Peer Recognition of Prodromal Signs of

Psychosis:

A Signal Detection Analysis

A thesis presented in partial fulfilment of the requirements for the

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ABSTRACT

Using signal detection analysis, this study investigated young peoples' sensitivity to prodromal signs or psychotic symptoms compared to more everyday signs of distress in their friends. In a questionnaire format, 117 high school students (aged 13 to 16 years) were asked to report the level of concern they would have if one of their friends exhibited certain characteristics. Half of the latter were neutral, everyday phenomena (no signal), and the remainder were either DSM-IV symptoms of psychosis or empirically-derived prodromal signs of early onset psychosis (signal). Each possible sign was modified (made more serious) by descriptors used in psychological models to define pathology behaviorally: rare in youth, high in frequency, recent change, and lack of obvious (rational) environmental cause. High frequency was the modifier leading to the greatest degree of concern. Accurate and sensitive detection, based on d' values, was adequate for psychotic symptoms, especially by females rather than by males, although depressed mood (a prodromal sign in this context) was most readily detected as a worrisome feature. The study has implications for analyzing how youth judge indices of distress in their friends and for their general ability to recognize that certain characteristics are more troublesome than others. Telling a responsible adult of their concerns was the most frequently suggested response, followed by attempting to help and talking to the peer about their concerns. If rapid detection of early onset psychosis is to be a goal of preventative mental health services, youth who are sensitive to classic symptoms of psychosis may still need educating in recognizing the difference between behavioral characteristics that are part of everyday distress and those that are indicative of more serious adjustment difficulties that might be emerging.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Psychosis, a distressing psychological disorder that usually develops first in young people can be effectively treated if it is detected at a very early stage. Detection is often difficult as adults may see the early signs as normal or exaggerated adolescent behaviour - perhaps an urgent sense that something is not quite right. Clinical psychologists and mental health services interested in secondary prevention and the early diagnosis of psychological disorder in youth are very dependent on peers identifying their friends' behaviors as being indices of problems more serious than everyday distress.

Early Intervention

Early intervention enables those whose lives are affected by first episode psychosis to experience an optimum recovery and have an increased quality of life. This is achieved by providing effective best practice treatment at the earliest possible stage, with the aim of reducing the duration of untreated psychosis. The powerful words from the perspective of a carer best describe the need for early intervention:

> "What person who has watched someone they love pass through the Gehenna of acute psychotic illness and prolonged, repetitive treatments in a psychiatric unit, what person does not long for the capacity to eliminate that suffering? What family member who has experienced the devastation, the chaos of an acute episode of schizophrenia, could not conscionably endorse and encourage research into prevention of the illness?" (Peterson, 2000, p. 201).

The effectiveness of early intervention is well supported in the literature (Edwards & McGorry, 2002; Edwards, McGorry, & Pennell, 2000; Larsen, Johannessen, Guldberg, Opjordsmoen, Vaglum, & McGlashan, n.d.; Lines, 2000; Malla, Norman, Manchanda, McLean, Cortese, & Scholten, 2002 & Spencer et al.,

2001). An excellent example of the promotion of early intervention is TIPS (Early Treatment and Identification of Psychosis), which is an ongoing multi-centre project in Scandinavia with the specific aim of reducing the duration of untreated psychosis. To assist in achieving this goal, extensive information campaigns are provided which are directed toward the public, health professionals and schools about the early signs of psychosis. This has resulted in increased appropriate referrals to psychiatric health services from families, teachers and social workers and has achieved a major reduction in the duration of untreated psychosis (Johannessen & McGlashen, 2000).

Australia and New Zealand are reported as being two of the leading countries in this field (Edwards et al., 2000), with New Zealand having Guidelines for Early Intervention for Psychosis Services (Mental Health Commission, 1999). Nationally, we have many Early Intervention Services. Regions where services are not currently available include the Manawatu, and needs assessment (Boyd, 2004) suggest that there is a strong demand from the community for a local early intervention service.

