“Can jealousy be detected as a unique pattern of recordable facial expressions by the FaceReader, and thus do such expressions manifest differently between sexes upon exposure to jealousy – evoking Snapchat messages?”
DECLARATION

I hereby declare that this dissertation is the result of my own independent investigation under the supervision of my tutor. The various sources to which I am indebted are clearly indicated. This dissertation has not been accepted in substance for any other degree, and is not being submitted concurrently for any other degree.

[Signature]

[Redacted], Candidate
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Abstract

The first aim of this current research was to identify the emotional components that make up jealousy. To do so, the Noldus FaceReader was used to record the activations of the basic emotions, when participants were presented with both emotional and sexual infidelity revealing Snapchat messages. The second aim of the study was to determine if sex differences, in response to sexual and emotional infidelity revealing Snapchat messages, can be measured in the activations of basic emotions by the Noldus FaceReader. Participants viewed two messages from a hypothetical romantic rival (one emotional and one sexual) and two neutral messages from their hypothetical partners’ friend. The FaceReader was used to record the activations of the basic emotions, for the 20 seconds in which they viewed each message. Results indicated that the FaceReader was unable to detect a unique pattern of emotional facial expression for jealousy. It was also unable to indicate a significant difference between males and females and message type. Therefore, it could be argued that jealousy does not result in an expressional response. Instead, future research should investigate the jealousy as a behavioural response.
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1. Introduction

Developments in media technology, such as: Facebook, Twitter and Snapchat, means that our access to information online has increased. Thus, it provides a channel for individuals to monitor their partner’s interactions and activities online, more freely (Drauker & Martsolf, 2010; Patchin & Hinduja, 2006; Tokunaga, 2010). The act of investigating a romantic partner’s private communication channel, without their knowledge is known as ‘snooping’ (Derby et al., 2012). It has been identified that 66% of individuals engaged in snooping behaviour. However, it has also been identified that such behaviour usually yields negative outcomes on a relationship, such as: trust issues, lack of communication and conflict (Derby et al., 2012). So, why do so many people ‘snoop’ through their romantic partners private communication channels? One link identified with snooping behaviour, was heightened rates of jealousy (Muise & Desmarasis, 2009). Thus, it is important to research the nature of jealousy in order for us to understand how it impacts our behaviour, and why individuals feel the need to ‘snoop around’ on their partners private communication channels.

In the context of this dissertation, jealousy is defined as an emotional response to the threat of losing a valued relationship to a rival (Hepburn, 2010). This is reported in many different cultures (Wood & Eagly., 2002). Feelings of jealousy can be attributed to many violent crimes in romantic relationships, including murder (Daly & Wilson, 1988). However, despite the potential negative effects of jealousy, evolutionary psychologists have attempted to explain the adaptive function of jealousy for both sexes. The most widely accepted idea suggests that the sex differences reported for jealousy arises from the different roles males and females play during child rearing (Buss et al., 1992). It is thought that as males face the adaptive challenges of potential paternity uncertainty, and thus investing his time in a non-biological child, it would be adaptive for males to be more sensitive to cues of sexual infidelity. However, the adaptive challenges for women relate more to the loss of her partner’s time and resources, and therefore cues to emotional infidelity are thought to be more fundamental to a woman’s jealousy (Buss et al, 1992). This idea was supported by Widerman and Kendall (1999) who found that males were more likely to report higher levels of jealousy to sexual infidelity than emotional infidelity, whereas for women this was the reverse. However, due to technological advances, Buss et al.’s (1992) research supporting the evolutionary perspective of jealousy could be seen as outdated and therefore may not be relevant for today (Bolhuis, 2015).

One huge development since Buss et al.’s (1992) original study is the increase in the access to the internet. It has been identified that over 4 billion people worldwide access the internet, for an average of 6 hours per day (We Are Social, 2018). Due to users spending so much
time per day using the internet, it has become an essential part of people’s lives. This increase in usage is thought to be due to the increase in technology; with almost two thirds of the world’s population owning a smartphone. More interestingly, it has been identified that over 3 billion people use the internet to access social media, of which almost all do so using a smartphone (We Are Social, 2018). This has increased by 14% since January 2017. This suggests that the advances in technology facilitates our ability to communicate with others online more freely. However, it could be argued that this could also create new challenges for couples. Mileham (2007) argues that the advances in the availability of technology and online platforms have made it easier for individuals to enjoy the stability of a committed relationship, but also enjoy the advantages of infidelity. For example; married individuals have access to specialised chat rooms that encourage infidelity, (such as: Yahoo’s Married and Flirting). Sites like these reinforce the internet’s potential to enable married individuals to meet strangers, flirt, and engage in sexual conversations or sexual behaviours with others online (e.g. Young et al., 2000). Research that has used social media platforms (such as: Facebook) to create different infidelity scenarios, found that males reported higher levels of jealousy to sexual infidelity messages (Dunn & Billett, 2017). On the other hand, it was found that women reported higher levels of jealousy to emotional infidelity messages. As findings were consistent with Buss et al.’s (1992) earlier findings, who did not use the social media paradigm, it could be argued that the same evolutionary pressures still remain present today, suggesting that this theory is still relevant.

The statistics for the number of active users on social media platforms has identified that Facebook is the most popular messaging platform, with 72% of adults having an active profile, while only 15% of adults have an active Snapchat account (Ofcom, 2017). These sites are particularly popular among younger users. From a survey, it was identified that 83% of 18 – 24-year-olds use Facebook and 62% use Snapchat (Ofcom, 2017). Snapchat is a social networking site that allows individuals to share photos, videos and messages with one another, in the knowledge that they will dissolve after a few seconds. One study investigated the motives for using Snapchat and Facebook (Utz, Muscanell & Khaild, 2015). It was identified that Snapchat was used for flirting and finding new love interests more than Facebook, with 13% of individuals admitting to ‘sexting’ on Snapchat. ‘Sexting’ is a term used to describe the communication of sexually explicit content, via text messages or social media sites (Ringrose et al., 2012). It was argued that Snapchat was the preferred site for such communications, as it was more private, and the nature of the site reduces the need for self-censorship. The study also identified that individuals were more likely to report feelings of jealousy to Snapchat infidelity messages, than Facebook infidelity messages (Utz, Muscanell & Khaild, 2015). This may suggest that the use of a more private channel of communication
could pose a larger threat to a relationship. In addition to this, it has been identified that males report higher levels of jealousy to sexual infidelity Snapchat messages, compared to emotional infidelity Snapchat messages (Dunn & Ward, 2017). However, the reverse was found for women. These findings suggest that Snapchat could play a role in increasing the risk of the evolutionary pressures of jealousy appearing in today’s society.

