.455	< 0.001
Profile Image	Poisson	535	9.929	0.007

### 3.2 Non-Sensitive Information

#### 3.2.1 Loneliness

The results of this study have also shown that there was evidence of a relationship between Loneliness and Non-Sensitive Information ( $p < 0.001$ ). A Cross-tabulation has shown that more users who indicated they were Lonely revealed Non-Sensitive Information than those who indicated they were Not-Lonely. For example, 39 of the 269 who indicated they were Lonely revealed 7 Non-Sensitive attributes compared to only 25 of the 269 who indicated they were Not-Lonely. This indicates that more Lonely users revealed Non-Sensitive Information compared to those Not-Lonely. Table 4 below shows the means and standard deviation for the Non-Sensitive Information variable. Table 5 below shows the results of the statistical analysis for the Non-Sensitive Information variable. Table 6 below shows the means for Lonely and Not-Lonely for the criterion variables.

#### 3.2.2 Relationship Status

The results of this study have shown that there was evidence of a significant relationship between Relationship Status and Non-Sensitive Information ( $p < 0.001$ ). A Cross-tabulation has shown that more users who did not indicate their Relationship Status revealed Non-Sensitive Information than those who indicated they were Single or In-A-Relationship. For example, 27 of the 220 who did not indicate their Relationship Status revealed 4 Non-Sensitive attributes compared to only 7 of the 153 Single group and 13 of the 165 In-A-Relationship group. This indicates that Singles did not reveal more Non-Sensitive Information than those In-A-Relationship.

#### 3.2.3 Profile Image

The results of this study have shown that there was no evidence of a significant relationship between Profile Image and Non-Sensitive Information ( $p > 0.05$ ). This

suggests that there is no difference with respect to revealing Non-Sensitive Information between users who appeared Alone in their Profile Image and those who did not appear at all or who appeared with a romantic partner or friend(s) in their Profile Image. This means that those who appeared Alone in their Profile Image did not reveal more Non-Sensitive Information than those who appeared with others in their Profile Image.

**Table 4.** Mean and standard deviation for the Non-Sensitive Information variable

Predictor variables	Mean	Std. Deviation
Loneliness	7.55	3.794
Relationship Status	6.96	3.581
Profile Image	7.55	3.794

**Table 5.** The results of the statistical analysis for the Non-Sensitive Information variable

Predictor variable	Model used	Residual df	Chi-Square	P Value
Loneliness	Negative Binomial	536	6.604	< 0.001
Relationship Status	Negative Binomial	535	19.656	< 0.001
Profile Image	Negative Binomial	535	.995	> 0.05

**Table 6.** The means for Lonely and Not-Lonely for the criterion variables

Criterion variables	Mean (Standard Error)	
	Not-Lonely	Lonely
Sensitive Information	5.71 (.146)	6.19 (.152)
Non-Sensitive Information	6.66 (.436)	8.43 (.544)

**Table 7.** The means for the In-A-Relationship, Null and Single for the criterion variables

Criterion variables	Mean (Standard Error)		
	In-A-Relationship	Null	Single
Sensitive Information	6.27 (.195)	5.32 (.155)	6.50 (.206)
Non-Sensitive Information	7.76 (.642)	5.34 (.392)	8.42 (.712)

**Table 8.** The means for the Alone, Does-Not-Show-User and Not-Alone for the criterion variables

Criterion variables	Mean (Standard Error)		
	Alone	Does-Not-Show-User	Not-Alone
Sensitive Information	6.11 (.127)	4.91 (.330)	5.84 (.224)
Non-Sensitive Information	7.76 (.425)	7.36 (1.169)	6.94 (.689)

## 4. DISCUSSION AND CONCLUSION

### 4.1 *Self-disclosure and Loneliness*

Lee, Noh & Koo's (2013) study has found that engagement in self-disclosure in SNS can reduce the feelings of Loneliness among SNS users thereby enhancing their well-being. Building on this limited existing research a question arose: do Lonely Facebook users reveal more Sensitive Information than those Not-Lonely? The aim of the study was to determine if a relationship exists between Loneliness and the amount of Sensitive Information revealed (self-disclosure) by female Facebook users. Given Lee, Noh and Koo's (2013) study that suggested engagement in self-disclosure in SNS has been found to reduce feelings of Loneliness, and Al-Saggaf & Nielsen's (2014) results have shown that more people who felt 'lonely' in Facebook disclosed their activities, favourite things, their relationship status and their address, it was predicted that more Lonely users would reveal Sensitive Information than Not-Lonely users.