Early Detection of Psychosis – Prodromal Signs

To enable early intervention to occur, we must be able to detect the early or prodromal signs of psychosis. Before early treatment programmes can even be addressed there needs to be a level of confidence in detecting the signs, and then knowing how to seek help. These signs must be accurately detected to avoid the risk of false positives. As Larsen et al. (2001, p.323) state "we identified no studies that prove that intervention in the prodromal phase is possible without a high risk for treating false positives." While there are issues around the prodromal signs of psychosis being variable and non-specific, a vast amount of recent research supports the clear identification of prodromal signs and prediction of psychosis (Edwards & McGorry,

2002; McGorry, Yung, & Phillips, 2002; Phillips et al., 2002; Yung et al., 1998a,b, &

Yung et al., 2003).

Research has been conducted around asking those whose lives are affected by

first episode psychosis to retrospectively identify how they perceived their prodromal

phase. Two core dimensions of experience were highlighted in such a study by Moller

(2000) as being "disturbance of perception of self" and "extreme preoccupation by and

withdrawal to overvalued ideas". Four potential dimensions of prodromal behaviour

were also identified as being: quit school, university or job, or major truancy,

observable shift of interests, social passivity, withdrawal or isolation, and change in

global appearance or behaviour. Yung and McGorry (1996) found people to self-report

a wide variability of phenomena and sequence patterns, with symptoms being a mixture

of attenuated psychotic symptoms, neurotic and mood-related symptoms and

behavioural changes.

In contrast to the retrospective studies, a New Zealand longitudinal study

(Poulton, Caspi, Moffitt, Cannon, Murray, & Harrington, 2000) investigated whether

self-reported delusional beliefs and hallucinatory experiences at age 11 years predicted

schizophrenic outcomes 15 years later. A strong linear relationship was found between

self-reported psychotic symptoms in childhood and adult schizophreniform disorder.

Strong symptom children were 16 times more likely to have a schizophreniform

disorder diagnosis by age 26 years than were the controls.

Research has also been conducted regarding other people being able to recognise

the prodromal signs of psychosis in others. Reports by family and friends about their

family member or friend with first-episode psychosis were used in one study to derive a

checklist of behaviours describing the evolution of various phases of illness. Good

reliability was achieved with age at the first appearance of psychotic symptoms and at

initiation of treatment seeking, but it was found that judging the beginning of the prodrome was more difficult (Beiser, Erickson, Fleming, & Iacono, 1993).

General practitioners are primary care health professionals who may be in an extremely helpful position to detect the earliest signs and symptoms of psychosis. Yet, following a literature review and using experiences and data obtained during the Buckingham Integrated Mental Health Care Project, Falloon (2000) found that general practitioners often have difficulty recognising the earliest signs of a psychotic episode.

Youth spend a large proportion of their time in the school environment; therefore, can teachers recognise the early signs of psychosis? Olin et al. (1998) examined teacher ratings as a tool for identifying those at risk of developing psychosis. The average age of students involved in the study was 15 years of age. The high-risk group (n = 207) were children with mothers who had schizophrenia, and there was also a low risk or control group (n = 104). In 1962, an extensive teachers' report where teachers rated the behaviours of both groups was obtained. The first intensive diagnostic interview was conducted between 1972 and 1974 and the second intensive diagnostic interview was conducted between 1986 and 1989. It was found that the teachers were able to anticipate which of the students would develop serious psychiatric disorders and their ratings also differentiated within the group of people who subsequently developed schizophrenia. Within the low-risk individuals, teachers were able to predict which students would develop psychotic disorders in the following 25 years. They were found to be more accurate in predicting severity of negative symptoms than severity of positive symptoms.

Peers

Peer groups and friendships play a large role in the lives of youth. Crockett (1988) explored self-reports of childhood peer relationships and home life with adults

who had never been treated and adults who had received psychiatric treatment. Analysis showed that worst memories of childhood peer relationships were associated with worst prognosis (schizoaffective and schizophrenia disorders), but not with worst memories of parents. Subjects, who were paranoid, recalled membership in cliques, teams or gangs, but few close childhood friends.