However, research supporting the evolutionary perspective of jealousy has been criticized for its reliance on self-report, forced-choice measures of jealousy. Such measures force participants to choose between sexual and emotional infidelity revealing scenarios, as to which is more distressing. Questions about the validity of such responses weaken the evolutionary argument that attempts to explain jealousy. According to Harris (2002, 2003), studies have failed to find convergent validity between the use of forced-choice responses and other measures of sexual and emotional jealousy. In one study, it was identified that using forced-choice questions replicated the typical gender differences identified by Buss et al. (1992). However, more open questions did not yield the same support for the evolutionary argument. For example: when asked to report feelings of jealousy to hypothetical scenarios involving: 1) their mate having a one-night stand whilst on a vacation and 2) their mate falling in love with someone whilst on vacation, both males and females reported higher feelings of jealousy to the first scenario over the latter (Harris, 2003). Therefore, from such inconsistencies between the findings of forced-choice and open questions, it was concluded that sexually dimorphic mechanisms when responding to different infidelity types, could be magnified by using forced-choice questions.

Therefore, other researchers have focused on the physical measures of jealousy; such as the amount of attention paid to infidelity messages, and the recall of such messages (Dunn & McLean, 2015; Schutzwohl & Koch, 2004). Such studies have found that females fixate more on emotional messages than males, and males fixate more on sexual messages than emotional messages of infidelity (Dunn & McLean, 2015). Hence, it is no surprise that women recall more emotional infidelity cues while males recall more sexual infidelity cues (Schutzwohl & Koch, 2004). This idea suggests that individuals pay more attention too, and therefore are able to recall, information that is more salient to them, in terms of reproductive success. These findings support the differences in the adaptive role of jealousy between males and females. However, these findings are concluded from indirect measures of jealousy. Therefore, it cannot be categorically concluded that females attend too and recall more emotional infidelity cues over sexual infidelity cues because of their adaptive nature to such cues, and the reverse for males.
Acknowledging this problem, Pitrzak et al. (2002) conducted multiple physiological measures of jealousy including; pulse rate, peak electrodermal activity (EDA), surface electromyographic activity (EMG) and skin temperature. Participants were shown emotional and sexual infidelity messages as well as neutral messages. They were instructed to signal when they had each image in mind, by pressing a button, which triggered the psychological measures of jealousy for 20 seconds. It was found that males showed a larger increase in responsiveness to sexual infidelity messages than emotional infidelity messages, whereas women respond higher to emotional infidelity messages. Both males and females showed increased heart rate, peak EDA, EMG and skin temperature to their adaptively primary infidelity type (sexual and emotional respectively). Therefore, these findings provide support for the evolutionary argument and the role of jealousy as an adaptation to different parenting pressures. Buss et al. (1992) also found that males showed an increase in brow contraction to sexual infidelity cues, whereas females showed an increase in brow contraction to emotional infidelity cues. Although this finding was not significant, it suggests that feelings of jealousy were negative. As these responses were not controlled by the participants, these findings strengthen the evolutionary argument for the adaptive role of jealousy. The use of such physiological, objective measures makes results more conclusive as they have been derived from a scientific measure of these concepts.

The evolutionary perspective of jealousy has also been critiqued for its use of imagined scenarios. Harris (2002) suggested that hypothetical scenarios bare no relationship with participants' reactions to a mate’s infidelity, and thus sex differences in jealousy are due to methodological flaws. However, Kuhle (2011) conducted a study analysing the TV series ‘Cheaters’; a series where a victim would watch a video of their partner’s involvement with a romantic rival, and would then be supported in confronting them. The findings from this study supports the evolutionary perspective of jealousy, in that males were more likely to inquire about sexual aspects of their partners infidelity, whereas women were more likely to inquire about the emotional aspects of their partners infidelity. Results from Kuhle’s (2011) study align with findings of other research which utilised hypothetical scenarios in its methodology (e.g. Buss et al., 1992; Dunn & Billett, 2017). This therefore disputes the claim that the use of hypothetical scenarios fails to reflect real life infidelity, and thus strengthens the validity of hypothetical scenarios used in evolutionary research on jealousy. Also, as gaining ethical approval for the use of real infidelity scenarios is immensely difficult, this research project decided to employ the use of hypothetical scenarios.

Despite such rich findings around the topic, researchers of emotion do not consider jealousy to be a primary emotion. Instead, researchers consider it to be a combination of the more basic emotions outlined by Ekman (1992); happy, sad, angry, scared, surprised and disgust.
(Frank, 1988; Hupka, 1984; Plutchik, 1980). Pietrzak et al. (2001) found that when participants were asked to imagine their partner engaging in emotional and sexual infidelity, males reported significant increases in anger, rage and betrayal for sexual imagery, whereas females reported significant increases in anger, anxiety and fear for emotional imagery. This not only supports the evolutionary theory of jealousy, in that males and females showed adaptive responses to sexual infidelity and emotional infidelity cues respectively, but it also supports the idea that jealousy is a combination of the different primary emotions. However, the literature is yet to provide a scientific measure of these emotions.

As previously discussed research is yet to use a quantitative, linear, scientific method to measure the emotional components of jealousy. However, other researchers have used the Noldus FaceReader to measure emotional responses. The Noldus FaceReader is a program that is designed to record emotional valence (EV) from facial expressions and categorises them into the 6 basic emotions; happy, sad, angry, surprised, scared and disgust, outlined by Ekman (1992). The FaceReader has been identified as being 87% accurate at identifying facial expressions (Terzis, Moridis & Economides, 2010). Existing research has used the FaceReader to identify many relationships with patterns of facial expressions for the basic emotions, such as amusement and attitudes towards advertisements (Lewinski & Shrimpton-Smith, 2006) and consumers reactions to food products (Danner et al., 2014). Results from both studies were validated by self-report measures (Lewinski & Shrimpton-Smith, 2006; Danner et al., 2014).