As predicted there was evidence of a relationship between Loneliness and Sensitive Information ( $p = 0.024$ ). Indeed, more Lonely users revealed Sensitive Information compared to those Not-Lonely. For example 64.3% (N=173) Lonely users revealed their Hometown compared to only 52% (N=140) Not-Lonely users who revealed this attribute. The same goes for Non-Sensitive Information. More Lonely users revealed Non-Sensitive Information compared to those Not-Lonely users. For example, 49.1% (N=132) Lonely users provided information in the "About You" section compared to only 39.4% (N=106) Not-Lonely users. This shows that overall Lonely female users revealed more information about themselves than Not-Lonely users on Facebook. This is different from how lonely people behave in the offline world (Chelune, Sultan, & Williams, 1980). In offline settings, lonely people tend to exhibit lower levels of self-disclosure (Davis & Franzoi, 1986). Further research is needed to shed light on how online and offline lonely people compare in terms of their attitude towards self-disclosure.

### 4.2 *Loneliness, Relationship Status and Profile Image*

A Chi-Square test has shown a significant relationship between Loneliness and Relationship Status in that more users who indicated in their Relationship Status that they were Single were Lonely than Not-Lonely. For example, 39% (N=105) of the 269 who indicated they were Single were Lonely compared to only 17.8% (N=48) Singles of the 269 Not-Lonely users. Moreover, a Chi-Square test has shown a significant relationship between Loneliness and Profile Image in that more users who appeared Alone in their Profile Image were Lonely than Not-Lonely. For example, 79.9% (N=215) of the 269 who appeared Alone in their Profile Image were Lonely compared to only 60% (N=162) Alones of the 269 Not-Lonely users. Similarly 13% (N=35) of the 269 whose Profile Image showed the user with a romantic partner or friend(s) were Lonely compared to 30.1% (N=81) Not Alones of the 269 Not-Lonely users. These findings further encouraged the exploration of the associations between Relationship Status and Profile Image and Sensitive/Non-Sensitive Information.

### 4.3 *Relationship Status, Profile Image and self-disclosure*

Past research has suggested that there is a relationship between Relationship Status and self-disclosure. In light of this suggestion from the literature and given the findings of this study pertaining to Loneliness and Relationship Status, it was predicted that more users who indicated they were Single would reveal Sensitive and Non-Sensitive Information compared to those who did not indicate their Relationship Status or those who indicated they were In-A-Relationship. While there was evidence of a significant relationship between Relationship Status and Sensitive and Non-Sensitive Information, more users who did not indicate their Relationship Status revealed Sensitive and Non-Sensitive Information than those who indicated they were Single or In-A-Relationship. The results of this study did not support this prediction. It appears that while Relationship Status was able to explain the disclosure of one or more pieces of information it could not explain a group of items such as Sensitive Information.

Similarly, past research has suggested that there is a relationship between Profile Image and self-disclosure. In light of this suggestion from the literature and given the findings of this study pertaining to Loneliness and Profile Image, it was predicted that more users who appeared Alone in their Profile Image would reveal Sensitive and Non Sensitive Information compared to those who did not appear at all or who appeared with a romantic partner or friend(s) in their Profile Image. The findings of this study show that there was evidence of a significant relationship between Profile Image and Sensitive Information ( $p < 0.007$ ). Indeed, more of those who appeared Alone in their Profile Image revealed Sensitive Information compared to those who appeared with others in their Profile Image.

However, there was no evidence of a significant relationship between Profile Image and Non-Sensitive Information. There is no difference with respect to revealing Non-Sensitive Information between users who appeared Alone in their Profile Image and those who did not appear at all or who appeared with a romantic partner or friend(s). The results of this study did not support the prediction with regards to Non-Sensitive Information.