Further evidence that peers play a large role in the life of youth is the supporting evidence of the effectiveness of peer-run support groups for youth who are affected by first episode psychosis. Peer-support is described by Edwards and McGorry (2002) as a therapeutic approach to patients with schizophrenia and was one of the results of the Early Psychosis Projects. Peer-based support as part of an in- and out-patient treatment programme is described as effective in preventing patients from dropping out of the treatment (Linszen & Lenior, 1999). Francey (1999) mention a female who established a peer-run support group that she believes has been important in her learning to cope with her illness.

If peer relationships are so important in youth, this raises the question – can youth identify when a friend is experiencing an emotionally disturbing time? Hoffman, et al. (1977) found this to be the case. Subjects were fourth and sixth graders who had five vignettes read aloud to them. One vignette described a normal boy and four vignettes described emotionally disturbed boys. Interviews were coded to a 5-point scale of degree of perceived emotional disturbance and it was found that subjects differentiated among the boys in the vignettes in a manner congruent with clinician judges' ratings.

If youth are able to identify when a friend is experiencing an emotionally disturbing time, they also need to know what to do about it to enable the friend to receive appropriate assessment and treatment. Trying to help the friend and

encouraging the friend to tell a responsible adult would be an effective response for a young person.

One of the difficulties encountered when examining young people's detection of psychotic symptoms is that if the symptoms are described in typical psychiatric terminology, their pathological nature is emphasised. If a young person is already exhibiting a frank symptom of psychosis (such as would be found in the DSM-IV criteria), then detection might take place earlier than if the young person waits to be seen at a mental health clinic, but detection cannot be said to have really preceded the onset of the psychotic syndrome.

An alternative perspective on this issue can be found in behavioural and social learning theories of mental illness. Such theories tend to stress not the content of symptoms, but the fact that there is continuity between normal and typical behaviour and behaviour that is judged inappropriate by society. Thus behavioural theories tend not to make such clear distinctions between "normal" and "psychotic" behaviour as would be typical of a psychiatric model. In behaviour theory, it is usually assumed that certain dimensions of a behaviour make it pathological. For example, a behaviour that occurs only occasionally might be part of typical behaviour, but if the behaviour occurs repeatedly and excessively, it becomes a problem. Another aspect of pathological behaviour is that the behaviour being judged is not related to an obvious cause. For example, if someone was feeling low in mood because he or she heard that a friend had been diagnosed with cancer, we would not consider that a sign of abnormality as opposed to someone whose depressed mood seemed unrelated to current circumstances. Another feature of abnormality is that the content of the behaviour is very rare in that particular age group – sucking your thumb when you are five years old would not be judged as inappropriate compared to sucking your thumb when you are fifteen years

old. Another behaviour characteristic that might indicate that a behaviour is problematic is that it has suddenly changed. If a young person stops playing a sport it is not considered unusual if he or she had announced intent to do so and gradually dropped out of that activity; but it is of great concern if a young person who loves a particular activity suddenly gives it up. Although there are other dimensions whereby a behaviour of a given content can be judged to be abnormal, these four seem to represent widely recognised characteristics that relate to abnormality.

Signal Detection Theory

Signal detection theory (SDT) measures performance and is about decisions or choices that people make. Originally, auditory signal detection tasks involved an observer identifying the presence or absence of a weak pure tone embedded in a burst of white noise and visual signal detection tasks involved an observer detecting the presence or absence of a weak flash of light against a background whose level of illumination fluctuates randomly. The methodology developed out of SDT, allows us to measure sensitivity, how well the observer is able to make correct judgements and avoid incorrect ones, and bias, the extent to which the observer favours one hypothesis over another independent of the evidence given (McNicol, 1972). Within the field of psychology, these tasks have been extended and include studies of facial recognition (Metzger, 2002; Podd, 1990). In the field of clinical psychology, SDT has been used again with recognition memory, although this time as a function of neuroticism, introversion, extraversion and arousal (Hershkowitz & Texas, 1971). It has also been used with a task to assess the performance of people who have a diagnosed psychological disorder (Axelrod, 2002; Bentall & Slade, 1985), and to analyse the diagnostic accuracy of clinical assessments (Dunn, 2000; McFall & Treat, 1999). SDT has been used as a statistical method which takes into account the prevalence,

sensitivity and specificity of autistic disorder which had been solely diagnosed by descriptive criteria (Siegel, 1990). To date, I have found no studies using signal detection tasks to detect the presence or absence of clinical symptomology in other people. Such a highly accurate methodology seems to be an extremely appropriate methodology to use for such a study.

