Delusional Ideation, Cognitive Processes and Crime Based Reasoning

Delusional Ideation and Cognition

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Abstract

Probabilistic reasoning biases have been widely associated with individuals experiencing delusional beliefs (Galbraith, Manktelow & Morris, 2011; Lincoln, Ziegler, Mehl, & Rief, 2010; Speechley, Whitman, & Woodward, 2009; White & Mansell, 2009), however, little research has focused on biases occuring during every day reasoning (Galbraith, Manktelow & Morris, 2011), and moral based reasoning (Wilkinson, Jones & Caulfield, 2011). 235 participants were recruited across four experiments exploring crime based reasoning through different modalities and dual processing tasks. Study one explored delusional ideation when completing a visually presented crime based reasoning task. Study two explored the same task in an auditory presentation. Study three utilised a dual task paradigm to explore modality and executive functioning. Study four extended this paradigm to the auditory modality. The results indicated that modality and delusional ideation had a significant effect on individuals reasoning about violent and non-violent crime ($p<0.05$). Dual processing did not impact upon reasoning.

Individuals, unavoidably, engage in the process of reasoning as they interact and exist within the world (Green & Gilhooly, 2005). Simple, everyday tasks, such as deciding over a coffee menu, entail a reasoning process. Whilst individuals have the ability to successfully navigate their way through everyday complex situations, all kinds of 'biases' or errors in reasoning have been detected whilst individuals solve simple reasoning problems in a psychological laboratory setting (Verschueren, Schaeken, & Ydewalle, 2005).

Probabilistic processing properties have been found to impact upon the way that individual's reason (Evans, Ellis, & Newstead, 1996; George, 1997; Stevenson & Over, 1995), playing a central role in the conditional inference process (Liu, Lo, & Wu, 1996; Oaksford, Chater, & Larkin, 2000). Lui et al., (1996) demonstrated how probability estimates were used to solve conditional inference problems, which Oaksford et al., (2000) likens to a computational model. They claim that the tendency to accept the inference is directly related to the conditional probability of the conclusion given the categorical premise.

A probabilistic reasoning bias has been widely reported in clinical populations (Hemsley & Garety, 1986; Huq, Garety, & Hemsley, 1988; Garety, Hemsley, & Wessely,1991) which suggests that under conditions of uncertainty, patients with delusions demonstrate a `jumping to conclusions' (JTC) style of reasoning, requiring less information than 'healthy' individuals to arrive at a decision, and being more confident about the decision that they have reached. Huq et al. (1988) presented deluded type schizophrenia patients and a control group with a pair of containers. One of the containers contained 85 red and 15 green beads and the other contained 15 red and 85 green beads. Once out of view, the beads were drawn one at a time in a seemingly random sequence. Participants were required to indicate when they had

reached a decision as to which jar the beads were being drawn from. Deluded patients required less draws than controls before reaching a decision and approximately 40% of the deluded patients came to a confident conclusion after only one draw. This has subsequently been replicated in several further studies (Dudley John, Young, & Over, 1997a, 1997b; Fear & Healy, 1997; Garety et al., 1991, in press; Peters & Garety, in press). Similar findings have been identified with non-clinical populations that have been screened for subclinical delusional ideation using the Peters Delusion Inventory (e.g. Galbraith, Manktelow & Morris, 2010; 2008).

