The Relationship between Neuroticism,

Current Affect,

Past Contact with Dogs

and Fear of Dogs

Kaya Kochman

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Supervisor: Dr Patricia Frazer

Head of Department: Dr Sinead Eccles

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Department of Psychology

DBS School of Arts
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Abstract

The purpose of the study was to examine the relationship between neuroticism, current affect, past contact with dogs and fear of dogs, with a hope to enhance the understanding of this specific fear. A mixed, experimental and correlational within-subjects design was used on a convenience sample of 33 participants. Participants’ GSR was measured while exposing them to a series neutral and dog images. The GSR response to dog images was significantly higher than that to neutral pictures; the difference between the two was used as a physiological indicator of ‘fear’ in the correlational analysis. Neuroticism was measured by The Big Five Inventory (John, Srivastava, 1999); current affect was measured by PANAS (Watson, Clark, Tellegen, 1988); past exposure to dogs was measured by a Semantic Differential. Whilst there was no significant association between ‘fear’ and the 3 psychological factors, the power of the tests was too low to reject the hypotheses.
Introduction

The main aim of the current study was to address the issue of fear of dogs through devising an appropriate measure of the emotion, and examining whether its development relates to individuals’ behavioral, personality and cognitive characteristics. Of the latter, past exposure to dogs, neuroticism and negative affect in the etiology of specific fear were on the forefront of the inquiry. The following paragraphs will, therefore, attempt to place fear in the existing psychological theories and to cognize how this may relate to fear of dogs. Previous literature will be called upon to evaluate research measurement of fear and the potentially determining factors of fear that were the subject of this inquiry.

Fear

Fear in psychological literature is defined as a response to immediate danger (Kring, Johnson, Davison, Neale, 2012, p.175). This immediate effect of fear allows for a fast response when faced with a threat. Fear activates our sympathetic nervous system, and causes arousal in preparation for a fight or flight response. Such fight or flight response, a term first coined by Walter Cannon in 1932, equips us with the ability to confront adverse situations and is, therefore, an adaptive behaviour that increases our chance of survival (Kring et al., 2012, p.175).

Though necessary for our well-being, fear can be in some cases experienced in a disproportionate manner. Kring et al. (2012, p.176) urge that in instances of specific phobias, an excessive amount of fear is experienced when faced with given stimuli, such as snakes, spiders, heights or closed spaces. A negative response is often clustered around a group of similar objects and situations; whilst a person experiencing such phobia recognizes the exaggerated fear of the particular stimulus, they tend to resort to avoidance of the feared object or situation. Fear of dogs
can be characterized as an example of such specific fear. Psychology’s role is to understand the etiology and maintenance of specific fears and find possible ways of treatment.

Living with a specific fear can often be limiting as it usually means the person suffering from such condition goes to great lengths to stay away from the feared stimuli. There are few outdoor places where one can be guaranteed they will not be met by a dog. Parks, streets, public transport are all among the places one would need to refrain from, in order to spare themselves the unpleasant emotions. While avoidance has the obvious benefits of abstaining from the experiences of fear, excessive avoidance can lead to social withdrawal, and to an acquisition and maintenance of further anxiety disorders (Dymond, Schlund, Roche, Houwer, Freegard, 2012). So what are the processes that lead to a development of a specific fear?

Mowrer (1947, as cited by Kring et al., 2012, p. 185) suggest that the development of specific fears occurs in two steps. Firstly, through classical conditioning, one learns to associate a neutral stimulus with an adverse stimulus. Therefore, when one is attacked by a dog, they may learn to associate this animal, the conditional stimulus (CS) with the physical pain experienced, the unconditional stimulus (UCS). For this reason, the more one is exposed to non aggressive dogs, the more this fear should be lost, as the negative association continues to disintegrate. To Mowrer, the second step of conditioning, operant learning, explains why the fear may in some cases persist. In this second stage, the person engages in avoiding the CS, and ultimately, such avoidance is also reinforcing this behavior, as for each time effort is being made not to encounter the feared stimulus, a reward is issued in the form of a lack of fear experienced. The theory explains why some of us may fear dogs, as these animals, unlike snakes or sharks are not uncommonly associated with painful events. But questions arise in relation to how such fear is acquired in a person that has never personally experienced a harmful event involving a dog,
likewise, how fear is not acquired in another person, even in the presence of a painful event. The theory, therefore, necessitates an examination of how some people can have a higher propensity for developing fears than others.

The purpose of the current research was to answer these questions with the aim to shed some light on the multifaceted way in which people acquire a specific fear of dogs. The following paragraphs will discuss how behavioral, cognitive and personality factors can become risk factors for the development of this fear.

Past Exposure to Dogs

Fear-conditioning.

The behavioral model developed by Mowrer (1947, as cited by Kring et al., 2012, p. 185) continues to be the most influential in understanding the development and maintenance of specific fear. Kring et al. (2012, p. 185) suggest, that several modifications were made to the original theory to help our understanding of the first step in fear acquisition. Rachman (1977) urges that the reason why a specific fear may be developed in a person in the absence of a direct painful experience that would facilitate the classical conditioning, can be due to varied pathways in which people learn. Learning can occur not only by personal exposure but also via modeling or verbal instruction. Research suggests that indirectly acquired fears seem to be as powerful as those from direct experiences (Olsson, Nearing, Phelps, 2007). In this particular study, participants were shown a film in which a man received shocks and were told that they will also receive them. The neural mechanisms activated when watching the man receive the shocks were the same as those acquired via direct experience. The increased activity in the amygdala, as seen by functional magnetic resonance imaging (fMRI), suggested that learning in a non-direct setting
that is seen as relevant to our own future well-being can be just as effective as that through personal experience.

How does this relate to the acquisition of fear of dogs? Most people can recall experiences, if not their own, those derived from their social setting, of pain inflicted by dogs. The media is filled with scary fictional as well as non-fictional images of dangerous dogs and the harm the animals can have on people. Should everyone, therefore, by these direct and non-direct learning pathways, fear dogs? Not if we consider Mowrer’s (1951) second step of fear conditioning. A frequent exposure to non-threatening dogs should allow persons to lose the fear of dogs. Such exposure is indeed used as a treatment of specific phobias (McCabe, Antony, 2002, p. 136). McCabe and Antony (2012, p.136) urge that in vivo treatment is the most efficient way of eliminating a specific phobia, particularly that of animals. Such exposure may lead to a clinically significant improvement in as many as 90% of the patients, as reported by Öst, Brandberg, Alm (1997).

*Fear-inducing stimuli type.*

Furthermore, frequent exposure to dogs should prevent us from developing a fear of this animal in the way that the animal is not perceived as a novel stimulus. According to Bronson (1968, p.409-410), fear of all unknown stimuli may be regarded as inherent. Therefore, not all instances of fear originate from a painful experience. Bronson explores the development of fear in humans and animals and concludes that persons exposed to diverse types of excitatory stimuli during the early stages of life tend to be less fearful when faced with novel events in later life. Therefore, an early exposure to a large amount of varied stimuli, in a nourishing environment, may act as a buffer for future experience of fear.
Nevertheless, certain stimuli can be categorized as having a higher propensity to induce fear in humans. Kring et al. (2012, p. 190) explain that people do not tend to develop phobias of stimuli such as flowers, lambs or pieces of furniture. What we do tend to fear are usually objects or events that could be potentially life threatening. Seligman (1971) discusses the idea that humans have evolved having to pay particular attention to potentially threatening stimuli, such as dangerous animals, which is referred to as prepared learning. This is perhaps why the human fear circuit may have been programmed to respond to certain dog breeds, particularly larger ones, with alarm. Research conducted by Lipp and Edwards (2002) seems to confirm this theory. Half of the participants in this study were conditioned to fear with fear-relevant pictures of snakes and spiders as CS, while the other half were conditioned with fear-irrelevant pictures of flowers and mushrooms as CS. As predicted by the researchers, the extinction of electrodermal responses in the fear-relevant images group required more trials than that of the fear-irrelevant images group. But this research does not specifically address the issue of fear of dogs. Should dogs be characterized as fear-relevant stimuli? Perhaps it could also depend on the size and breed of a dog, as this animal, unlike a snake or a spider, comes in a great variety, from cuddly looking toy breeds to more threatening looking mastiffs or guard dogs.