Unlike Relationship Status, which could not explain a group of items such as Sensitive Information, Profile Image was able to explain the disclosure of Sensitive Information. More Alones in their Profile Image revealed Sensitive Information than those who appeared with others in their Profile Image. In the face of this and since more Alones were Lonely, further research is needed to shed light on the relationship between Loneliness and Profile Image. If it becomes clear that Profile Image does predict Loneliness, users may want to avoid uploading a Profile Image that depicts them Alone so they are not perceived as being Lonely.

### 4.4 *Limitations*

Three limitations to the present study and suggestions for future research are outlined. Firstly, the data collection and analysis focussed only on female Facebook Users. Nosko et al., 2010 found gender to be unimportant for distinguishing who would or would not likely disclose information. A future study, however, could consider



examining if Loneliness among male users also encourages the disclosure of Sensitive and Non-Sensitive Information. Secondly, this study focused only on Facebook; other SNS, such as Twitter and LinkedIn, should also be studied to account for the effect of technological platform on Loneliness. Thirdly, while the study explored two variables (i.e. Relationship Status and Profile Image) in addition to Loneliness, the study did not account for other factors that have been found to also predict self-disclosure such as narcissism, attention seeking, introversion etc. Future studies may wish to study the effect of Loneliness on self-disclosure while taking into consideration other potentially influencing factors.

#### 4.5 Conclusion

This study examined the existence of relationships between Loneliness, Relationship Status and Profile Image, on one hand, and self-disclosure of Sensitive and Non-Sensitive Information on Facebook on the other. A total of 269 personal profiles of women who reported being lonely and 269 profiles of women who reported not being Lonely were analyzed. Sensitive Information was analyzed using Poisson regressions. Non-Sensitive information was analyzed using negative binomial regressions. The results confirmed that more Lonely users revealed Sensitive and Non-Sensitive Information on Facebook than Not-Lonely users. The results also confirmed the existence of a relationship between Loneliness and Relationship Status in that more users who indicated in their Relationship Status that they were Single were Lonely than Not-Lonely. Similarly, the results also confirmed the existence of a relationship between Loneliness and Profile Image in that more users who appeared Alone in their Profile Image were Lonely than Not-Lonely. These associations encouraged the exploration of the associations between Relationship Status and Profile Image and Sensitive/Non-Sensitive Information. With regards to Relationship Status, more users who did not indicate their Relationship Status revealed more Sensitive and Non-Sensitive Information compared to those who were Single or those who were in a relationship. Regarding the Profile Image, more users who appeared Alone in their Profile Image revealed Sensitive Information compared to users who presented themselves with others in their Profile Image. For Non-Sensitive Information, no differences were found between users who appeared in their Profile Image Alone compared to those who appeared with a partner or friends, or to those who did not have a Profile Image.

As predicted, this study has found that more Lonely users revealed Sensitive and Non-Sensitive Information than Not-Lonely users. The results imply that Lonely users are at risk of becoming victims of cybercrimes and thus should be more careful online. The results of this study did not support the second prediction. It was the users who did not indicate their Relationship Status (Nulls) who revealed more Sensitive and Non-Sensitive Information rather than those who indicated they were Single or In-A-Relationship. However, the third prediction was partially supported. More of those who appeared Alone in their Profile Image revealed Sensitive Information compared to those who appeared with others in their Profile Image. However, there

was no difference with respect to revealing Non-Sensitive Information between users who appeared Alone in their Profile Image and those who did not appear at all or who appeared with a romantic partner or friend(s). Future research should study the effect of Loneliness on self-disclosure while taking into account other potential influencing factors.

The literature review has revealed that while self-disclosure can reduce feelings of loneliness, it can put users at risk of becoming victims of cybercrimes such as identity theft, harassment, cyber-stalking, and cyber scams. This study has also shown that indicating that one is Lonely or appearing Alone in the Profile Image can predict self-disclosure in SNS. In order to take advantage of the opportunity to form social relations in SNS, users need to disclose more to present themselves to others. But by disclosing too much sensitive information about themselves, users can expose themselves to the risk of falling victim to these crimes. SNS users should not disclose all types of information; they should disclose information selectively.

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