Dual processing theory

Dual process theories have provided an alternative explanation to previous single system theories which maintain that cognitive processes such as reasoning are therefore governed by a single system (Braine, 1990; Rips, 1994; Johnson-Laird, 1983). Dual process theories, therefore, arguably stand in contrast to modular models of human cognition (Barrett & Kurzban, 2006; Carruthers, 2006; Sperber, 1994; Tooby & Cosmides, 1992). Dual processing accounts of reasoning and human behaviour have been developed by both cognitive and social psychologists (Manktelow, 2012), the relevance of which is the theoretical application to 'higher' cognitive processes which include thinking, reasoning, decision making, and social judgment (Evans, 2008). All dual process theories share the common idea that there are two differing modes of processing: System One and System Two (Kahneman & Frederick, 2002; Stanovich, 1999). The first system, occasionally referred to as the heuristic system (De Neys, 2006), solves problems based on an individual's prior knowledge and beliefs. The second system, sometimes referred to as the analytic system, allows reasoning according to logical standards, which requires access to a central working memory system of limited capacity. As a result, System One is

assumed to operate rapidly and automatically, whereas the operations of the analytic system are believed to be slow and heavily demanding of resources (De Neys, 2006). These two systems can act in concert and consequently the heuristic system will usually provide a fast, frugal and correct conclusion. However, heuristic processing can lead to biased reasoning in situations that require more elaborate and analytic processing. This occurrence leads to conflict between the two systems (Stanovich & West, 2000).

Evans (1984) suggests that heuristic processes are preconscious, and their role is to select representation relevant to a particular problem space. This is in contrast to Tversky and Kahneman's (1974) proposal of strategy heuristics that provide shortcuts to a solution. Analytic processing is conscious and therefore, can be classified as deliberate, explicit thinking. This function serves to operate on representations considered to be relevant by heuristic processes that are then used to generate inferences and form judgments (Evans, 1995; 1996).

System One, according to Evans (1996), is pragmatic in nature, is based on prior experiences, beliefs, and background knowledge. It accomplishes objectives reliably and efficiently without necessarily accompanying consciousness. System Two is explicit, sequential, controllable, and makes high demands of working memory (Evans, 1996). Typically, System Two operates outside of normative logical conventions, however, it has the ability of accomplishing solutions to logical, hypothetical, forecasting and consequential problems (Evans, 1996). In comparison to System One, System Two is slow, however, its speed facilitates flexibility and controllability.

Modality

Little research has explored the impact that modality (auditory vs. visual) may have on reasoning biases, particularly when considering delusion ideation and especially given the characteristics, such as deficits in auditory sensory "echoic" memory (Umbritch *et al.,* 2000) associated with 'schziotype' experiences. These deficits lead to difficulties in extracting relevant information from sensory stimuli across all modalities (Javitt *et al.,* 2000).

As such, individuals who experience deficits in extracting relevant information may produce biases on tasks that require the utilisation of represented extracted information. In other words, some individuals are overwhelmed with the mass of information available through their senses, and are unable to filter out the relevant or important information.

As noted by Delhommeau, Dubal, Collet, and Jouvent (2003) few studies have explored the perceptual, and in particular auditory, processing of individuals with Schizotypal tendencies. Yee, Deldin, and Miller (1992) used an Event-Related potentials augmenting/reducing paradigm to rule out simple sensory deficits in tone perception; they found no differences between groups. However, some studies have reported differences in the strategies employed by controls and test groups (Miller, 1986), which suggests that differences may have occurred due to peripheral auditory abnormalities or difficulties in maintaining a template in echoic memory.

Delusional Ideation

The continuity approach has gathered a wealth of support with regards to considering delusions and other features of psychosis being measurable on a continuum that includes clinical to the nonclinical population (Freeman, Pugh, Vorontsova, Antley & Slater, 2010; Galbraith, Morgan, Jones, Ormerod Galbraith & Manktelow, 2014; van Os, Linscott, Myin-Germeys, Delespaul & Krabbendam,

2009). Schizotypy is a sub-clinical category of experience which captures individuals who present schizo-psychopathological characteristics but are not extreme enough to be classed as clinical (Claridge & Beech, 1995). Gruzelier (1996) suggests that schizotypy consists mainly of impulsive non-conformity, social anxiety, positive features such as unusual perceptions, and negative features such as introversion.