Fear of dogs vs. other specific fears.

Research specifically concerning the etiology of dog fears is sparse, upon reviewing the literature, a study conducted in 1988 was found (DiNardo, Guzy, Jenkins, Bak, Tomasi, Copland, 1988, p. 241-244). This research set out to analyze the predominance of conditioning events relating to dogs in dog fearful versus non dog fearful participants. DiNardo et al. (1988) discuss that, while studies on the etiology of fear of small animals have mainly focused on snake fears, fear of dogs has scarcely been examined. Findings from snake fear studies have been mixed in
relation to the etiological role of conditioning events in such phobias. Murray and Foote (1979) suggest that the majority of snake fears in students were acquired via indirect experience, and that very few persons with this fear could report direct conditioning experience with this animal. A further distinction is made by Öst and Hugdahl (1981), proposing that direct conditioning events tend to give rise to phobias, rather than non-clinical fear. However, a study on persons experiencing small animal phobias, conducted by McNally and Steketee (1985) showed that only 23% of phobics recalled a conditioning experience. This research differentiated between conditioning events involving an experience of physical pain, stimulus-stimulus (S-S) conditioning, and those involving extreme fear without physical pain, stimulus-response (S-R) conditioning. The latter was found in all phobics in this study. Interestingly, it was the expectation of fear, rather than of physical harm, which way key to the sustenance of the phobias.

While relevant to the understanding of the etiology of specific fear, DiNardo et al. (1988) urge that development of dog fear follows a somewhat different path to that of snakes, spiders or rats. Whilst the latter are not commonly found associated with a painful experience, the former is often recalled as such. In most western countries, people are seldom exposed to dangerous snakes or spiders that could inflict pain upon them. Other animals, such as rats, whilst commonly inhabiting human surroundings, do not tend to attack people. Dogs, on the other hand, are a likely source of painful experience and many individuals can recall one or more incidence of a dog bite or a dog attack. DiNardo et al. (1988) applied McNally and Steketee’s (1985) distinction between S-R and S-S events to measure the predominance of these events in dog-fearful versus non-fearful participants. The study was conducted on 790 Introductory Psychology students, whom were each presented with Geer’s (1965, as cited by DiNardo et al., 1988) Fear Survey
Schedule (FSS) to select persons at the extreme ends of the spectra for dog fear. The participants identified as dog–fearful and non dog-fearful were then presented with a behavioral approach test, in which they reported their anxiety levels whilst being approached by an oncoming black Labrador dog handled by a trainer. This eliminated three participants from the study as their ratings were inconsistent with their group’s category. This may immediately afford some consideration in relation to the methods determining inclusion. Firstly, one may question the validity of the FSS’s self report; perhaps a physiological measurement of fear response could offer a more accurate assessment of this emotion. Secondly, perhaps a Labrador dog as a breed would not tend to induce as much fear response as a breed possessing characteristics deemed as more fear-inducing, such as big build, cropped ears or an aggressive image promoted by popular media. Moreover, a live dog walking up to a participant is likely to display certain submissive bodily movements, such as a lowering of the body or a wagging tail. Thus, possibly, a use of images depicting dogs, rather than using a live dog with all the variability of behavior it may welcome, could be a more robust way of obtaining an accurate fear response.

Once the thirty-seven participants had been identified in the DiNardo et al. (1988) study, a modified form of McNally and Steketee’s (1985) structured interview was individually administered to both groups. Questions were designed to obtain information regarding both S-S and S-R experiences with dogs as well as the expectation of fear or harm upon coming across this animal. The findings suggest that whilst both S-S and S-R conditioning events were prevalent in the dog fearful group, as 56% participants reported these, the same events also featured among the non dog-fearful participants, with 66% of participants reporting such events. The S-S versus S-R ratio in the two groups was also similar, which suggests that whether physical pain or fear alone was experienced in the event was of no relevance to the development
of dog-fear. Understandably, the dog-fearful participants expected a significantly higher probability of harm during an encounter with a dog than the non dog-fearful participants. Perhaps most importantly, both presence and absence of the conditioning events and their type, S-S or S-R, were not a significant predictor of subsequent dog-fear. DiNardo et al. (1988) emphasize that the findings offer a clear contrast to the studies conducted on other small animals. As predicted, the study examining fear of dogs showed a much higher percentage of conditioning events and the occurrence of both S-R and S-S experiences (DiNardo et al., 1988), compared to the studies relating to fear of other small animals, where mostly S-R events were recorded. Expectation of harm played an important role in dog fear versus snake fear (DiNardo et al., 1988).

Furthermore, the nature of dog fear acquisition is also evident when the amount of reported conditioning events taken together in the DiNardo et al. (1988) study, which was present in 66% of the participants, is contrasted with 50% of such events in Öst and Hugdahl (1981) study on fear of snakes, spiders and rats. The implications of the difference in which humans are exposed to dogs, versus snakes, spiders or other animals we tend to fear, have a huge importance in the way we conduct research on fear of dogs. The particular contact humans have with this animal makes it a complex paradigm to study. DiNardo et al. (1988) concluded there must be other factors determining whether or not a negative experience will lead to a development of fear of dogs, bar the conditioning events or their particular type.

Other theories (Mowrer, 1951; Öst, Brandberg, Alm, 1997) suggest that it is the exposure which is detrimental in the etiology of specific fear, rather than singular experiences. It is imperative that based on the research evidence, further studies address the issue of exposure to dogs broadly in the etiology of dog fear. The following paragraphs will discuss the cognitive and
personality aspects that, alongside the behavioral factors discussed, may affect the development of fear of dogs.

**Neuroticism**

Kring et al. (2012, p. 187) describe neuroticism as a personality trait characterized by a proneness to react to stimuli with an increased negative affect. A study conducted by de Graaf, Bijl, Ravelli, Smit, Vollebergh (2002) examined how neuroticism can be a risk factor for depression and anxiety disorders. De Graff et al. (2002) urge that most studies examining the etiology of psychiatric disorders disregard the potential predictors, aside from patients’ demographics and their psychiatric history. The study set out to investigate how the socio-demographic, life events and personality characteristics were all intertwined in the etiology of 12 month first incidence of mood, anxiety and substance use disorders in the general population. The study’s findings are relevant to development of fear of dogs as they offer some support in how personality links to development of anxiety disorders, such as phobias. According to the data obtained by de Graff et al. (2002), neuroticism predicted the onset of mood disorders and depression. Moreover, in the absence of negative life events, 0.3% of participants with low neuroticism developed new mood disorders, in comparison with the participants with high level of neuroticism, where this figure moved to 3.5%. Likewise, such difference was noted when examining the cases where negative life events were present, with 3.9% of participants with low levels of neuroticism developed new mood disorders, in comparison with the participants with high levels of neuroticism, where this rose to 9.0%.

Having examined the findings from this study, it is important to recognize that a special interest should be afforded in recognizing the multi-dimensional nature of the development of
anxiety disorders. Not only are the actual life events important in the etiology of these disorders, as observed in the study, personality traits also have an impact on the occurrence of anxiety-related conditions. Importantly, Craske et al. (2009, as cited by Kring et al., 2012), urged that people with anxiety disorders have a higher propensity to develop fears, in the way they acquire them quicker via classical conditioning and show a slower extinction of them afterwards. De Graff et al. (2002) emphasized that a timely intervention targeting individuals with vulnerable personality traits could bring the development of a new disorder in them to a halt. They propose that the best way of reducing the emergence of such disorders is through intervention before they arise, through attention to their precursors, amongst which, high levels of neuroticism is key. Also, teaching individuals at risk appropriate coping skills for dealing with challenges and other stressors is described as essential.