The aim of this project was to record the activations of the basic emotions, using the FaceReader in response to participants being presented with infidelity-revealing Snapchat messages. In doing so, it attempts to identify the emotional components that make up jealousy. Does jealousy manifest as an independent emotion, at least in terms of the manifestation of a distinctive pattern of recordable facial characteristics? The second aim of this study was to determine if the sex differences in the activations of emotions can be recorded by the FaceReader, in response to messages depicting either emotional or sexual infidelity. Participants were shown sexual, emotional and neutral infidelity messages and were asked to imagine how each scenario would make them feel. The FaceReader took a 20 second reading of the participant’s facial expression when viewing each scenario. It was assumed that the increases in more negative emotions such as anger, sadness and fear would signal jealousy (Buss et al., 1992). It was also predicted that there would be an overall sex difference, where women would show higher levels of distress to infidelity messages than males. It was also predicted that males would show higher levels of distress to the sexual infidelity messages than the emotional infidelity messages, whereas this was expected to be the reverse for women (Dunn & Billett, 2017; Wiederman & Kendall; 1999). Based on findings
reported by Dunn and Billett (2017) and Wiederman and Kendall (1999) it was also predicted that males would show increased levels of distress for sexual infidelity messages compared to females, and females would show increased distress for emotional messages compared to males. Finally, it was predicted that the FaceReader would detect higher levels of anger for males than other emotions when imagining sexual infidelity (c.f. Pietrzak et al., 2002). In contrast, it is predicted that it would detect significantly higher levels of anger and fear for females when imagining emotional infidelity.
2. Method

2.1. Pilot Study

A pilot study was conducted to test the materials, and for the researcher to familiarise herself with the equipment, before commencing the study. Five participants; 4 females and 1 male, were recruited using an opportunity sample. They were asked to watch a PowerPoint slide show which contained the four scenarios. They were then asked to imagine how each scenario would make them feel (please refer to the procedure section for full details). From this it was identified that participants would not be able to participate if they wore glasses. This was due to the glare of the screen onto the lenses, resulting in the FaceReader failing to find the image of the face. Therefore it was unable to detect the facial expressions. Due to this finding from the pilot study, being able to read off a screen without glasses was incorporated within the inclusion criteria of the study. Another issue identified for change within the pilot study was the lighting of the room. Initially the pilot study was carried out in a small artificially lit room, however the image quality was poor and thus the FaceReader failed to detect the facial expressions. Therefore, the experimental study was carried out in a naturally lit room.

In addition, participants were asked to identify the nature of each message to test if the messages were explicit to their infidelity type. They were also asked to comment on the realism of the messages, in terms of language and structure. Participants were able to correctly identify which messages were sexual, emotional and neutral. Participants made positive feedback regarding the language used and the use of emoticons in the creation of the messages, stating that they were realistic of what they might see in real life. Thus it could be determined that these messages possessed high ecological validity.

2.2. Design

A mixed experimental design was used in order to incorporate both within-subject and between-subject factors. The within-subject variable, message type, consisted of two levels; emotional and sexual infidelity from a baseline measure. The between-subject variable, sex of participant, also consisted of two levels; male and female. The dependant variables were the emotional valence scores from a baseline measure, of the facial expressions; happy, sad, angry, , scared & disgust. This was measured using the Noldus FaceReader version 5.1. In order to control for order and boredom effects, the message types were counterbalanced in terms of presentation to the participants, by systematically alternating the PowerPoints (see appendix 2.A – 2.D).
2.3. Inclusion Criteria
It was essential that participants identified as heterosexual to take part in this study, as it has been identified that sex differences disappear as the same adaptive challenges faced in same-sex relationships are not evident (Sagarin et al., 2002). It was also important that participants were able to read off a screen without glasses; a problem identified in the pilot study. Finally, although age was not an essential measurement of the study, participants must be between 18 and 30, due to the context of Snapchat being used, as it is more frequently used by younger generations (Ofcom, 2017).

2.4. Sample
Fifty-one participants, aged between 18 and 30 years old from Cardiff Metropolitan University were used. They were recruited using an opportunity sample, on a voluntary basis. Participants were recruited using the Participant Panel and also those who were in personal contact with the researcher. Of the 51 participants 29 were female and 22 were male. The mean age of female participants was 19.6 years, with a standard deviation of 2.59 years. The mean age of male participants was 20.2 years, with a standard deviation of 3.26 years.

2.5. Materials and Apparatus
An information sheet, consent form and debrief form was created in Microsoft word (see appendices 1.B. and 1.C.). Other materials and apparatus used to conduct this experiment were, the four messages (emotional, sexual and two neutral), PowerPoint slide shows, the Noldus FaceReader version 5.1 and a standard webcam.

2.5.1. Messages
Four messages were created; two neutral, one to allude sexual infidelity and one to allude emotional infidelity:

Sexual Message:

“Last night was out of this world, I can’t wait to f**k you until you cum again! You better scream my name louder next time! P.S. I agree, this will only ever be sexual!”
Emotional Message:

“Although were so far apart I feel so f**king close to you. I feel like you’re my soul mate! I can’t wait to meet you one day! P.S. I agree sex would complicate things”

Neutral Messages:

“How are you finding the essay? I am finding it so f**king hard, I think I’m going to fail! Maybe we could meet up to go through it together. P.S. Tomorrow’s lecture is cancelled.”

“I have only just got home, the traffic was f**king manic on the Newport Road. It was a good gym session today though, we will be feeling it in the morning! P.S. Legs tomorrow?”

The messages were all constructed to contain the same number of words and the same expletives to follow the criteria of Dunn and McLean (2015). Emoticons were also used to mimic realistic messages between individuals conversing via social media (Haas et al., 2011). They were created using a Snapchat account and screenshot to capture them in this format (see figures 2.1 – 2.3), as it was found that snapchat elicits higher levels of romantic jealousy than other forms of social media (Utz et al., 2015). Participants viewed emotional and sexual infidelity messages from a romantic rival, and neutral messages from a partner’s friend. Thus, male participants viewed emotional and sexual messages from ‘James’ and neutral messages from ‘Jessica’. This was the reverse for females. The messages were presented to participants in PowerPoint.
2.5.2. PowerPoint Slides

In total four PowerPoint slide shows were created, each containing all four of the different messages. Prior to the presentation of the jealousy evoking messages, a neutral message was presented, which should have elicited no emotional response. This therefore provided a baseline from which changes in emotional expression in response to jealousy-eliciting messages could be measured. Each message was timed to be presented on the screen for 20 seconds (Pitrzak et al, 2002). The messages were counterbalanced in order of presentation, in attempt to control for order effects. This made up two presentations for female participants and two for male participants, resulting in four all together.

2.5.3. Noldus FaceReader

The Noldus FaceReader version 5.1 is a program designed to detect emotional valence (EV) from facial expressions. The software finds the participants face and assigns 491 facial feature locations in order to create a 3D model of the face. Facial expressions from the 3D model of the face are classified using an artificial neural network made up of over 10,000 images (Bishop, 1995) and categorised within each of the dimensions: happy, sad, angry, surprised, scared and disgust, the basic emotions outlined by Ekman (1992) (see figure 2.4). EV is computed as a quantitative, linear combination ranging from 0 – 1. This computing process operates on a real-time video frame rate. The researcher added markers to the data to indicate when each message was viewed, which could be seen in the output of the data. No visual record was taken of the participants face. The FaceReader was linked to an external webcam which was mounted on the computer screen in which the PowerPoint slides were presented, to capture the participants facial expressions (see figure 2.5).
Figure 4: The Noldus FaceReader real-time mesh of 491 locations on the participants’ face and the measure of the corresponding facial expressions. Permission taken from participant (see appendix 1.D).