Galbraith, Manktelow & Morris (2008; 2010) have conducted a number of studies exploring psychopathological tendency primarily composed of samples of non-pathological individuals. Galbraith et al.'s approach, using a psychometric test to screen for schizotypal tendencies, circumvent issues of medication effects, motivation, and the nature and severity of the symptoms and experiences over time faced when testing a clinical sample (Galbraith, Manktelow & Morris, 2010; Thurston *et al.* 2008). Furthermore, ethical dilemmas are overcome, as are the implications faced when recruiting and testing a clinical sample (Galbraith, Manktelow & Morris, 2010).

The presented research, therefore, is an attempt to assess whether delusional belief rating relates to probabilistic reasoning biases on auditory and visually presented crime based reasoning task. The research aimed to explore whether individuals with high scores on the Peters Delusion Inventory (PDI) reason differently to a control group (individuals scoring low for schizotypal tendencies) on auditory and visually presented crime based reasoning tasks. It was hypothesised that high scoring individuals would make decisions based on less information.

EXPERIMENT ONE

Method

Participants. Forty-five (11 male and 34 female) student volunteers from various undergraduate courses at a University took part in this study. The age of the

participants ranged between 19 and 44 (M = 24.33, SD = 6.82). No other demographic information was collected.

Design. This study adopted a mixed 2x2 experimental design. The study consisted of a within participant factor, violent (emotionally arousing) and non-violent scenarios, and a between participant factor, high and low scorers on the PDI. The dependent variable was data gathering (which was a measure based on a scale to rate how much information an individual required before making a decision).

Materials & Procedure. The following measures were presented to participants in a laboratory setting. The *Peters Delusions Inventory* (Peters et al., 1999) – paper form- is a 21-item measure of delusional ideation. The scale has good levels of reliability and validity (Peters et al., 2004). The response format is a 5 point scale for distress, preoccupation, and conviction in relation to the 21-items presented. The *Computerised Visual Reasoning Task* (CVRT) was specially designed to measure individuals crime based decision-making about whether the character in two scenarios 'had done the right thing'. Participants were able to gather as much or as little information as they desired about a given scenario before making a decision. This concept derived from traditional reasoning tasks, such as the beads tasks, except applied to a manufactured but realistic life scenarios.

The violent scenario (emotionally arousing) used a story about a character that attacked a 'youth' in the street. The attack was based on a number of assumptions. Following the short story about the sequence of events leading to the attack were subsequent statements that provided additional information and described a more complete picture of the events. Each additional statement was displayed on screen for as long as the participant wished to view. The non-violent scenario was based on a story about a character that lied in order to borrow money from a man with no intention to pay him back. The statements following the short story described vital

information with regards to exposing the truth behind the character's need for the money. Participants were required to indicate at which point they were happy to make a decision by pressing the D key and the number of required statements recorded.

Results

Descriptive Statistics. The reasoning task results were analysed using SPSS statistics 17.0 and are presented below. Descriptive statistics for the 'data gathering' scores can be viewed in Table 1.0 (see appendix). The descriptive statistics suggested that high PDI scorers require less information compared to low PDI scorers for both violent and non violent crime scenarios, although this effect is represented to a greater extent in the non violent crime scenario.

Inferential Statistics. A two-way mixed ANOVA suggested that there was not a significant interaction between PDI and Crime Type ($F1,41 = 3.15$, $p > 0.05$). Further analysis showed a low effect size ($D = 0.18$) according to Cohen's D (Cohen, 1992).

Non-violent Scenario and 'data gathering'

Whilst a non-significant interaction was found overall, a significant effect was highlighted when analysing PDI on 'data gathering' with regards to reasoning about non-violent scenarios ($F1, 41 = 6.96$, $p < 0.05$). Further analysis revealed a large effect size ($D= 1.02$) according to Cohen's D (Cohen, 1992).