In a one-interval, or a yes-no SDT experiment, a hit is when the stimulus is present and was identified, a miss is when the stimulus was present and was not identified, a false alarm is when the stimulus was not present and was identified, and a correct rejection is when the stimulus is not present and was not identified. These outcomes can be represented in a stimulus-response matrix:

	Response	
Stimulus	"yes"	"no"
Present	Hit	Miss
Not Present	False Alarm	Correct Rejection

(MacMillan & Creelman, 1991). An analysis of the hit and false alarm rates enables one to derive a statistic, d' that is independent of response bias. SDT analysis is important for providing evidence of bias free discrimination. By removing the effects of decision bias, the d' measure gives a clear indication of the degree of discrimination possible, free from the potentially confounding effects of response bias. The benefit and point of using SDT analysis is to obtain a bias free estimate of delectability.

The purpose of my study was to determine if a sample of college students from the lower North Island, are able to recognise the early signs of psychosis in fellow students and to investigate the sensitivity of youth to prodromal signs or psychotic symptoms compared to more everyday distress in friends. I hypothesise that youth are able to detect the early signs of psychosis in their friends and they are able to

distinguish these signs from everyday behaviour. A further purpose was to investigate, using SDT, if, when thinking of one's friends a particular sign of distress stands out against a background of a lot of other things the person might be doing or saying (detecting a signal against a background of noise). A goal of the current study was to investigate whether the four dimensions; lack of obvious cause, rare in youth, high in frequency and change in behaviour, could be used to modify a particular, otherwise neutral activity. If so, whether these modifications would be equally detectable by young people, or whether one of these characteristics stand out as being particularly salient.

METHOD

Participants

The sample consisted of 117 students whose ages ranged from 13 to 16 years old. "Incidence of schizophrenia begins to rise during the 15 to 18 year age range" (Pelosi & Birchwood, 2003, p.197). Therefore, I asked for volunteers in the younger age range of 13 to 15 years of age to investigate if they were sensitive to certain behaviours of their peers. The average age was 13.9 years old ($SD = .78$ years). Forty two participants (35.9%) were 13 years old, 45 participants (38.5%) were 14 years old, and 30 participants (25.6%) were 15 years old or older. As only six participants were 16 years old, 15 and 16 years old participants were included in the 15+ age bracket. Forty two participants (35.9%) were female and 75 participants (64.1%) were male. Thirty participants (25.6%) identified as New Zealand Maori, 78 participants (66.7%) identified as New Zealand European and nine participants (7.7%) identified as belonging to other cultural groups.

Procedure

Ethics approval for this research was obtained from the Massey University Human Ethics Committee. Participants were recruited from secondary schools within the lower North Island specifically, Manawatu, Wanganui, Wairarapa and Southern Hawkes Bay districts. In total, thirteen schools were approached, either in person or in writing, to participate. Permission was obtained from the principal and/or Board of Trustees.

An information sheet and consent forms (see Appendix) were sent to parents/care givers of students aged 13 to 15 years of age via the school. It was decided by the school who the information packs were sent to. Some schools allowed for

recruitment of participants from all students in the desired age range and others a sample of students from one class or year.

Once parental consent was obtained, these students were invited to complete the questionnaire either at their school or home. Instructions for completing the questionnaire were provided on the questionnaire itself and the attached information sheet. No time limit was given. Completed questionnaires were returned either by post or in person. A draw was made for a music voucher, for those who chose to enter, once all completed questionnaires were returned.