Whilst the study offers some important explanations of how personality traits may affect one’s development of fears, and how this can be manipulated to one’s advantage, it is important to consider its limitations. The incidences of disorders are based on self reported accounts, and in a form of structured interviews, therefore, their validity may be questioned due to difficulties with accurate recall (de Graff et al., 2002). A valuable contribution to trait characteristics of psychopathology was made by by Kotov, Gamez, Schmidt and Watson (2010) who conducted a large scale review of all relevant research between the years of 1980 to 2007. Kotov et al. (2010) eliminated all accounts that were based on self reported data, too small, or were trait and disorder specific. On conclusion of this process, the researchers examined data from 175 studies and drew associations between personality traits, such as neuroticism, extraversion, disinhibition, conscientiousness, agreeableness, openness and specific disorders in adults, such as anxiety, depression and substance use disorders. This study found that personality is strongly linked to
mental illness. Amongst all traits, neuroticism was most markedly correlated with the various disorders, however, its association to specific phobias was weaker than predicted. Nonetheless, when considering the fear related conditions alone, such as specific phobia, panic disorder, agoraphobia and social phobia, high levels of neuroticism, in all cases was the predominant personality trait over other characteristics. Kotov et al. (2010) discuss the idea that neuroticism is an essential dimension that ought to be examined in any studies concerning personality characteristics in psychopathology.

When discussing the reliability of these findings one needs to be mindful of the fact that the analysis was based on a large number of studies, which used their own methods for measuring personality scales, and diagnoses. This is why the reliability of the smaller than expected association between high levels of neuroticism and specific phobias is unclear. On the one hand it could be due to specific fears being perhaps more externally determined, rather than arising due a personality trait. On the other hand, it could lay in the structural shortcomings of the study (Kotov et al., 2010). One such shortcoming could be sought in the discord of the results arising from using different diagnostic methods in the various studies examined. Kotov et al. (2010) confirm that a comparison of the studies’ methods showed that where completely structured interviews were applied, weaker results were obtained than those based on informal diagnosis, structured clinical interviews and other methods.

This issue with applying appropriate methodology to obtain accurate data of the origin of fear in a person is captured in a study conducted by Kheriaty, Kleinknecht and Hyman (1999). Kheriaty et al. (1999) propose that because people’s memory is prone to be affected by various factors, such as individual’s personality traits, the accuracy of the recalled events and diagnoses can be compensated. Kheriaty et al. (1999) discuss that two main methods of gathering
retrospective reports of fear origins have been used in psychology thus far, either structured interview elicited recall (DiNardo et al., 1988; Kheriaty et al., 1999; McNally, Steketee, 1985), or questionnaire elicited recall (Kheriaty et al., 1999).

In this study, the two methods of capturing the memory for fear onset events in dog and blood fearful participants were used with the aim to see which one yielded more accurate results. It was found that 93% of the participants given a written questionnaire (Phobia Origins Questionnaire) reported a phobia onset event, whilst 54% of the participants assessed by a structured interview (Phobia Origins Structured Interview) were able to recall such events. Moreover, the POQ yielded more reports of vicarious and instructional learning than did the POSI. Kheriaty et al. (1999) urge that the considerable difference in recall between the two methods may dispute the validity of previous studies on the origins of fear that were based on a structured interview techniques. The researchers discuss that the study concerning etiology of fears is intertwined with the issue of autobiographical memory. Moreover, this is often one’s memory of events that took place many years previous to the study as, according to Kheriaty et al. (1999), the onset of fear of dogs generally occurs in the childhood, with an approximate mean age of 8.5. How can one preserve the validity of retrospective memories, which often may not even relate to a particular event, but rather vicarious or informational learning? The work of Kheriaty et al. (1999) indicates that more fear pathways are activated via written assessment and so, it is a favorable means of assessment versus a structured interview. This is why further inquiry should perhaps be conducted in a form of written questionnaires.
Kotov et al. (2010) recognize that aside from the personality factors, cognitive factors, such as positive and negative affect are strongly linked to anxiety disorders, with negative affect showing a high comorbidity with high levels of neuroticism. Kring et al. (2012) describe affect as a short lasting emotional feeling; several studies have focused on the association between this emotional quality and anxiety disorders (Watson, Clark, Carey, 1988). May affect be, therefore, one of the factors determining whether a negative experience will lead to a development of fear, discussed by DiNardo et al. (1988)?

A study conducted by Watson et al. (1988) examined how the mood factors relate to clinical cases of anxiety and depressive disorders. They saw negative affect (NA) as a broad predisposition to negative feelings that affects other cognitive factors, such as self concept and world view; comparatively, positive affect (PA) was representative of a person’s enjoyable experience (Watson et al., 1988). Consistent with the researchers’ predictions, negative affect (NA) showed a high association with anxiety and depression, and was a prevailing predictor of psychiatric illnesses. Positive affect (PA), on the other hand, was negatively related to depression only. For these reasons, research concerning development of fear should focus on examining negative affectivity, as it is the prevalent mood component in anxiety related illnesses. The research findings relating specifically to anxiety disorders showed that NA was significantly related to 55% of these complaints; phobias were significantly correlated to NA, with fear of small animals linked to NA with particular intensity.

Whilst the relation of negative affectivity and fear of dogs has not been yet explored, there is strong evidence (Watson et al., 1988) that negative mood is associated with numerous
fear disorders. The study discussed in the previous paragraph was based on a clinical sample, where high comorbidity in psychiatric complaints is observed. The findings of the study, whilst differing in the nature of the sample, necessitate a further inquiry of the effects of mood on person’s perception of potential fear.

Rationale

Drawing from the previous paragraphs, the aim of the present study was to examine what are the factors determining the development of fear of dogs via considering past exposure to the animal, person’s levels of neuroticism and their affectivity. The purpose of this work was to shed some light on how this fear sets in in one individual, and how it doesn’t in another. As discussed by DiNardo et al. (1988), research focusing on fear of dogs is sparse, moreover, the particular relation humans have with this species makes it complex to examine. Unlike snakes, spiders or rats, humans tend to be fond of dogs; it may indeed be difficult for a fearful person to avoid exposure to the animal. As fear of dogs presents a challenge in a pet loving society, it is vital we examine its etiology, the risk factors that determine it and further, knowing these implications, we may be better equipped to address the issue in dog fearful individuals.

In the light of this rationale, the current study was conducted with the hope to broaden our understanding of this specific fear. Where previous research concerning fear of dogs (DiNardo et al., 1988), proposed that there must be other factors than specific events in one’s life that determine this fear, the current study was conducted with a hope to fill this gap. The three psychological factors discussed in the previous paragraphs were, therefore, examined in relation to fear of dogs. Firstly, the frequency of exposure to the animal was measured via a semantic differential in a scored manner, from ‘never’ to ‘very frequently’. Such scale, unlike a structured
interview, was used to allow for a clear interpretation and focus on the relevant data only, as discussed in the previous paragraphs. Secondly, levels of neuroticism were examined via the use of The Big Five inventory based on the OCEAN model (John, Srivastava, 1999). As contended earlier, neuroticism plays an important role in anxiety disorders, including specific phobias (DeGraff et al., 2002; Kotov et al., 2010), however, it was the study’s imperative that the measurement of this factor was conducted using a written assessment as to prevent inaccurate results (Kheriaty et al., 1999), hence why the use of the predetermined scale. Lastly, to complete our understating of determinants of fear of dogs, the study examined the impact of affectivity on this condition. Though negative affect is reportedly often in comorbidity with high levels of neuroticism (Kotov et al., 2010), research suggests that the former is an important component of anxiety disorders (Watson et al., 1988). To examine its relation to fear of dogs, the study administered the PANAS scale to measure general positive and negative affect (Watson, Clark, Tellegen, 1988).