Discussion

The data collected from the reasoning task suggest that there were no significant differences between high and low PDI scorers, when measuring the amount of

information required before making a decision about a violent crime scenario. However, there was a significant difference when reasoning about a non-violent scenario. Despite the non significant results from the violent scenario, it is still possible to see a trend in the mean 'data gathering' scores that suggests that high scorers requested less information when reasoning about a violent crime. It seems that low scoring individuals required more information, when compared to high scoring individuals, before making a decision or coming to a conclusion.

EXPERIMENT TWO

Method

Participants. Fifty-five participants from a University took part in this study. All participants were undergraduate students from a range of faculties and degree courses across the University. Participants were aged between 19 and 52 (M = 23.8, SD 8.01), ten were males and forty-five females. It was ensured during the recruitment stage that all participants were first language native English speakers.

Design. A 2x2 experimental design was adopted for this study. Similar to study one, independent variable one was based on PDI scores and independent variables two was based on scenario type (violence and non-violent).

Materials & Procedure. Consistent with study one, the 21-item *Peters Delusions Inventory* (Peters et al., 1999) was used to measure delusional ideation (see study one for more information). The *Computerised Auditory Reasoning Task* (CART) was specially designed for this study, which was an adaptation from study one. The auditory reasoning task presented the same information as study one but through an auditory modality, given the evidence of cross modality bias occurring in individuals with schizotypy as well as a small amount of evidence for differentiation in psychosis

prone individuals (Rheed, Wakefield, Harris, Parry, Cella, Tsakanikos, 2007: Ferstl, Hanewinkel & Krag, 1994). Once again, Eprime programming software was used to program, present and capture participant's responses. Participants wore a head set in order to listen to the crime based scenarios and additional information. Given that the information was delivered to participants through auditory presentation, statements could be heard once unlike study one where participants could read and re-read on screen.

Results

Descriptive statistics The reasoning task results were analysed using SPSS statistical analysis software 17.0, and are presented below. Descriptive statistics for the 'data gathering' scores can be viewed in table 1.1 see appendix.

Inferential statistics The results from the Levene's pre-test were non significant and therefore did not violate any assumptions for parametric testing (Levene's $p \geq 0.05$). A two-way mixed Analysis of Variance (ANOVA) was performed on the results of the reasoning task, therefore considering the independent variables of PDI (high and low) and crime type (violent and non-violent), and the dependent variable data gathering. The two-way mixed ANOVA revealed a non-significant interaction between PDI and scenario type ($F2, 32 = 15.04$, $p > 0.05$). Further analysis showed a large effect size according to Cohen's D ($d = 1.3$), and retrospective power = 0.99 (Cohen, 1992).

Discussion

The results from this study proved interesting. A two-way analysis of variance (ANOVA) demonstrated that overall there was no interaction between PDI and crime type, however, the *p* and *f* values suggested significant differences between high and

low scorers within each crime type (violent and non violent). Either individuals who scored high for Schizotypal tendencies required fewer 'chunks' of information before making a decision (data gathering), compared to individuals who scored low for Schizotypal tendencies, or it is possible that low scorers gathered more information in comparison to high scorers. The descriptive statistics suggest that the violent crime scenario, which was potentially more emotionally arousing, created a bigger gap between the mean 'data gathering' scores generated by the high and low scoring groups. Therefore, it could be argued that the violent crime scenario exacerbated the 'jump to conclusions' bias that frequently occurs in individuals at risk of delusions (Huq, Garety & Hemsley, 1988), or caused low scorers to gather further information before making a decision. Furthermore, the results suggest that the biases in reasoning that accompany delusional beliefs, which have presented themselves on traditional non-specific reasoning tasks, also present themselves on crime based reasoning tasks.

EXPERIMENT THREE

Method

Participants. 74 participants from a University took part in this study. The participants were undergraduate students from a range of Faculties and degree courses across the University. Participants were aged between 18 and 54 (M = 22.5, SD 6.69), 23 were males and 51 females. It was ensured during the recruitment stage that all participants were first language native English speakers.