Materials

The questionnaire "Is Everything Alright?" was specifically designed for this research (see Appendix). Questionnaires for males were printed on yellow paper and the questionnaire for females on green paper. The two questionnaires differ only in the gender-specific phrases. The participants were requested not to put their name on the questionnaire.

Background information was initially sought regarding gender, age and ethnicity of the participant. Two open-ended questions were included in the questionnaire. The question, "what do you think are the most important qualities in a friend?" was asked initially in the questionnaire to assist the participant in promoting thought about friends and friendships. The second question, "if you indicated concern, what would you do about it?" completed the questionnaire. The purpose of this question was to see what coping strategies participants currently use (or say they would use) if they were concerned about a friend. A coding system was developed to show the participants' open-ended responses to this second question, to be scored according to how effective and appropriate their responses were. This coding system was as follows: 1= nothing, 2= socialise with the person, 3= talk to friend, 4= try to help, 5= tell a responsible adult,

6= encourage friend to tell a responsible adult, 7= try to help friend and tell a responsible adult, and 8= try to help friend and encourage friend to tell a responsible adult.

The main content of the questionnaire are the statements of concern. Eighty statements were randomly listed and participants were asked to rate them on a Likert Scale from 1 (not a concern at all) to 6 (a serious concern). The scale had no mid-point therefore, points 1, 2 and 3 indicated three levels of no concern and points 4, 5 and 6 indicated three levels of concern. Participants were asked to think of a friend, the same age and gender, and identify how concerned they would be if the friend behaved as the statement suggests. I developed the statements in consultation with clinical psychologists, mental health workers, parents and youth.

Of the eighty statements, forty were neutral or were expected to be of no concern. They are statements of every day youth behaviour. The remaining forty statements were modified statements and were divided into two types: half (twenty statements) were statements that represent psychotic symptoms and the remaining twenty statements represented prodromal signs of psychosis. An example of a psychotic statement is "if I had a friend who is always listening and responding to a voice that no one else can hear, to me this would be.......". The equivalent neutral statement is "if I had a friend who is sensitive to experience, to me this would be........". An example of a prodromal statement is "if I had a friend who never laughs or smiles, to me this would be.......". The equivalent neutral statement is, "if I had a friend who has a low mood when things don't go right, to me this would be.......". Psychotic symptoms were represented by five criteria from DSM-IV (American Psychiatric Association, 1994): visual hallucinations, auditory hallucinations, disorganised behaviour, disorganised speech, and delusions. Prodromal signs were represented by

the five most reported signs as found by Edwards and McGorry (2002): reduced concentration, reduced drive and motivation, depressed mood, sleep disturbance, and anxiety. For each of the signs (five psychotic and five prodromal) there were four modifiers which then characterised the statement as a symptom (a total of 40 statements). The four modifiers are: lack of obvious cause (for example, "if I had a friend who out of the blue will tell stories that I can not make sense of, to me this would be......."), rare in youth (for example, "if I had a friend who is anxious about things the rest of us are not anxious about, to me this would be......."), high in frequency (for example, "if I had a friend who can not concentrate on anything, to me this would be......."), and change in behaviour (for example, "if I had a friend who used to spend time with other females but now will not as she believes all females have special powers which could harm her, to me this would be.......").

The statements of concern were structured in this way to enable the data collected to be analysed, not only using descriptive statistics (SPSS computer package), but to establish a bias free estimate of ability to detect symptoms using SDT analysis. The design of this study allowed for a one-interval design or a yes-no experiment. "Yes" is when concern is expressed by the participant, responses 4, 5 or 6 on the Likert scale, and "no" is when concern is not expressed by the participant, responses 1, 2, or 3 on the Likert scale. A hit is when the statement was a symptom and the participant identified concern, a miss is when the statement was a symptom and the participant did not identify concern. Similarly, a false alarm is when the statement was not a symptom and the participant identified concern, and a correct rejection is when the statement was not a symptom and the participant did not express concern. The SDT measure detection used was d', defined as: $d' = z$ (hit rate) $- z$ (false alarm rate). The measure of response

bias was c, defined as -0.5 (z (hit rate) + z (false alarm rate)), (MacMillan & Creelman,

1991).