Figure 5: Experiment setup. External webcam on top of the participants’ screen connected to the FaceReader on the experimental computer. Permission taken from participant (see appendix 1.D).
2.6. Procedure
Participants were given an information sheet outlining the details and the requirements of the study, and a consent form which they were required to sign in order to continue the study. They were then verbally informed by the researcher that they were about to see four scenarios, and they must try to imagine each scenario as best as they can. They were told that the FaceReader would pick up their emotions from their facial expressions. They were also informed that the FaceReader would not take a visual recording of their face. Finally, they were told that the PowerPoint presentation in which they were about to view was timed to navigate itself, and that they would not need to click through it themselves. The researcher remained in the sound attenuated room with the participant throughout the duration of the study. They were asked to imagine a long term committed romantic relationship they are in, had in the past or would like to have in the future (Buss et al., 1992). They were then asked to imagine that while snooping through their partners phone, they see messages of the following two scenarios; sexual and emotional infidelity. Prior to revealing each of these messages they were exposed to neutral messages, that did not elicit any emotional expression. Each message was present on the screen for 20 seconds. After the study the participants were thanked for taking part and debriefed.

2.7. Method of Analysis
A $2 \times 2 \times 6$ mixed analysis of variance (ANOVA) was used to incorporate within subject factors of sex of participant and between subject factors of message type and emotional expression.
3. Results

As results reflected change in mean emotional valence (EV) from a baseline measure, values range from -1 – 1. To transform negative values, prior to carrying out any statistical test, a constant value of 1.43787 (the most negative value in the data set + 1) was added to the data set, which made the new range for emotional valence from baseline 0 – 2.

Figure 3.1 shows the differences between the emotional valence scores from baseline (after transformation) between males and females in response to exposure to sexual and emotional infidelity scenarios.

Mauchly’s Test of Sphericity indicated that the assumption of sphericity had been violated for Message Type \([X^2(0) = 0.0, p < .05]\), and for emotional expression \([X^2(14) = 287.5, p < .05]\). Therefore, Greenhouse-Geisser corrections were used in the reporting of the 2 X 2 X 6 ANOVA. Levene’s Test indicated that the assumption of homogeneity of variance, for sexual happy \([F_{1,49} = 5.39 p < .05]\), sexual disgust \([F_{1,49} = 4.89 p < .05]\), emotional surprised, \([F_{1,49} = 6.58 p < .05]\), and emotional disgust \([F_{1,49} = 5.34 p > .05]\), had been violated. However, it also showed that the assumption of homogeneity of variance had not been violated for sexual sad \([F_{1,49} = 0.03 p < .05]\), sexual angry \([F_{1,49} = 0.74 p < .05]\), sexual surprised \([F_{1,49} 0.64 p < .05]\), sexual scared \([F_{1,49} = 3.70 p < .05]\), emotional happy \([F_{1,49} = 1.45 p < .05]\), emotional sad \([F_{1,49} = 1.35 p < .05}\), emotional disgusting. 

![Figure 6](image-url)
= 0.52 $p < .05$, emotional angry $[F_{1,49} = 2.42 \ p < .05]$, and emotional scared $[F_{1,49} = 0.57 \ p < .05]$.

Data was subjected to a 2 X 2 X 6 mixed ANOVA which incorporated the between-subjects factor sex of participant and the within-subjects factor of message type. Results showed no significant main effect of sex $[F_{1,49} = .02, \ p > .05, \ \eta^2 = .00]$, no significant main effect of message type $[F_{1,104} = 1.28, \ p > .05, \ \eta^2 = .03]$ and no significant main effect for emotional expression $[F_{1,104} = 2.49, \ p > .05, \ \eta^2 = .05]$. There was no significant interaction between sex of participant and message type $[F_{1,104} = 0.481, \ p > .05, \ \eta^2 = .01]$ or between sex of participant and emotional expression $[F_{1,104} = 1.44, \ p > .05, \ \eta^2 = .03]$ or between message type and emotional expression $[F_{1,104} = 0.29, \ p > .05, \ \eta^2 = .01]$. The overall interaction between sex of participant, message type and emotional expression was not significant $[F_{1,104} = 0.39, \ p > .05, \ \eta^2 = .01]$.

To summarise the findings, results indicated that measures of emotional facial expressions in the infidelity conditions did not differ significantly from the baseline (neutral) scores. Results also showed no significant differences between emotional expression and sex of participant and the message type.
4. Discussion

The first aim of this project was to identify the emotional components that make up jealousy. To do so, the Noldus FaceReader was used to record the activations of the basic emotions when participants were presented with both emotional and sexual infidelity revealing Snapchat messages. The second aim of this study was to determine if sex differences in response to sexual or emotional infidelity revealing Snapchat messages can be measured by the Noldus FaceReader, in the activations of the basic emotions. This research was written from the perspective of an evolutionary psychologist. Such theory has been criticised for its outdated idea of jealousy (Bolhuis, 2015). This research intended to use infidelity revealing Snapchat messages in order to explore the sex differences within contemporary jealousy, and thus refute claims that findings from an evolutionary psychological perspective of jealousy are historical. This study also intended to take a scientific, linear measure of jealousy in order to support the evolutionary perspective of jealousy, and dismiss claims that sex differences in jealousy are down to the use of forced choice methodological flaws (Harris, 2003). Participants viewed four Snapchat messages; one which alluded to sexual infidelity, one which alluded to emotional infidelity and two neutral messages. The FaceReader was used to detect facial expressions to determine emotional valence (EV) scores. Neutral messages were used as a baseline measure to determine change in EV from baseline for emotional and sexual infidelity messages.