The question of fear itself was examined via a physiological arousal measurement, in order to move away from the self report model. Participants were exposed to a series of images presenting 10 neutral and 10 dog images whilst a Galvanic Skin Response (GSR) was being recorded. This was conducted to allow the researchers determine the levels of arousal when exposed to the potentially fear-inducing images. The following four hypotheses were, therefore, proposed. It was firstly hypothesized that there would be a significant difference in participants’ GSR response to the fear-inducing dog versus neutral images. The difference between this response to the two types of images was represented in a numerical form and used to represent the participants’ ‘fear’ response, and subsequently employed in the later analyses. It was secondly hypothesized that there would be a significant relationship between participants’ high
neuroticism scores and the ‘fear’ response reflected in the increased GSR to dog versus neutral images. Thirdly, that there would be a significant relationship between participants’ negative current affect and the fear response. Lastly, that there would be a significant relationship between low past exposure to dogs and the fear response. In addition, comparisons across gender were made on the ‘fear’ response described.
Method

Participants

Thirty-five participants were recruited by convenience sampling, in an informal capacity, verbally and through e-mail. Two of the participants were invited to take part in the pilot study, which resulted in a considerable shortening of the experimental part of the research. Consequently, the results obtained from the pilot participants were not included in the further analysis. Of the 33 participants that constituted the sample, 11 were male (n=11, 33.3%) and 22 female (n=22, 66.7%). All of the individuals were either final year Psychology students at DBS or their friends and relatives. The participation was fully voluntary and did not provide any gain, be it financial or college credit. The criteria for exclusion were stated that all participants had to be 18 years of age or over. Furthermore, due to the potential upset the viewing of dogs images could evoke in dog fearful persons, advice was given not to participate in the research if suffering from a phobia of dogs. This precaution, along with the research information, the right to withdraw at any time of the study and a consent form was drafted and given to all participants in writing (see Appendix B). A signed form agreeing to participation in the study was then collected from each of the individuals and kept on file. In order to protect participants’ anonymity, all data gathered in the research were entered into a password-locked PC and immediately de-identified.

Due to the aforementioned restrictions imposed in choosing the research sample, the most dog-fearful, i.e. phobic participants were eliminated; therefore, the study excluded the most relevant persons of interest to the study. Moreover, most of the participants were friends or relatives of the researcher and dog enthusiasts themselves. These considerations were of substantial importance to the accuracy of the study’s findings.
Design

The study used a mixed design, which was partly experimental and partly correlational. The experimental part was employed to create a new variable which was subsequently used in the correlational part of the research. This new variable was obtained through measuring participants’ Galvanic Skin Response (GSR) when exposed to neutral and dog images. The independent variable was the (neutral and dog) images, whilst the dependent variable was the change in GSR. The mean GSR to dog and neutral images was computed into a numerical representation, following to which, the mean GSR neutral images was subtracted from the mean GSR dog images. The numerical value which represented the latter difference was used as a physiological indicator of ‘fear’ for each of the participants. In the correlational part of the study, the relationship between ‘fear’ and neuroticism, current affect and past contact with dogs was examined. The criterion variable was ‘fear’, whilst the predictor variables were neuroticism, current affect and past contact with dogs. All variables in the study were within subjects and the data obtained in the research were quantitative.

Materials

Four assessment methods were used to measure the variables. In the experimental part of the study, participants were presented with a PowerPoint slideshow which contained 20 images, 10 of which depicted dogs and 10 neutral images. The pictures of dogs (see Appendix F) were selected with the view to induce fear in the observer, whilst the neutral images, showing household equipment, peaceful scenery and other non-threatening imagery (see Appendix F), were used to obtain a neutral physiological response for contrast. Of the former, 4 images were sources from the International Affective Picture System (IAPS) (Lang, Bradley, Cuthbert, 2008)
and 6 were obtained by the researcher on the Internet, for usage of which, permission was sought and gained. The latter neutral images all originated from the IAPS (Lang et al., 2008).

In the correlational part of the study, 3 questionnaires were used to gauge participants’ current affect, neuroticism and past contact with dogs. The PANAS (Watson et al., 1988) was used to measure general positive and negative affect (see Appendix C). This 20 item scale consists of words that describe various feelings and emotions of both positive, e.g. ‘interested’, ‘inspired’, ‘active’, and negative nature, e.g. ‘distressed’, ‘guilty’, ‘scared’. Participants were to choose the appropriate answer from 5, ranging from ‘very slightly or not at all’ to ‘extremely’ to indicate if they had been experiencing this emotion during the week prior to the day of the research. The questionnaire was scored by adding the sums for each of the affects, with higher scores indicating higher levels of the particular affect. The Cronbach’s alpha coefficient for the 10 positive affect items was 0.847 and 0.859 for the 10 negative affect items, which indicated the items had relatively high internal consistency, where a coefficient of 0.70 or higher is a desirable indicator of reliability.

A personality scale The Big Five inventory (John, Srivastava, 1999), which includes neuroticism as one of its subscales, was used to measure neuroticism levels (see Appendix D). This 44 item scale consists of short phrases stating how one feels they are in general, e.g. ‘Can be moody’. Participants were to choose an appropriate number from 1 to 5, describing to what extent they felt each of the characteristics applied to them, ranging from ‘strongly disagree’ to ‘agree strongly’. The select 8 items that apply to neuroticism were then averaged and an overall score was given to represent this trait. The Cronbach’s alpha coefficient for the 8 items was 0.844, suggesting that there was a relatively high internal consistency.
In the absence of a previously tested measure concerning past contact with dogs, a semantic differential scale composed by the researcher (see Appendix E) was applied. Semantic differentials have a broad application in the medical field and are a relatively easy measure both in terms of administration as well as data interpretation; research indicates that such scales are a useful technique for assessing self reported quantitative data (Boogaerts, Vanacker, Seidel, Albert, Bardiau, 2000).

The Semantic Differential applied in the current study posed one question, asking participants to mark with an ‘x’ the extent to which they had been exposed to dogs over their lifetime, on a continuous line from the extreme left, which stood for ‘never’ to the extreme right, which stood for ‘very frequently’. The scale was then computed in two ways; firstly, it was measured with the ruler and each millimeter towards the right was expressed as 0.1 in numerical values. The line was 15.5 centimeters long, therefore, the highest possible score was also 15.5. Secondly, the scale was divided into five categories, with ‘x’ marked between 0 to 3.1 cm falling into a ‘never’ category, 3.1 to 6.2 cm into ‘seldom’, 6.2 to 9.3 cm into ‘occasionally’, 9.3 to 12.4 cm into ‘quite frequently’ and 12.4 to 15.5 cm into ‘very frequently’ category. The former scale was used in the correlational analysis with ‘fear’, whilst the latter was used to compose a bar chart representation of the overall exposure to dogs in the sample (see Figure 1, in the Descriptive Statistics of the Results section).

Apparatus

The study took place in DBS Laboratory, which was equipped with 2 PCs, a HP Compaq microtower Desktop 2.66ghz and a Lenovo Intel 2140 1.60hz. The former PC was used by the researcher to record the participants’ GSR, which accompanied the aforementioned PowerPoint presentation of images that ran simultaneously on the latter PC and to which the
participants were exposed. The PowerPoint presentation was started concurrently with the GSR recording, and set to change the images automatically, with each of the images displayed on screen for exactly 10 seconds. The recording software used to capture the GSR was Labchart7, with GSR Amplifier connected to a Powerlab 26T biofeedback unit. Care was taken to ensure that an individual had only the PC playing the PowerPoint presentation in their view sight, and that the GSR recording on the other PC was sufficiently concealed. Also, precautions were made to make certain that the PowerPoint presentation started at the same time as the GSR recording to protect the validity of the recordings. At the end of the research, data were entered into SPSS version 18 and analyses were conducted.