RESULTS

Descriptive Statistics

Mean ratings for modified (symptomology) statements and neutral statements were calculated and are depicted in Figure 1. It can be seen that the concern ratings for modified statements ($M = 4.27$, $SD = .66$) was greater than for the neutral statements ($M = 3.21$, $SD = .66$), a difference which was statistically significant, $t(116) = -20.56$, $p < .0001$.
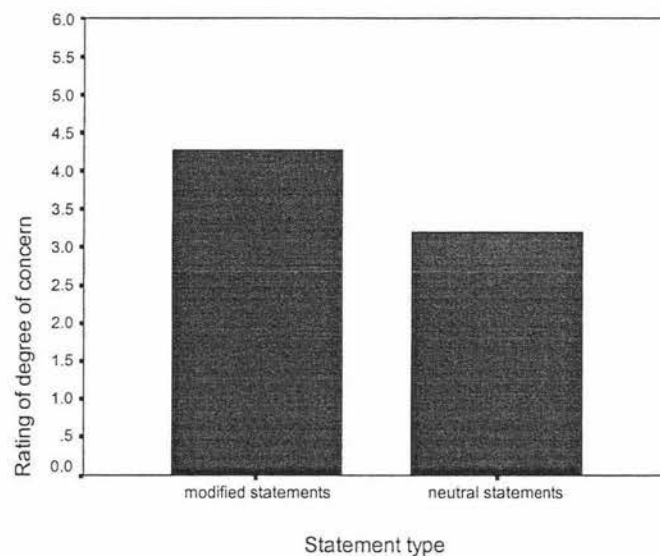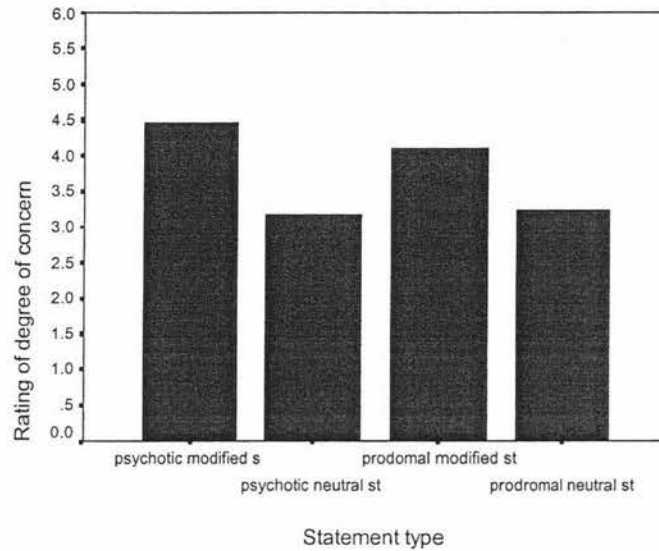

Figure 1. Mean concern ratings for modified and neutral statements.

Within the modified group, mean ratings for psychotic statements and prodromal statements were calculated, along with mean ratings for the neutral forms of both these types of symptom and they are depicted in Figure 2. It can be seen that ratings for psychotic statements ($M = 4.46$, $SD = .72$) was greater than for the prodromal statements ($M = 4.09$, $SD = .72$), a difference which was statistically significant, $t(116) = -7.22$, $p < .0001$. The neutral form of psychotic statements ($M = 3.17$, $SD = .70$) was slightly lower than the neutral form of prodromal statements ($M = 3.24$, $SD = .72$). This difference was not statistically significant.

Figure 2. Mean concern ratings for psychotic and prodromal modified statements and

statements of their neutral form.

Within the psychotic group of modified statements, visual hallucinations are the

psychotic symptom reported to be of the most concern ($M = 5.01$, $SD = .89$), followed

by delusions ($M = 4.86$, $SD = 1.16$), auditory hallucinations ($M = 4.81$, $SD = 1.03$),

disorganised speech ($M = 3.84$, $SD = .81$) and disorganised behaviour ($M = 3.75$, $SD =$

.83. As can be seen in Figure 3, the neutral versions of each psychotic symptom were

all rated in approximately the same fashion.