In relation to the first aim of this research, the results indicated no significant difference between the measures of emotional facial expressions in the infidelity conditions and the neutral conditions. It was hypothesised that jealousy would be determined by increases in negative emotions such as anger, sadness and fear (Buss et al., 1992). Findings from this study did not support this hypothesis and therefore the null hypothesis for this research aim was accepted. From this, it could be concluded that jealousy does not have its own unique pattern of emotional facial expressions made up of the 6 basic emotions, outlined by Ekman (1992) (at least not one that can be detected by the FaceReader). It could therefore be suggested that, as the FaceReader cannot detect the emotional components that make up jealousy, jealousy may be considered an emotion in its own right. This theory would support the findings of this current study, as the FaceReader is not programmed to detect jealousy as an emotion alone. In one study it has been identified that humans have the innate ability to detect jealousy as a primary emotion above the levels of chance (Dunn & Smith, 2018). Together, findings from this current study and from Dunn and Smith (2018), refute the concept that jealousy is a secondary emotion made up of the basic emotions (Frank, 1988; Hupka, 1984; Plutchik, 1980).
With regards to the second research aim, there were no significant differences found between males and females in their responses to emotional and sexual infidelity revealing Snapchat messages. It was predicted that females would show higher levels of distress to infidelity messages than males (Dunn & Billett, 2017; Weiderman & Kendall, 1999). It was also predicted that females would show higher levels of distress to emotional infidelity messages than sexual infidelity messages (Dunn & Billett, 2017; Weiderman & Kendall, 1999). This was predicted to be the reverse for males. Finally, it was hypothesised that the FaceReader would detect higher levels of anger than any other facial expression for males when viewing sexual infidelity messages (c.f. Pietrzak et al., 2002). However, it was predicted that it would detect significantly higher levels of anger and fear for females when imagining emotional infidelity (c.f. Pietrzak et al., 2002). The results from this study did not support these hypotheses; therefore, the null hypotheses for this research aim were accepted. As a result of these findings, it could be suggested that males and females do not differ in terms of their presentation of jealousy for different infidelity types. Hence, this does not support previous research which identified sex differences in jealousy (Buss et al., 1992; Dunn and Billett, 2017; Dunn & McLean, 2015; Pietrzak et al., 2002, Schutzwonhl and Koch, 2004). In addition, these findings do not support the evolutionary perspective of jealousy, which suggests that males and females are more adapted to responding to different infidelity cues, due to the different pressures faced during child rearing.

Despite using similar imagined infidelity revealing messages to previous researchers, that had investigated the evolutionary perspective of jealousy (Dunn and Billett, 2017; Dunn & McLean, 2015; Dunn & Ward, 2017), this study did not yield the same results. The main difference between this current study and previous research was the use of the FaceReader to measure the components that make up jealousy. As this is an objective measure of emotional responses, it could be suggested that jealousy may be a subjective state, hence it does not translate to facial expressions (Sabini & Silver, 2005). This idea would therefore provide an explanation for the FaceReader failing to detect the emotional facial expressions that make up jealousy. It has been suggested by Buss (2000) that emotional states, such as jealousy, have behavioural consequences rather than mere emotional facial expressions. This idea would be supported by findings which suggest that feelings of jealousy are attributable to many violent crimes (Daly & Wilson, 1988). Buss (2000) argued that it is for this reason that jealousy is not considered a basic emotion by facial expression, but still provides an explanation as to why it is shaped by evolution. If this is the case then findings from this current study are as expected, and therefore they support the idea that jealousy is a subjective state which cannot be detected by facial expressions. However, this research did not investigate the behavioural consequences of such subjective state, so therefore it cannot provide full support for this
theory (Buss, 2000). However, it may be interesting to consider the findings from Pietrzak et al.’s (2002) study, which identified sex differences in the increases in peak EDA, EMG and skin temperature, which was consistent with the evolutionary perspective of jealousy. Increases in such physiological responses could indicate increases in the activity of the sympathetic nervous system (SNS), which prepares the body for a fight or flight response (Jansen et al., 1995). Such preparations of these biological systems may be displayed as the behavioural consequences of jealousy that we know today. This provides support for Buss’s (2000) idea that jealousy elicits behavioural responses rather than an expressional response, which could also explain why results from this current study do not align with those of Pietrzak et al. (2002).

Several limitations have emerged from this study. The first one addresses the high emotional valence scores of happiness in response to the infidelity messages. According to Buss et al. (1992) jealousy is defined by negative feelings towards infidelity scenarios, which is not supported by this current research. An observation made by the researcher was that participants seemed to find both the emotional and sexual infidelity messages initially amusing, which was detected by the FaceReader as high levels of happiness. This in turn affected the overall results. Therefore, beginning the recording of facial expressions after the initial humorous reaction, may be more reflective of individual’s reactions to jealousy – evoking scenarios. In one study conducted by Pietrzak et al. (2002), physiological measures of jealousy were not taken until participants signalled that they had each of the scenarios in their minds. By adopting this method in any further research that requires the measurement of facial expressions, that may elicit an initial humorous reaction, may increase the validity of such measurements.

The second limitation highlighted within this research was the lack of comparison data. Other research that has used the FaceReader to measure emotional expressions has also used self-report measures of such expressions in order to validate findings (Lewinski & Shrimpton-Smith, 2006; Danner et al., 2014). However, this current research study did not take a measure of self-report which could be compared to data retrieved from the FaceReader. Thus, it cannot be determined to what extent the participants reported feelings of jealousy to these messages. Therefore, it could be argued that this study did not validate previous research that investigates the sex differences in jealousy (Buss et al., 1992; Dunn and Billett, 2017; Dunn & McLean, 2015; Pietrzak et al., 2002, Schutzwonhl and Koch, 2004) because it may not actually measure jealousy. If this is the case then, findings from this study neither support or refute the evolutionary theory of jealousy. Future studies that use the FaceReader to measure emotional expression should use self-report measures to ensure the validity of the measure. It may be beneficial for future researchers to replicate this study with the addition of a self-report scale.
of jealousy, to determine individual’s subjective ratings of jealousy. This would help ascertain if jealousy can in fact be measured by the FaceReader, and if the results from this study are due to the materials not eliciting a jealous state.

The final limitation identified within this research involves the demographic used for the sample. Young people between the ages of 18 and 30 were selected to participate in this study for two reasons. The first reason being that, younger generations were identified as more likely to use Snapchat than older generations (Ofcom, 2017). Therefore, as Snapchat was the medium used to present the infidelity messages, it was essential that they understood the uniqueness of this social media platform; in that it minimises the need for self-censorship, making it more private. The second reason for the use of this demographic was that it was easily obtainable through university, or through people in personal contact with the researcher. However, Buss et al. (1992) proposed that being in a committed relationship activates the mechanism of jealousy. This idea was supported by Murphy et al. (2006) who identified that relationship experience yields within-sex differences in jealousy. Therefore it could be argued that relationship experience comes with age, and thus using a younger sample does not take into consideration this factor. Also by only using this small age range, it means that results cannot be generalised to an older or younger population.