Design. The 2x2x2 experiment designed enabled the exploration of three independent variables: PDI (between factor determined by the scores on the Peters Delusions Inventory: Peters *et al.,* 1996); scenario type (within factor representing non-violent and violent); and memory task (within factor compiled of high and low memory load)

explored using a dot matrix memory task. There was one dependent variable which was the amount of information required before making a decision based on a 0-8 scale (data gathering).

Materials & Procedure. Consistent with previous studies presented in this paper the *21-item Peters Delusions Inventory (Peters et al., 1999)* was used to measure delusional belief ideation (see previous studies for more information). The *Dual Processing Visual Computerised Decision Task (DPVCDT)* was specially developed for this study. This task was an adaptation of the reasoning task used in experiment one to present information to participants in a visual modality. Statements were present on screen for participants to observe for as long as they wished. In addition to previous studies in this paper, the dot matrix memory task (dual task) was completed. Both of these tasks were presented and completed using E-Prime stimulus software. This design explores whether 'dual tasking' as opposed to a change in modality, and therefore greater demands on processing, enhances the effects of biases in individuals who score high for delusional beliefs. This is supported by the evidence of bias' occurring in individuals with Schizophrenia, schizo-type disorders, as well as a small amount of evidence for differentiation in psychosis prone individuals (Rheed, Wakefield, Harris, Parry, Cella, Tsakanikos, 2007: Ferstl, Hanewinkel & Krag, 1994).

Results

Descriptive statistics The reasoning task results were analysed using SPSS statistics analysis software 17.0, and are presented below. Descriptive statistics for the 'data gathering' scores can be viewed in table 1.2 see appendix.

Inferential statistics: 'Data gathering' The data gathering results were analysed using a 3 way mixed Analysis of Variance (ANOVA) to assess the impact of one between subject independent variables (PDI: high and low) and two within subject independent variables (Scenario type: violent and non-violent; Memory load: high and low) on participants 'data gathering' scores.

Box's test of equality of covariance matrices was significant ($p \leq 0.05$) and therefore the results below are reported using the Greenhouse-Geisser.

There was no significant interaction between memory and PDI ($F= 2.69$, $p > 0.05$, $\eta^2 = 0.05$), PDI and Scenario type ($F= 0.12$, $p > 0.05$, $\eta^2 = 0.00$), memory and scenario ($F= 1.18$, $p > 0.05$, $\eta^2 = 0.02$), and memory, scenario and PDI ($F= 0.00$, $p > 0.05$, $\eta^2 = 0.00$).

There was a significant difference in mean data gathering between high and low scorers ($F= 6.79$, $p < 0.05$). There was also a significant main effect of memory (easy / hard: $p < 0.05$) but there was no significant main effect of scenario type ($p > 0.05$).

Discussion

The quantitative data presented no significant interactions, in any combination, between PDI, memory load and crime type. This could be interpreted, explained and accounted for in a number of ways. It is possible that the experiment design is not sensitive enough to capture any relationships between PDI, dual systems of processing and crime scenario type, despite adopting tools and methods that had been

used previously in a number of studies which had generated significant results (Galbraith *et al*., 2009; Evans, 2009; De Neys, 2006).

The results suggest that the biases that occurred in experiment one and two were not a result of overloaded resources and increased demands placed on memory but rather the impact of modality (visually or auditory processed information). Nonetheless, it is impossible to be conclusive without testing the dual process paradigm within the auditory modality.

It is also possible that dual process theory does not adequately account for aspects of crime based real world reasoning and hence there is no relationship or interaction between the two separate systems when reasoning about crime based scenarios. It is also possible that the two systems of processing do not impact upon one another when individuals are engaged with crime based reasoning.

EXPERIMENT FOUR

Method

Participants. Sixty-One participants took part in the auditory Dual Processing study. The participants were recruited from a University. The sample consisted of undergraduate students from a range of faculties and degree courses across the University. Participants were aged between 18 and 38 (M = 22.8, SD 5.41), 21 were males and 40 females.