Procedure

Participants were invited to take part in the study in an informal capacity, verbally and on-line. At the outset, it was made clear that participation was entirely voluntary and the purpose of the study was to examine fear of dogs and that the research would entail viewing of fear-inducing dog images. It was, therefore, advised that persons with dog phobia do not take part in the research, due to a potential upset caused by the aforementioned images. Further to the initial agreement to participate, all 35 individuals were given written information including details outlining the particulars of the research, the assurance of full anonymity and the right to withdraw at any stage of the study along with a consent form (see Appendix B). This consent form was signed by each of the participants and collected by the researcher and stored for safekeeping.

All testing took place in the DBS laboratory, based in Dublin 2. The first 2 individuals were invited to a pilot study which enabled the researcher to draw valuable conclusions on the basis of participants’ observed behaviour and their feedback which led to a
shortening of the experimental part, from 40 seconds per image displayed, to 10. This reduction aided the ease of viewing of the slideshow as well as prevented from distraction and boredom settling in in the viewers. Due to the different timing of the experimental conditions the data obtained from the pilot participants were not directly comparable with the rest of the study and were not included in further analyses.

Following to the pilot study, the remaining 33 participants were invited to the research and a 15 minute time slot allotment was agreed with each of the individuals. Each of the participants was asked to enter the laboratory room individually, take a seat at the designated PC, and given 2 pen and paper questionnaires which took approximately 5 minutes to be completed. The order of the 4 measures applied in the research was relevant as to limit the potential effect the viewing of fear-inducing images could have on participants’ affect and perceived personality traits. A PANAS mood scale (Watson et al., 1988) was, therefore, firstly administered (see Appendix C), following to which, individuals were asked to complete the Big Five Inventory (John, Srivastava, 1999), (See Appendix D). Once the 2 questionnaires were collected, participants were fitted with a set of finger electrodes connected to the GSR Amplifier. When some time elapsed (approximately 2 minutes), the researcher was able to obtain the individual’s zero reading, which corresponded to their relaxed state and the experimental part of the research could commence. Individuals were asked to gaze at the PowerPoint slideshow depicting both neutral and dog images, whilst the GSR was being recorded. The order of the images viewed by each of the participants was randomised through the researcher’s toss of a coin, in an effort to counterbalance the order effect. The 20 images were divided into 4 blocks, with 2 possible orders: 5 neutral, 5 dog, 5 neutral, 5 dog or, 5 dog, 5 neutral, 5 dog, 5 neutral. At a start of the button, both the PowerPoint presentation as well as the GSR recording began, with each of the
images displayed on the screen for 10 seconds. The time it took to present the full PowerPoint presentation was 3 minutes 20 seconds. The individuals’ results were saved onto the PC, marking the order of images they were exposed with an assigned number code that was used to de-identify the data.

Finally, a Semantic Differential was administered (see Appendix E), which took approximately 2 minutes to complete. The 3 questionnaires were collected by the researcher and marked by the corresponding number code to match with the individuals’ GSR reading in further analyses. This marked the end of the research slot allotted for each participant. Once data were gathered from all participants, the results were input to SPSS and data analyses commenced.
Results

Descriptive Statistics

A total of 35 individuals took part in the study, however, 2 of the participants attended the pilot-study and their results were not taken into the statistical analyses. Of the 33 individuals that were included in the following analyses, the majority of participants were female (n = 22, 66.66%) however, one-third were male (n = 11, 33.33%). The majority of participants (75.75%) had quite frequent or very frequent past exposure to dogs (see Figure 1).

Figure 1 Past exposure to dogs in the sample
Descriptive statistics of the mean and standard deviation for each variable were obtained and are given in Table 1. The average GSR to dog images was higher than that of GSR to neutral images, i.e. 2.52 (SD = 2.75) versus 2.09 (SD = 3.02), respectively. The mean neuroticism score was 2.87 (SD = 0.76). The mean negative affect score was 20.70 (SD = 6.68), whilst the mean positive affect score of 32.58 (SD = 6.51). The mean past exposure to dogs score was 11.11 (SD = 4.33). The mean ‘fear’ score (which was derived by subtracting the mean GSR to neutral images from the mean GSR to dog images) was 0.43 (SD = 1.06).

Table 1 Descriptive Statistics of Psychological Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSR Neutral Images</td>
<td>33</td>
<td>2.09</td>
<td>3.02</td>
</tr>
<tr>
<td>GSR Dog Images</td>
<td>33</td>
<td>2.52</td>
<td>2.75</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>33</td>
<td>2.87</td>
<td>0.76</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>33</td>
<td>32.58</td>
<td>6.51</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>33</td>
<td>20.70</td>
<td>6.68</td>
</tr>
<tr>
<td>Past Exposure</td>
<td>33</td>
<td>11.11</td>
<td>4.33</td>
</tr>
<tr>
<td>Fear</td>
<td>33</td>
<td>0.43</td>
<td>1.06</td>
</tr>
</tbody>
</table>

A Shapiro-Wilk W test was used to assess normality. A p-value less than 0.05 suggests that the data fit the normal curve poorly and is not normally distributed. The results indicated that GSR dog images (p = 0.566), Positive Affect (p = 0.739) and Neuroticism (p = 0.051) were normally distributed; however, GSR neutral images (p = 0.018), Negative Affect (p = 0.002), Past Exposure (p = 0.000) were not normally distributed. Due to the fact that the variable ‘Fear’ was created by subtracting GSR neutral images from GSR dog images, the variable Fear
(p = 0.011) was also not normally distributed. To confirm this, the distribution of GSR neutral images had a kurtosis value of 3.343 (SE = 0.79). Kurtosis value above 2.00 indicates substantial non-normality. The non-normal distribution of GSR neutral images is captured by a histogram in Appendix A.

**Inferential Statistics**

Significant results were found in (1) the difference between GSR to dog images and GSR to neutral images, and (2) the correlation between negative affect and neuroticism (see Table 2).

**Table 2 Correlation table**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Positive Affect</th>
<th>Negative Affect</th>
<th>Past Exposure</th>
<th>Fear</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSR Neutral Images</td>
<td>-0.029 (0.87)</td>
<td>-0.056 (0.76)</td>
<td>-0.309 (0.08)</td>
<td></td>
</tr>
<tr>
<td>GSR Dog Images</td>
<td>-0.309 (0.08)</td>
<td>-0.141 (0.44)</td>
<td>-0.236 (0.19)</td>
<td></td>
</tr>
<tr>
<td>Positive Affect</td>
<td>-0.148 (0.41)</td>
<td></td>
<td>-0.309 (0.80)</td>
<td></td>
</tr>
<tr>
<td>Negative Affect</td>
<td></td>
<td>-0.141 (0.44)</td>
<td>-0.039 (0.83)</td>
<td>-0.309 (0.08)</td>
</tr>
<tr>
<td>Past Exposure</td>
<td>0.329 (0.06)</td>
<td>0.282 (0.11)</td>
<td>0.207 (0.25)</td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>0.096 (0.59)</td>
<td></td>
<td>-0.141 (0.44)</td>
<td>-0.309 (0.08)</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>-0.126 (0.48)</td>
<td>-0.139 (0.44)</td>
<td>0.543 (0.001)**</td>
<td>0.046 (0.79)</td>
</tr>
</tbody>
</table>

* p significant at .05 level.

** p significant at .01 level.
The study’s first aim was to generate a variable expressing a physiological indicator of ‘fear’, and to subsequently examine how this variable relates to neuroticism, current affect and past exposure to dogs. It was, therefore, hypothesized that there would be an increase in GSR to the dog versus neutral images. A Wilcoxon signed rank sum was used to compare the two measurements in the sample. The results suggested that there was a statistically significant difference in GSR response between the dog and neutral conditions ($z = -2.957, p = 0.003$, 2-tailed). The value obtained through subtracting the GSR neutral from GSR dog images was then used to test the further hypotheses.