This research has contributed to the evolutionary perspective of jealousy in that it has provided evidence to suggest that jealousy does not result in the mere activation of facial expressions. Therefore, along with other research, that has identified physiological changes in response to jealousy (Pietrzak et al., 2002), it may be determined that jealousy has behavioural consequences instead (Buss, 2000). However in order to determine the behavioural consequences of jealousy, future research should investigate this concept. One way in which this could be researched is by presenting individuals with sexual and emotional infidelity messages, and measuring changes in facial expressions and physiological states. Following this, individuals could be given a questionnaire asking them how they would react to each situation. This study would examine if the effects of physiological arousal, in response to jealousy – evoking messages, results in behavioural consequences, whilst excluding jealousy as a mere expressional emotion. This experiment would better test Buss’s (2000) theory of jealousy.

However, the idea that jealousy does not result in an expressional response, has negative implications for the recognition of jealousy in relationships. It has been identified that feelings of jealousy can be attributed to many violent crimes within romantic relationships; including murder (Daly & Wilson, 1988). Therefore, it could be suggested that as we are unable to read
jealousy as a facial expression, then we are unable to detect feelings of jealousy before it leads to violence.

In summary, findings were unable to reflect the expected sex differences, highlighted in previous jealousy research, using a scientific, linear measure. Therefore, it could be argued that the sex differences in jealousy, claimed by evolutionary psychologists, are mere reflections of hypothetical, forced-choice scenarios. Thus, it could be argued that this research provides contradictory evidence for the theory of jealousy having evolved in response to child rearing pressures. However, the fact that jealousy was remained undetected as an emotional response by the FaceReader could strengthen this perspective, in that it could explain why sex differences were not measured. It also supports the idea that jealousy is an emotion that results in more than just a mere expressional response.
5. References


6. Appendices

Appendix 1

1.A. Approved ethics application
1.B. Information sheet and consent form
1.C. Debrief form
1.D. Photograph publication permission

Appendix 2

2.A. PowerPoint presented to female participants (Emotional – Sexual)
2.B. PowerPoint presented to female participants (Sexual – Emotional)
2.C. PowerPoint presented to male participants (Emotional – Sexual)
2.D. PowerPoint presented to male participants (Sexual – Emotional)
CARDIFF METROPOLITAN UNIVERSITY APPLICATION FOR ETHICS APPROVAL

When undertaking a research or enterprise project, Cardiff Met staff and students are obliged to complete this form in order that the ethics implications of that project may be considered.

If the project requires ethics approval from an external agency such as the NHS or MoD, you will not need to seek additional ethics approval from Cardiff Met. You should however complete Part One of this form and attach a copy of your NHS application in order that your School is aware of the project.

The document Guidelines for obtaining ethics approval will help you complete this form. It is available from the Cardiff Met website.

Once you have completed the form, sign the declaration and forward to your School Research Ethics Committee.

PLEASE NOTE:
Participant recruitment or data collection must not commence until ethics approval has been obtained.

PART ONE

<table>
<thead>
<tr>
<th>Name of applicant:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Supervisor (if student project):</td>
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</tr>
<tr>
<td>School:</td>
<td>Health Sciences</td>
</tr>
<tr>
<td>Student number (if applicable):</td>
<td>[Redacted]</td>
</tr>
<tr>
<td>Programme enrolled on (if applicable):</td>
<td>BSc Psychology</td>
</tr>
<tr>
<td>Project Title:</td>
<td>Do facial expressions manifest differently between the sexes upon exposure to jealousy – evoking snapchat messages.</td>
</tr>
<tr>
<td>Expected Start Date:</td>
<td>27/11/2017</td>
</tr>
<tr>
<td>Approximate Duration:</td>
<td>2-3 months</td>
</tr>
<tr>
<td>Funding Body (if applicable):</td>
<td>N/A.</td>
</tr>
<tr>
<td>Other researcher(s) working on the project:</td>
<td>N/A.</td>
</tr>
<tr>
<td>Will the study involve NHS patients or staff?</td>
<td>No</td>
</tr>
<tr>
<td>Will the study involve taking samples of human origin from participants?</td>
<td>No</td>
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</table>

In no more than 150 words, give a non-technical summary of the project

Appendix 1.A. Approved ethics form
Human jealousy is defined as an emotional response to the threat of losing a valued relationship to a rival and can be attributed to many violent crimes in romantic relationships (Daly & Wilson, 1988; Hepburn, 2010). Many researchers of this field have found that women report higher levels of jealousy to emotional infidelity cues than sexual infidelity cues, whereas for males this is the reverse (Dunn & Billett, 2017; Weiderman & Kendall, 1999). Evolutionary psychologists believe that the sex differences in jealousy are due to the different adaptive functions males and females face during child rearing (Buss et al., 1992).

However, emotion researchers do not consider jealousy a primary emotion, but instead it is considered to be a combination of the more basic emotions outlined by Ekman (1992; Frank, 1988; Hupka, 1984; Plutchik, 1980). Pietrzak et al. (2001) found that when asked to imagine their partner engaging in emotional and sexual infidelity, males reported increases in anger, rage and betrayal, whereas women reported increases in anger, anxiety and fear. This supports the idea that jealousy is made up of a combination of the different primary emotions. However, the literature is yet to provide a scientific measure of these emotions.

The Noldus FaceReader is a program that is designed to detect facial expressions and categorise them into the 6 basic emotions outlined by Ekman (1992). This research aims to use the FaceReader in order to measure the differences between the activations of the basic emotions, and the responses to infidelity–revealing snapchat messages. It also aims to determine the sex differences between the activations of the emotions measured by the FaceReader.

References


Does your project fall entirely within one of the following categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper based, involving only documents in the public domain</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Laboratory based, not involving human participants or human tissue samples</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Practice based not involving human participants (eg curatorial, practice audit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compulsory projects in professional practice (eg Initial Teacher Education)</td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

If you have answered YES to any of these questions, no further information regarding your project is required.

If you have answered NO to all of these questions, you must complete Part 2 of this form

**DECLARATION:**

I confirm that this project conforms with the Cardiff Met Research Governance Framework

Signature of the applicant:  
Date:

**FOR STUDENT PROJECTS ONLY**

Name of supervisor:  
Date:

Signature of supervisor:

**Research Ethics Committee use only**

Decision reached:  
- Project approved  
- Project approved in principle  
- Decision deferred  
- Project not approved  
- Project rejected

Project reference number: [Click here to enter text.]

Name: [Click here to enter text.]  
Date: [Click here to enter a date.]
PART TWO

A RESEARCH DESIGN

A1 Will you be using an approved protocol in your project?
   No

A2 If yes, please state the name and code of the approved protocol to be used
   Click here to enter text.