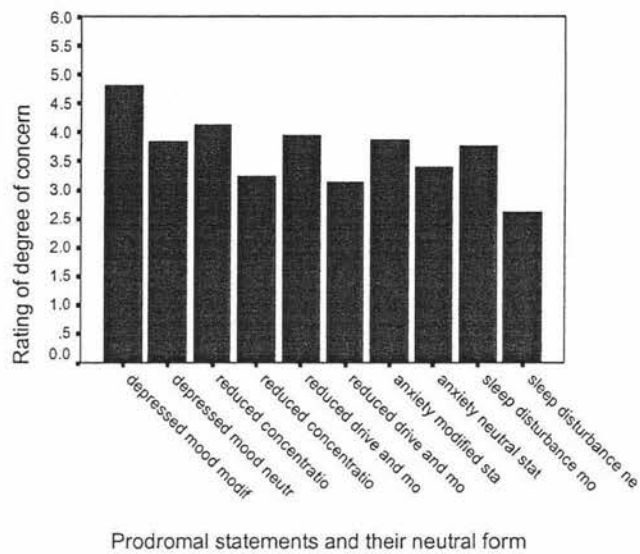Psychotic statements and their neutral form
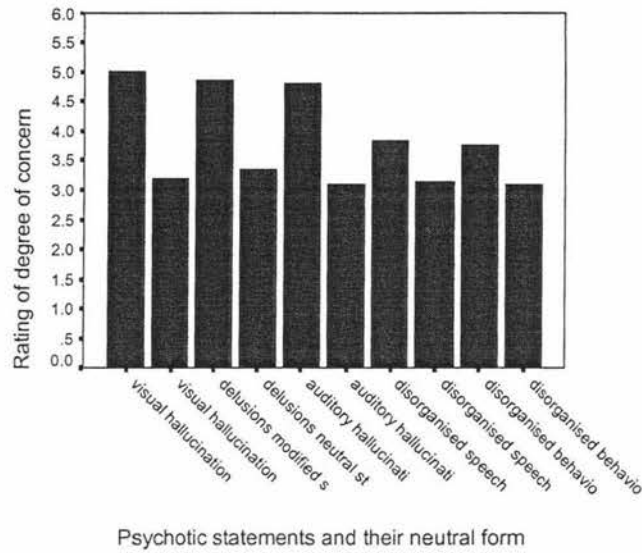
Figure 3. Mean concern ratings for the five modified psychotic symptom statements and their neutral form (modified psychotic symptom followed by the neutral form).

Within the prodromal group of modified statements, depressed mood was rated as most concerning of the five prodromal signs ($M = 4.79$, $SD = .97$), followed by reduced concentration ($M = 4.13$, $SD = .89$), reduced drive and motivation ($M = 3.94$, $SD = .91$), anxiety ($M = 3.86$, $SD = .82$) and sleep disturbance ($M = 3.7$, $SD = 1.03$). These are depicted in Figure 4. The neutral forms of the prodromal symptoms were rated as being of greater concern than the neutral forms of psychotic symptoms, and also showed greater variability with the neutral stem for depression being rated as more concerning than the neutral stem for sleep disturbance.

Figure 4. Mean concern ratings for the five modified prodromal sign statements and their neutral form (modified prodromal symptom followed by the neutral form).

For each of the 10 symptoms, prodromal and psychotic, the participants rated the neutral statements as less concerning than the symptom statement, with each difference being statistically significant using paired sample t tests.