It was hypothesized that the variable ‘fear’ would positively correlate with high level of neuroticism. A Spearman’s rank-order was used to measure the association between ‘fear’ and neuroticism, which indicated there was no significant correlation between participants’ increase in GSR to fear-inducing images of dogs less neutral images and neuroticism ($r = -0.109, p = 0.55$, 2-tailed). These results suggested that the correlation between fear and neuroticism was -0.109 and, therefore, fear only shared 1.18% of its variability with neuroticism.

Further, it was hypothesized that there would be a significant positive correlation between ‘fear’ and negative affect. A Spearman’s rank-order was used to measure this association and suggested that there was no significant correlation between participants’ increase in GSR to fear-inducing images of dogs versus neutral images and negative affect ($r = -0.141, p = 0.44$, 2-tailed). Fear only shared 1.99% of its variability with participants’ negative affect.

Finally, whilst it was hypothesized that there would be a significant negative correlation between ‘fear’ and past contact with dogs, a Spearman’s rank-order used to measure this
association suggested that there was no significant correlation between the variables ($r = -0.309$, $p = 0.08$, 2-tailed). Fear only shared 9.55% of its variability with participants’ past exposure.

In addition, a Wilcoxon-Mann-Whitney U test was carried out to check for demographic factors, i.e. participants’ gender, in relation to the fear response. The test revealed that female participants experienced greater fear, with a mean rank of 17.36, compared to the mean rank of 16.27 in the male counterparts. The results suggested that there was no significant difference between fear in males and fear in females ($U = 113$, $p = 0.76$).

Power was calculated using G*Power (Faul, Erdfelder, Lang, Buchner, 2007). A sample size of 33 and effect size of 0.029 produced power of 0.05, which translates to a 5% chance of finding an association if one existed. The accepted power level tends to be 0.8, therefore, power in this study was deemed very low.
Discussion

The aim of the present study was to test whether psychological factors were associated with fear of dogs. Three psychological aspects were examined in an attempt to broaden our understanding of the etiology of this specific fear. Accordingly, personality traits (neuroticism), cognitive aspects (negative affect) and behavioural implications (past exposure to the animal) were investigated. The study was designed with the goal to move away from a self-reported assessment of fear; therefore, a physiological arousal measurement was applied. The results of the statistical analysis conducted offered evidence in support of the first hypothesis, that there would be a significant difference between participants’ GSR response to the dog versus neutral images. Indeed, pictures of dogs evoked a higher level of physiological arousal than did photographs of a neutral nature. The difference between the response to the two stimuli (GSR dogs less GSR neutral) was, for the purpose of the study, named ‘fear’ and subsequently used as a variable in further correlational analyses. The latter examination, however, provided no evidence to support the hypotheses that there was a significant positive association between the variable ‘fear’ and neuroticism, nor that there was a significant positive association between ‘fear’ and negative affect. Furthermore, statistical analysis provided no evidence to support the hypothesis that there was a significant negative correlation between ‘fear’ and past exposure to dogs. Whilst none of the correlational hypotheses were supported by data examination, it needs to be noted that the power analysis conducted on the study showed a very low power and, therefore, the results of the study should be deemed inconclusive.

Due to the aforementioned consideration, the study findings were uninterpretable. Therefore, the gap pointed out by DiNardo et al. (1988), i.e. that there must be other factors (than the presence or absence of fear conditioning experiences involving the animal) that predispose an
individual to develop a fear of dogs, which was the motive for composing the current investigation, was not addressed by the study. Due to the specificity of the present inquiry, which aimed at uncovering associations in a field with sparse research, it was not possible to directly compare its results to previous findings. The following paragraphs will attempt to interpret the current findings in the light of previous theory and research and evaluate it for the purposes of future inquiry.

Interpretation

As mentioned earlier, the primary research objective of the current study was to answer the question posed by DiNardo et al. (1988), of what factors contribute to the development of fear of dogs in the presence of negative experience associated with this animal. The assumption inherited from the previous investigation was that most people had, directly or indirectly, experienced fear-conditioning events involving a dog. Furthermore, based on DiNardo et al. (1988) findings, that conditioning events (both of S-S and S-R type) were equally likely in fearful and non-fearful participants, the current study did not include an assessment neither of the presence nor of the type of conditioning events. The question of whether individuals could be classified as fearful or non-fearful was also dropped; instead the focus was put on examining the three aforementioned psychological factors that were hypothesised to share an association with a heightened physiological arousal when exposed to fear-inducing stimuli. Whilst statistical analysis did not suggest significant findings, it is important to reinstate the limitations imposed by the inadequate power value observed in the current study.

What the present study did attain, however, was addressing the two objectives set out upon the evaluation of the study conducted by DiNardo et al. (1988). Firstly, it designed a measure of ‘fear’ which moved from a self report model, i.e. Geer’s FSS (1965, as cited by...
DiNardo et al., 1988), and was entirely based on a physiological assessment of this response. This was conducted with a hope to aid the accuracy of the measurement. The results suggested that, indeed, participants presented a significantly higher physiological arousal when exposed to the fear-inducing images of dogs, than when shown neutral pictures. Secondly, the issue of validity and reliability was addressed in relation to the fear-inducing stimulus administered. In the previous study (DiNardo et al., 1988) a live Labrador dog was used to evoke participants’ fear response. The issue with using a live animal of this particular breed was that the dog’s behaviour itself could vary across the testing times, but also, perhaps more importantly, the breed is considered well tempered and friendly natured in the general opinion. Is a Labrador dog likely to evoke a fear response in all individuals? With these considerations in mind, the current study devised a more robust stimulus by compiling a PowerPoint presentation of scary dogs and neutral images. This protected both the reliability of the stimulus, as all participants were exposed to the same slideshow, and its validity, as the dog images sourced depicted examples of breeds commonly deemed as scary and presented in aggressive poses, either barking, biting or growling. The results mentioned above confirmed the accuracy of the stimulus designed, as dog images evoked a significantly higher GSR response than did neutral images.

Since previous studies (Rachman, 1977; Olsson, Nearing, Phelps, 2007) suggested that development of a specific fear in a person can be learnt via many various pathways, not only by direct experience, it served as another reason for dropping the S-S and S-R differentiation. Because previous research on specific fear of small animals focused on the presence and type of conditioning events (Murray, Foote, 1979; Öst, Hugdahl, 1981; McNally, Steketee, 1985), it was not possible to conduct a direct comparison to the current study, which abandoned such distinctions. It is important, however, to bear in mind the point made by DiNardo et al. (1988),
namely that our exposure to dogs is very different to our exposure to snakes, spiders or rats. Moreover, other theories (Mowrer, 1951; Öst, Brandberg, Alm, 1997) suggest that it is the extent of the contact with the fear-inducing stimulus, rather than singular negative experiences, which is detrimental in the etiology of specific fear.

The behavioural aspect of fear acquisition was addressed by the current study in a Semantic Differential scale which measured one’s past exposure to dogs. This technique was employed to examine whether indeed, with more exposure to dogs, fear was less prevalent, as suggested in Mowrer’s (1951) conditioning theory, Bronson’s (1968) theory on inherent fear of novel stimuli and research in eliminating specific phobias (McCabe, Antony, 2002; Öst, Brandberg, Alm, 1997). Whilst the current study did not support the hypothesis, it is important to note that besides the shortcomings of the sample size, there was a high prevalence of frequent or very frequent contact with dogs in the sample and seldom did the participants show a low exposure to dogs (see Figure 1).