A3 Describe the research design to be used in your project

Design

A mixed design would be used which would incorporate the two independent variables (IV). IV one is a within-subject factor of message type (emotional infidelity, sexual infidelity and neutral), and IV two is a between-subject factor of sex of participant. The dependant variable (DV), measured by the face reader, consists of multiple levels, measuring the six basic emotions outlined by Ekman (1992) and neutral.

Participants

A minimum of 20 male and 20 female students, aged 18-30 years old, from Cardiff Metropolitan University will be recruited to take part using the Participant Panel. This age range was selected as it is important that they are aware of the concepts of Snap Chat, as the messages will be presented in this format. It is also important that they are old enough to imagine infidelity in a relationship. Participants must identify as heterosexual as Sagarin et al (2002) found that sex differences disappear as the same adaptive challenges faced in same-sex relationships are not evident.

Materials

Messages

The messages will be either be of a sexual, emotional or neutral nature:

"Last night was out of this world, I can’t wait to f**k you until you cum again! 😊 You better scream my name louder next time! P.S. I agree, this will only ever be sexual! ;P"

---

1 An Approved Protocol is one which has been approved by Cardiff Met to be used under supervision of designated members of staff; a list of approved protocols can be found on the Cardiff Met website here
“Although were so far apart I feel so f**king close to you. I feel like you’re my soul mate! I can’t wait to meet you one day! <3 P.S. I agree sex would complicate things xxx”

“How are you finding the essay? I am finding it so f**king hard, I think I’m going to fail :'( maybe we could meet up to go through it together P.S. Tomorrow’s lecture is cancelled.”

“I have only just got home, the traffic was f**king manic on the Newport road. It was a good gym session today though, we will be feeling it in the morning! P.S. Legs tomorrow?”

Participants will be informed prior to taking part of the explicit nature of these messages, and will be informed that they are able to terminate the study at any point.

_Noldus FaceReader_

The FaceReader version 5.1 would be used to detect and record each of the 6 basic emotions outlined by Ekman (1992). No visual record is taken of the participant. The FaceReader will be linked to an external webcam, which will be mounted on the computer screen that the participant will view the PowerPoint slides on.

**Procedure**

Participants will be given a consent form and information sheet prior to commencing the study, to read through and sign if they wish to continue. The researcher will remain in the sound attenuated room while the participant navigates through the PowerPoint slides, to add markers to the data so that facial expressions can be linked to when each message is viewed. They will be asked to imagine a long term committed relationship they are in, had in the past or would like to have in the future (Buss et al, 1992). They will then be asked to imagine that while snooping through their partners phone they see messages one of the following scenarios; sexual infidelity, emotional infidelity or neutral. Facial expressions will be measured for 20 seconds. They will then be thanked for taking part and debriefed. The debrief form will contain contact details for the researcher, so that they can withdraw their data, if they wish to do so, for up to 2 weeks after completion.
Method of Analysis

A $2 \times 3 \times 6$ multivariate analysis of variance (MANOVA) will be carried out to investigate the differences in the activations of the 6 basic emotions according to Ekman (1992) between males and females and between sexual and emotional cues to infidelity from a baseline measure.

Anonymity and Confidentiality

All participants will be given a participant number so data can be identified if they wish to withdraw from the study after completion. No participant will be referred to individually within the analysis of the report. All data will be kept on a locked password protected computer and on a USB stored in a safe place. Only the researcher and supervisor will have access to the data.

References


A4 Will the project involve deceptive or covert research?

No

A5 If yes, give a rationale for the use of deceptive or covert research

Click here to enter text.

B PREVIOUS EXPERIENCE

B1 What previous experience of research involving human participants relevant to this project do you have?

I have participated in many studies available on the Cardiff Metropolitan Participant Panel, as well as collecting data for both my data analysis module and my research methods module in Level 4 and 5, within my course.

B2 Student project only

What previous experience of research involving human participants relevant to this project does your supervisor have?

Click here to enter text.

C POTENTIAL RISKS
### C1 What potential risks do you foresee?

One of the main potential risks this research faces, is that individuals may take offence to the languages and the content of the messages. This could result in a large quantity of individuals choosing to terminate the research part way through, or contact the researcher to have their data removed from the data set. There is also the potential risk that individuals may find the context of the messages personally distressing.

### C2 How will you deal with the potential risks?

To overcome these potential risks, I will ensure that the participant information form includes information about the explicit nature of the messages they are about to view, as well as informing them verbally prior to commencing the study. This should therefore minimise the number of participants that terminate the study, and withdraw their data. However, if this is still the case, and I fail to find enough participants through the participant panel, I will recruit friends and family members who are able to making it into the lab to complete the study. All individuals will be provided with a debrief form at the end of the study which will have links to relevant support webpages such as [https://www.relate.org.uk/](https://www.relate.org.uk/) for individuals who may find the context of the messages distressing. All participants will also be reminded verbally before beginning the experiment that they can terminate it at any point if they wish.

---

When submitting your application, you **MUST** attach a copy of the following:

- All information sheets
- Consent/assent form(s)

Refer to the document *Guidelines for obtaining ethics approval* for further details on what format these documents should take.
Title of Project: Sex differences between the expression of jealousy.

Participant information sheet

The study
This study will be investigating the differences between the expressions of jealousy between males and to different types of jealousy-evoking snapchat messages.

What would happen if you agree to participate?
If you agree to participate you will be asked to imagine you are in a long term committed relationship and they you will be asked to imagine 4 scenarios. For each scenario you will be presented with a message in a snapchat format. Your emotional responses will be recorded, however, there will be no physical recording taken of yourself.

Exclusion criteria
You must identify as exclusively heterosexual.

Potential Risk
The nature of some of the messages are explicit and they contain some offensive language. If you find that you are offended before, during or after the study you are able to terminate or withdraw your results at any time. If you are concerned with your results, contact my supervisor (details at the bottom).

Potential benefits
You will receive credits for your course.

Withdrawal, anonymity and confidentiality
You have the right to withdraw from the experiment at any time, and you have 2 weeks from, the date of completion, to withdraw your data from the data set. If you wish to do so, please contact my supervisor with your participant number (on the top of this form). All data will be stored on a password protected computer, and stored in a password protected folder. All information will be kept confidential and no one will have access to the data other than the researcher and supervisor.
PARTICIPANT CONSENT FORM

Reference Number:
Participant name or Study ID Number:
Title of Project: Sex differences between expression of jealousy in response to jealousy-evoking snapchat messages.
Name of Researcher: [Redacted]

Participant to complete this section: Please initial each box.