Design. A 2x2x2 experimental design was adopted for this study. Independent variables PDI (high and low), crime type (Violent and non-violent) and memory task (High and Low). The dependent variable was data gathering (the amount of information participants required to make a decision).

Materials & Procedure

The study comprised three main component measures. As with the previous studies in this paper, the *21-item Peters Delusions Inventory* (Peters et al., 1999) was used to measure delusional belief ideation (see study one for more information). The *Dual Processing Auditory Computerised Decision Task (DPACDT)*was developed specially for this study. The task was based on the visual crime based reasoning task in experiment three, however, the renovated design presented the scenarios and statements to participants in an auditory modality accompanied by a visual dot matrix memory task. The tasks were presented and results were recorded using E-Prime stimulus software. This design explores whether reasoning biases are further enhanced by 'dual tasking' or whether the modality of presented information impacts upon individuals decisions (Rheed, Wakefield, Harris, Parry, Cella, Tsakanikos, 2007; Ferstl, Hanewinkel & Krag, 1994).

Participants were presented with either a simple or difficult dot matrix memory test which they were required to remember whilst reading a crime based scenario accompanied by additional statements. Participants were required to indicate at which point they were happy to make a decision about whether the character in the story had done the right thing. Participant's responses were recorded on a ten-part scale. Once participants had completed the crime scenario, they were then requested to recall the dot matrix memory task. This process was repeated to account for violent and non violent as well as simple and difficult conditions.

Results

Descriptive statistics The reasoning task results were analysed using SPSS statistics analysis software 17.0, and are presented below. Descriptive statistics for the 'data gathering' scores can be viewed in table 1.3 see appendix.

Inferential statistics: 'Data gathering' The data gathering results were analysed using a 2x2x2 mixed Analysis of Variance (ANOVA) to assess the impact of one between subject independent variables (PDI: high and low) and two within subject independent variables (Scenario type: violent and non-violent; Memory load: high and low) on participants 'data gathering' scores.

Box's test of equality of covariance matrices was significant ($p \leq 0.05$) and therefore the results below are reported using the Greenhouse-Geisser.

There was no significant interaction between memory and PDI (F= 0.48, $p > 0.05$, $\eta^2 = 0.01$), PDI and Scenario type (F= 0.95, $p > 0.05$, $\eta^2 = 0.02$), memory and scenario (F= 0.57 p= 0.81 $\eta^2 = 0.00$), and memory, scenario and PDI (F= 0.04, $p > 0.05$, $\eta^2 = 0.00$).

There was a significant difference in mean data gathering when comparing high and low PDI scorers ($F = 70.7$, $p < 0.05$).

Discussion

As with experiment three, the analysis of the data gathering results found no significant relationships between PDI, dual processing and crime type, suggesting that these factors do not impact upon one another. However, there were significant differences highlighted between high and low PDI scorers with regards to their data gathering scores consistent with previous findings. In other words, high PDI scorers

required fewer pieces of information before coming to a conclusion in comparison to low scorers who require more pieces of information before making a decision. However, the memory tasks did not interfere with this finding and caused no further elevated signs of reasoning biases. This suggests that the dual processing (Evans, 2003) account does not provide an explanation for why biases are elevated when presented in a visual modality.

It is possible that high PDI scorers require fewer pieces of information due to problems or abnormalities experienced with the processes and processing that are involved in the extraction of relevant information from sensory stimuli across all modalities (Javitt *et al.,* 2000), however, the frequency or intensity of these abnormalities are heightened when information is presented orally.