The issue, however, of whether we are naturally pre-programmed to fear certain animals, as suggested by Seligman (1971) and Lipp and Edwards (2002) was reflected in participants’ Galvanic Skin Response of the current study. The results suggested that, consistent with Seligman’s (1971) theory of prepared learning, there was a significant increase in GSR to dog versus neutral images, confirming that the former evoked a higher level of physiological arousal. A direct comparison to Lipp and Edwards’ (2002) study is not possible, as the current investigation was not based on fear conditioning and extinction of scary and neutral stimuli; scary and neutral images were exclusively used to measure the arousal response. Also, the question of whether all dogs should inherently evoke such fear response was left unanswered; to
assess whether Seligman’s (1971) theory applies to all breeds equally, fear response should perhaps be measured on viewing pictures of various types of breeds.

With regards to the personality traits component addressed in the present study, in contrast to de Graff et al. (2002) findings, which named neuroticism as one of the main predictors in the onset of anxiety disorders such as phobias, the current analysis did not support this association. The findings did not suggest high levels of neuroticism were associated with an elevated ‘fear’ response. It is, however, important to recall the implications imposed by the inadequate power value in the present research. The power value, as well as the fact that the previous study was conducted on a clinical sample, is the reason which does not allow for a comparison. De Graff et al. (2002) contribution to the understanding of neuroticism in the development of specific fear cannot be disputed on the basis of the present findings.

Likewise, the contribution made by Kotov et al. (2010), who found that neuroticism was a prevailing feature in persons suffering from a specific phobia across a broad range of research evidence, cannot be challenged by the present study, even though data analysis did not find a significant correlation between neuroticism and fear. Again, due to a very small power value, the study results could not be interpreted as meaningful. The question whether neuroticism is a factor in the etiology of fear of dogs, therefore, remains unanswered.

Upon the examination of the cognitive component included in the present study, the results did not indicate that negative affect was associated with the fear response. This is in contrast with the findings from a study conducted by Watson et al. (1988), in which negative affect was highly correlated with anxiety disorders, particularly in that of fear of small animals. Once more, the present study was limited by its inadequate power value to accurately measure the association. Interestingly, however, the current study’s results supported the idea that
negative affect shared a high comorbidity with high levels of neuroticism, as was suggested by Kotov et al. (2010).

Evaluation

The primarily constraint of the study was its aforementioned inadequate power value. With only a very slight chance of finding a correlation, if one existed, the results ought to be deemed uninterpretable and the hypotheses could not be rejected. To address this issue, a greater sample size should be used in further investigation. Moreover, the large predominance of frequent and very frequent past exposure to dogs found in the sample makes it for a difficult analysis of the fear of this animal. From the outset, the study made it clear that participation was not advised in a presence of a dog phobia. This was done to prevent the ethical considerations from arising; however, it quite clearly eliminated the most relevant group of interest to the study. Furthermore, a large proportion of the study participants admitted to attending the research simply because they were dog lovers personally and had a keen interest in the study’s findings. Perhaps this serves as a good explanation of why high levels of past exposure to dogs are so frequent in the sample (see Figure 1).

When discussing the results of the study, it should also be highlighted that the majority of the participants were Final Year Psychology students at DBS and, such high homogeneity of a sample could lead to inaccurate results. Notably, when examining the issue of fear, the sample should include people of various ages and educational backgrounds, which were not adequately captured in the current study. Gender imbalance was another issue detected in the study’s demographics; however, statistical analysis conducted on the sample found a slight, but not significant difference in the fear response between the two sexes. The issue of small power value
has to be reemphasized in evaluating these results, which is why future research should eliminate such gender imbalance where possible.

Some valuable feedback came from the participants of the study, whom voiced their opinions regarding the research during their attendance. All such observations were duly noted by the researcher and further evaluated in regards to the study’s design and the findings it produced. Accordingly, most of the participants felt that the dog images employed in the experimental part of the research were indeed scary. This is reflected well in the general trend that the GSR to dog images was higher than that to neutral images. Statistical analysis also confirmed that there was a significant difference between the physiological arousal to the two types of stimuli. Some participants, however, reported that whilst they found the dog images scary, they would have been much more afraid by the presentation, if the animals moved and barked or made other aggressive noise. Therefore, whilst the research attained the goal of composing a reliable fear-inducing stimulus, as accounted for in the data analysis, perhaps further inquiry should compose a presentation in which movement and sound can be conveyed.

Further participant feedback showed that some individuals paid particular interest to the neutral pictures presented in the experimental part of the study. One participant reported that she enjoyed looking at the image of the book and the boat (see Appndix 6). Indeed, upon an examination of the GSR recording for this participant, it was evident that around the time of when the two aforementioned pictures where displayed, the GSR went up sharply. This relation called into question the usage of the GSR in measuring fear. The Amplifier was devised to detect and record physiological arousal, not ‘fear’ per se. Therefore, to protect the validity of the measurement, further investigation needs to ensure that any stimulation other than that produced by the presentation is extinguished. Perhaps future study should also revise the appropriateness
of the neutral images administered in the current study (see Appendix F). Frequently, some of
the neutral photographs produced a sharp rise in the correspondent GSR recording, particularly
the image of the face, the clock and the cow in a field. Efforts should be, therefore, made to
eliminate, where possible, any other factors that have a potential of producing a physiological
arousal, such as sudden external noise which was another problem of the current study.

Despite these limitations, however, the current study attained the goal of creating a
measure of fear that moved from frequently unreliable self-report assessment. Providing that the
aforementioned considerations regarding the elimination of any extraneous arousal stimuli when
using the GSR Amplifier are fulfilled, GSR should stand for a valuable method of measuring
fear. Furthermore, the presentation used as the fear-inducing stimulus in the experimental part of
the study, was found to produce the desired response. Participant feedback regarding this
slideshow should be used to improve the quality of the effect it evoked on viewers’ physiological
response.

Once these two issues are developed upon, GSR measurement used in conjunction with
the audio-visual presentation could stand for a robust measure that captures ‘fear’ efficiently.
Only when combined with a careful consideration of the issues mentioned in the previous
paragraphs, however, future inquiry could attempt to answer the questions laid out in the
correlational hypotheses of this study with the hope to expand on the existing knowledge of fear
of dogs discussed by DiNardo et al. (1988). The association between ‘fear’ and neuroticism,
negative affect and past exposure to dogs should be, therefore, re-examined, as the current study
did not produce statistically interpretable findings due to its small power value. Drawing upon all
the limitations of current inquiry listed in the previous paragraphs, new inquiry should ensure the
sample size is large enough to produce an acceptable power value as well as to control for
sampling error. Following to this, the study sample should be recruited to preserve the representativeness of the population. In researching the determinants of specific fear, the sample should include people of different ages, educational backgrounds, promote gender balance, but perhaps most importantly, it should ensure that an even distribution of different exposure levels to dogs is protected. Where possible, future study should aim to include individuals with serious fear of dogs and dog phobics.

It is advisable, that once the sample issues are addressed, an appropriate laboratory limiting the external noise is sourced and the presentation of fear-inducing dog images is updated to an audio-visual recording, the future study uses the same psychological measures employed in the present research. This will allow for comparisons between the inquiries. Whilst the results of the current findings suggested that the fear-inducing images evoked an appropriate arousal response in the participants, the aforementioned participant feedback should be revised in relation to the usage of the neutral images (see Appendix F). The fact that the latter pictures were described by some persons as ‘interesting’ and ‘attractive’, as well as the fact that the corresponding GSR recording suggested they did cause a physiological arousal, called to question their validity. Further study should address this issue prior to conducting the research, to ensure that neutral images administered evoke as little arousal as possible.