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. [ ]

2. I understand that my participation is voluntary and that I am free to withdraw at any time before leaving the experiment, without giving any reason. [ ]

3. I agree to take part in the above study. [ ]

_______________________________________   ___________________
Signature of Participant
Date

_______________________________________   ___________________
Name of person taking consent
Date

____________________________________
Signature of person taking consent
Participant Number:

Debrief:

Sex differences between the expression of jealousy

Thank you for taking time to complete this study. This study was conducted to investigate if facial expressions manifest differently between the sexes upon exposure to jealousy – evoking Snapchat messages. Human jealousy is defined as an emotional response to the threat of losing a valued relationship to a rival and can be attributed to many violent crimes in romantic relationships. Evolutionary psychologists believe that the sex differences in jealousy are due to the different adaptive functions males and females face during child rearing, however, it is not considered to be a primary emotion. Instead jealousy is considered to be a combination of the more basic emotions outlined by Ekman. This research used the FaceReader in order to measure the differences between the activations of the basic emotions, and the responses to infidelity–revealing snapchat messages. It also aims to determine the sex differences between the activations of the emotions measured by the FaceReader.

All data will remain confidential and anonymous throughout the data collection, analysis and reporting of data. If you would like any more information regarding the results of the overall study, or you would like to withdraw your data, please contact the researcher on [email protected]. Please note you have two weeks to contact the researcher to withdraw data, just state your unique participant number (top of the debrief). If you think you have been affected by this study in any way and you would like to speak to someone about this, please contact [email protected] or visit https://www.relate.org.uk/.
PARTICIPANT CONSENT FORM FOR PHOTO USE:

Title of Project: Sex differences between expression of jealousy in response to jealousy-evoking Snapchat messages.

Name of Researcher: [redacted]

Participant to complete this section: Please tick the box.

1. I confirm to images of myself being published in this project. [✓]

[Signature of Participant] 15/02/15

Name of person taking consent 15/02/15

[Signature of person taking consent]
Appendix 2.A. PowerPoint presentation presented to female participants (Emotional – Sexual)

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

Imagine, while snooping on your partner’s phone, you find an unopened Snapchat from his friend...

You click on the message to open it...

Imagine how opening this message would make you feel.

Now imagine while snooping on your partner’s phone, you find an unopened Snapchat from another woman...
You click on the message to open it...

Imagine how opening this message would make you feel.

Jessica

Although we’re so far apart I feel so fucking close to you. I feel like you’re my soul mate! I can’t wait to meet you one day! 😘 P.S. I agree sex would complicate things 😳

Send a Chat

I

Hey

Q W E R T Y U I O P

A S D F G H J K L

↑ Z X C V B N M

123 space Send

Now imagine while snooping on your partner’s phone, you find an unopened Snapchat from her friend...

James

I have only just got home, the traffic was fucking manic on the Newport Road. It was a good gym session today though, we will be feeling it in the morning! 🏃‍♂️ P.S. Legs tomorrow?

Send a Chat

I

Hey

Q W E R T Y U I O P

A S D F G H J K L

↑ Z X C V B N M

123 space Send

Finally, imagine while snooping on your partner’s phone, you find an unopened Snapchat from another woman...
You click on the message to open it...

Imagine how opening this message would make you feel.

Jessica

Last night was out of this world, I can't wait to fuck you until you cum again! 😚 You better scream my name louder next time! P.S. I agree, this will only ever be sexual! 😚

Send a Chat

Thank you for taking part
Appendix 2.B. PowerPoint presentation presented to female participants
(Sexual – Emotional)

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

Imagine, while snooping on your partner’s phone, you find an unopened Snapchat from his friend...

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

You click on the message to open it...

Imagine how opening this message would make you feel.

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.
Now imagine while snooping on your partners phone, you find an unopened snapchat from his friend...

Finally, imagine while snooping on your partners phone, you find an unopened snapchat from another woman...
Although we’re so far apart I feel so fucking close to you. I feel like you’re my soul mate! I can’t wait to meet you one day! 💘 P.S. I agree sex would complicate things xxx

Thank you for taking part.
Appendix 2.C. PowerPoint presentation presented to male participants
(Emotional – Sexual)

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

Please imagine a serious committed romantic relationship that you have had in the past, that you are currently in, or that you would like to have in the future.

Imagine, while snooping on your partner’s phone, you find an unopened Snapchat from her friend...

You click on the message to open it...

Imagine how opening this message would make you feel.

Now imagine while snooping on your partner’s phone, you find an unopened Snapchat from another man...
You click on the message to open it...

Imagine how opening this message would make you feel.

Now imagine while snooping on your partner's phone, you find an unopened Snapchat from her friend...

Jessica

JESSICA

I have only just got home, the traffic was fucking manic on the Newport Road. It was a good gym session today though, we will be feeling it in the morning! 🙈 P.S. Legs tomorrow?

Finally, imagine while snooping on your partner's phone, you find an unopened Snapchat from another man...
Thank you for taking part
Appendix 2.D. PowerPoint presentation presented to male participants
(Sexual – Emotional)

You will be asked to imagine 4 scenarios, please engage with these as much as you can and try to imagine how each one would make you feel.

Please press enter when you are ready to begin.

Please imagine a serious committed romantic relationship that you have had in the past, that you are currently in, or that you would like to have in the future.

Imagine, while snooping on your partner’s phone, you find an unopened Snapchat from her friend...

You click on the message to open it...

Imagine how opening this message would make you feel.

Now imagine while snooping on your partner’s phone, you find an unopened Snapchat from another man...
You click on the message to open it...

Imagine how opening this message would make you feel.

James

JAMES

Last night was out of this world, I can't wait to fuck you until you cum again 😊. You better scream my name louder next time! P.S. I agree, this will only ever be sexual 😊.

Send a Chat

I Hey
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123 space Send

Now imagine while snooping on your partner's phone, you find an unopened Snapchat from her friend...

Jessica

JESSICA

I have only just got home, the traffic was fucking manic on the Newport Road. It was a good gym session today though, we will be feeling it in the morning! 😏. P.S. Legs tomorrow?

Send a Chat

I Hey
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123 space Send

Finally, imagine while snooping on your partner's phone, you find an unopened Snapchat from another man...
James

Although we're so far apart I feel so fucking close to you. I feel like you're my soul mate! I can't wait to meet you one day! 💖 P.S. I agree sex would complicate things xxx

Send a Chat

Imagine how opening this message would make you feel.

Thank you for taking part.
Word Count Statement

<table>
<thead>
<tr>
<th>Section</th>
<th>Words</th>
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