DISCUSSION AND CONCLUSION

Experiment one and two produced particularly interesting findings with regards to both reasoning biases and influential factors surrounding the intensity of those biases. It was concluded from experiment two that delusional ideation and crime based reasoning related to either modality, visual or orally presented information (Delhommeau, Dubal, Collet, and Jouvent , 2003), or the increase load on memory resources which naturally occur when remembering information that has been received through the auditory senses. However, the methodological design adopted for this study made it impossible to identify whether the causal factor was modality or indeed competition for working memory resources. Therefore, experiment three and four provided a solution to address this problem by adopting a

dual task design (Evans, 2003; 2008). This allowed for an investigation of whether an increase in memory load enhances the crime based reasoning biases identified by experiment one and two. The outcome of these additional studies suggest that it is not increased load on memory and resources that enhances the biases and therefore it can be deduced that there are key differences when reasoning using verbally presented information compared to visually presented information. The results reported in experiment two demonstrated that individuals with Schizotypal tendencies required fewer 'pieces' of information before making a decision, compared to individuals who scored low for Schizotypal tendencies. There was a significant difference in both non-violent and violent crime scenarios with regards to individual's 'data gathering' scores. However, the violent crime scenario created a bigger gap between the mean 'data gathering' scores generated by the high and low scoring groups. Therefore, it could be suggested that the violent crime scenario enhances and therefore replicates the 'jump to conclusions' bias that frequently occurs in individuals at risk of delusions (Huq, Garety & Hemsley, 1988). Furthermore, the results suggested that the biases in reasoning that accompany delusional ideation, have presented themselves on traditional non-specific reasoning tasks, also present themselves on crime based reasoning tasks given the right conditions.

This study has provided an initial exploration of delusional ideation and crime based moral reasoning, which is a novel focus. There could be merit in exploring delusional ideation and moral reasoning in a more direct measurable way using tools such as those outlined by Palmer (2012). A relationship between delusional ideation and moral reasoning could have implications for theoretical approach.

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Table 1.0
Data gathering descriptive statistics.

Crime Type	PDI Group	Mean 'Data Gathering' (chunks of information)	'Data Gathering' Standard Deviation (SD)	*P*	*F*
Violent	High (n=15)	2.14	2.25	0.69	0.16
	Low (n=15)	2.57	2.53		
Non violent	High (n=15)	1.79	1.42	0.04	6.96
	Low (n=15)	3.71	2.34		

Table 1.1
Data gathering descriptive statistics.

Crime Type	PDI Group	Mean Data Gathering (chunks of information)	Data Gathering Standard Deviation (SD)	*p*	*f*
Violent	High (n=19)	2.22	3.04	0.02	23.18
	Low (n=19)	6.78	3.95		
Non violent	High (n=19	3.11	3.27	0.01	8.82
	Low (n=19)	6.06	2.65		

Table 1.2
'Data gathering' descriptive statistics

Crime Type	PDI Group	Mean data gathering	Data gathering standard deviation (DV)	*p*	f
Violent (hard)	High (n = 25)	3.04	3.05	0.00	11.84
	Low (n=25)	4.72	4.03		
Violent (easy)	High (n=25)	2.68	2.69	0.00	18.31
	Low (n=25)	5.2	3.99		
Non Violent (hard)	High (n=25)	2.88	2.83	0.12	2.52
	Low (n=25)	4.32	3.53		
Non Violent (easy)	High (n=25)	3.48	3.16	0.09	2.99
	Low (n=25)	5.68	3.65		

Table 1.3

Data gathering descriptive statistics

Crime Type	PDI Group	Mean data gathering	Data gathering standard deviation (DV)	*p*	f
Violent (hard)	Low (n=20)	6.50	3.08	0.00	10.37
	High (n=20)	2.08	1.99		
Violent (easy)	Low (n=20)	6.88	3.17	0.00	11.39
	High (n=20)	2.33	1.69		
Non Violent (hard)	Low (n=20)	6.21	2.96	0.48	0.52
	High (n=20)	2.55	2.46		
Non Violent (easy)	Low (n=20)	6.54	3.27	0.00	14.87
	High (n=20)	2.41	1.77		