Due to the uninterpretable nature of the current analyses, the research results could not have any real-life application. Further analysis, however, should be conducted to help our understanding of this specific fear. Apart from the hypotheses set out in the present study, posed to fill the gap in research pointed by DiNardo et al. (1988), further inquiry could also address the question of whether humans are pre-programmed to fear certain dog breeds only. This would be conducted with a view to expand on Seligman’s (1971) theory on fear of animals, and perhaps
shed some light on what it is in dogs that we are prone to fear. To examine this, a presentation should be devised of both examples of dog breeds commonly known as fear-inducing as well as non fear-inducing, whilst recording viewers’ GSR. Perhaps clear fear-inducing attributes could be singled out, if the presentation contained series of dogs of the same breed, depicted by different representatives. For example, the Dobermann Pincher breed could be shown in different versions: one representative would be of a black color, cropped ears and docked tail, and another would be of a brown color, floppy uncropped ears and a long, undocked tail. In this way, the heightened GSR response would point to the most fear-inducing dog characteristics. Due to sparse research in the field, the possibilities of future inquiry are vast, but the question of how behavioral, personality and cognitive factors influence fear of dogs should not be neglected.

In conclusion, whilst the study’s findings did not support any of the correlational hypotheses linking ‘fear’ to low past exposure to dogs, neuroticism and negative affect, the results of the research were not deemed conclusive, due to the inadequate power size. The research did, nevertheless, attain its goal to move from a self-reported assessment of ‘fear’ by introducing a physiological arousal measurement combined with a slideshow presentation depicting fear-inducing images. This measurement could be a valuable form of investigating fear in further analysis. Future study should use the research evaluation provided in the previous paragraphs to attempt to answer the questions posed by the current inquiry.
References


Appendices

Appendix A. Histogram presenting the distribution of GSR to neutral images
Appendix B. Research Information and Consent Form

Research Participant Information and Consent Form

1. EXPLANATION OF RESEARCH:

This research will examine fear of dogs and how it relates to current mood, past contact with dogs and personality traits.

You are being asked to participate in this research which will require you attend a 15 minute time slot, at your convenience, pre-arranged with the researcher. The location of the research is DBS Laboratory, based in Dublin 2. On the day, you will be asked to complete a survey measuring your current mood and a survey measuring personality traits. This will take approximately 5 minutes. Following to that, you will be asked to watch a PowerPoint presentation, which will include images of dogs, while a Galvanic Skin Response measuring a physiological arousal is being recorded. This will take approximately 5 minutes. Finally, you will be asked to answer a one question survey measuring your past contact with dogs. This will not take more than a minute and it will mark the end of the research time.

You must be at least 18 years old to participate in this research and it is required that you are aware that the dog images you will be exposed to are of a scary nature. It is advisable, that if you have a phobia of dogs you do not participate in this research.

2. YOUR RIGHTS TO PARTICIPATE:

Participation in this research project is completely voluntary. You have the right to say no and to change your mind at any time. You may choose not to answer specific questions or to stop participating at any time. There will be no consequences for withdrawing from the research at any point in time.

This research will not involve any costs or compensations.

4. CONTACT INFORMATION FOR QUESTIONS AND CONCERNS:

If you have concerns or questions about this study, please contact the researcher, Kaya Kochman, mailing address:

61 The Beeches
Monkstown
Co Dublin
Telephone Number: 0872770023
E-mail: kaya.kochman@gmail.com

5. DOCUMENTATION OF INFORMED CONSENT.

Your signature below means that you voluntarily agree to participate in this research study.

____________________________     _____________________________
Signature      Date
Appendix C. Current Negative and Positive Affect Scale – PANAS

PANAS

Directions
This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word. Indicate to what extent you have felt this way during the past week.

Use the following scale to record your answers.

(1) = Very slightly or not at all   (2) = A little   (3) = Moderately   (4) = Quite a bit   (5) = Extremely

<table>
<thead>
<tr>
<th></th>
<th>Very slightly or not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
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</thead>
<tbody>
<tr>
<td>1. Interested</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>2. Distressed</td>
<td>1</td>
<td>2</td>
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<tr>
<td>3. Excited</td>
<td>1</td>
<td>2</td>
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<td>4. Upset</td>
<td>1</td>
<td>2</td>
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<td>5. Strong</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>6. Guilty</td>
<td>1</td>
<td>2</td>
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<td>7. Scared</td>
<td>1</td>
<td>2</td>
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<td>8. Hostile</td>
<td>1</td>
<td>2</td>
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<td>9. Enthusiastic</td>
<td>1</td>
<td>2</td>
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<td>10. Proud</td>
<td>1</td>
<td>2</td>
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<tr>
<td>11. Irritable</td>
<td>1</td>
<td>2</td>
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<tr>
<td>12. Alert</td>
<td>1</td>
<td>2</td>
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<tr>
<td>13. Ashamed</td>
<td>1</td>
<td>2</td>
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<td>14. Inspired</td>
<td>1</td>
<td>2</td>
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<tr>
<td>15. Nervous</td>
<td>1</td>
<td>2</td>
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<td>16. Determined</td>
<td>1</td>
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<tr>
<td>17. Attentive</td>
<td>1</td>
<td>2</td>
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<td>18. Jittery</td>
<td>1</td>
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<td>19. Active</td>
<td>1</td>
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<td>20. Afraid</td>
<td>1</td>
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Appendix D. The Big Five – Neuroticism Scale
How I am in general

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1 Disagree Strongly</th>
<th>2 Disagree a little</th>
<th>3 Neither agree nor disagree</th>
<th>4 Agree a little</th>
<th>5 Agree strongly</th>
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</thead>
<tbody>
<tr>
<td>1. ___ Is talkative</td>
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<td>2. ___ Tends to find fault with others</td>
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<td>3. ___ Does a thorough job</td>
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<td>4. ___ Is depressed, blue</td>
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<td>5. ___ Is original, comes up with new ideas</td>
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<td>6. ___ Is reserved</td>
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<td>7. ___ Is helpful and unselfish with others</td>
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<td>8. ___ Can be somewhat careless</td>
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<td>9. ___ Is relaxed, handles stress well</td>
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<td>10. ___ Is curious about many different things</td>
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<td>11. ___ Is full of energy</td>
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<td>12. ___ Starts quarrels with others</td>
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<td>13. ___ Is a reliable worker</td>
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<td>14. ___ Can be tense</td>
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<td>15. ___ Is ingenious, a deep thinker</td>
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<td>16. ___ Generates a lot of enthusiasm</td>
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<td>17. ___ Has a forgiving nature</td>
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<td>18. ___ Tends to be disorganized</td>
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<td>19. ___ Worries a lot</td>
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<td>20. ___ Has an active imagination</td>
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<td>21. ___ Tends to be quiet</td>
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<td>22. ___ Is generally trusting</td>
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<td>23. ___ Tends to be lazy</td>
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<td>24. ___ Is emotionally stable, not easily upset</td>
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<td>25. ___ Is inventive</td>
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<td>26. ___ Has an assertive personality</td>
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<td>27. ___ Can be cold and aloof</td>
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<td>28. ___ Perseveres until the task is finished</td>
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<td>29. ___ Can be moody</td>
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<td>30. ___ Values artistic, aesthetic experiences</td>
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<td>31. ___ Is sometimes shy, inhibited</td>
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<td>32. ___ Is considerate and kind to almost everyone</td>
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<td>33. ___ Does things efficiently</td>
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<td>34. ___ Remains calm in tense situations</td>
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<td>35. ___ Prefers work that is routine</td>
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<td>36. ___ Is outgoing, sociable</td>
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<td>37. ___ Is sometimes rude to others</td>
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<td>38. ___ Makes plans and follows through with them</td>
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<td>39. ___ Gets nervous easily</td>
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<td>40. ___ Likes to reflect, play with ideas</td>
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<td>41. ___ Has few artistic interests</td>
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<td>42. ___ Likes to cooperate with others</td>
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<td>43. ___ Is easily distracted</td>
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<td>44. ___ Is sophisticated in art, music, or literature</td>
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</table>
Appendix E. Semantic Differential Scale – Past Exposure to Dogs

Please mark ‘x’ to indicate the extent of your past contact with dogs over your lifetime.
Appendix F. Fear-inducing Dog Images and Neutral Images – Presentation