With regard to the type of modifier that generated the statement as a symptom, those that were high in frequency were reported as most concerning ($M = 4.33$, $SD = .72$), followed by change ($M = 4.29$, $SD = .74$), lack of obvious cause ($M = 4.25$, $SD = .70$) and rare in youth ($M = 4.21$, $SD = .74$), as depicted in Figure 5. An analysis of variance using Wilks' Lambda (which can vary from 0 to 1, with 0 meaning group means differ, and 1 meaning all group means are the same), revealed a statistically significant difference between these means, Wilks' Lambda $=.93$, $F(3, 114) = 2.75$, $p < .05$ multivariate eta squared $= .07$. Significant differences are found specifically with lack of obvious cause and high in frequency modifiers $t(116) = -2.03$, $p < .05$, and between rare in youth and high in frequency modifiers $t(116) = -2.37$, $p < .02$.
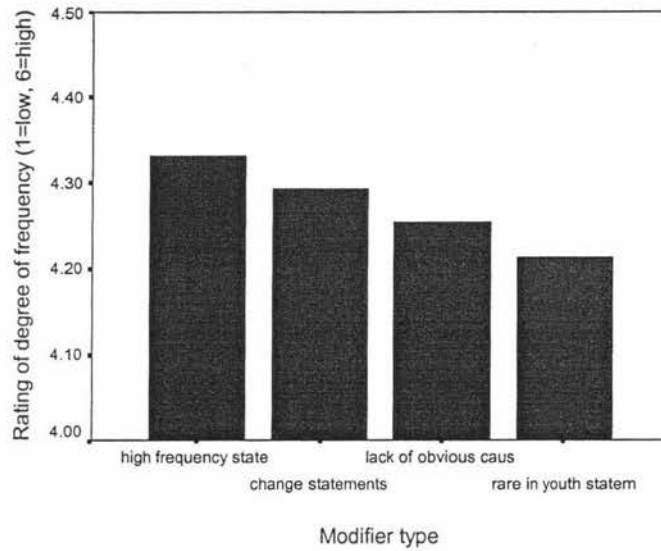
Figure 5. Mean concern ratings for type of modifier that generated the statement as a

symptom.

Signal Detection Analysis

In SDT, d' is a measure of discrimination. It tells us how well the 40 prodromal

and psychotic (modified) statements could be discriminated from the 40 neutral

statements. A d' of 0 means no discrimination. The larger d', the better the

discrimination. A negative d' indicates that the false alarm rate is greater than the hit

rate. The distribution of d' for 115 participants is depicted in Figure 6 ($M = 0.97$, $SD =$

0.57). Two participants were eliminated from the signal detection analysis as their

results implied that they did not complete the questionnaire according to instructions.
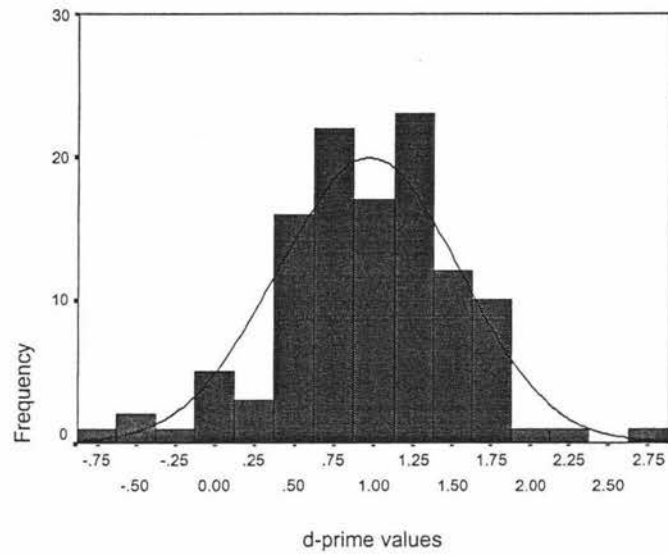
Figure 6. Distribution of *d'* for participants.

In SDT, *c* is a measure of bias. When *c* equals 0, false alarm and miss rates are equal. Negative values or *c* indicate a lax decision criterion; participants are biased to responding "yes". Positive values indicate a strict decision criterion; participants are biased to responding "no". The distribution of *c* for 115 participants is depicted in Figure 7 (*M* = -.23, *SD* = .51), the average bias was very small, being close to 0.
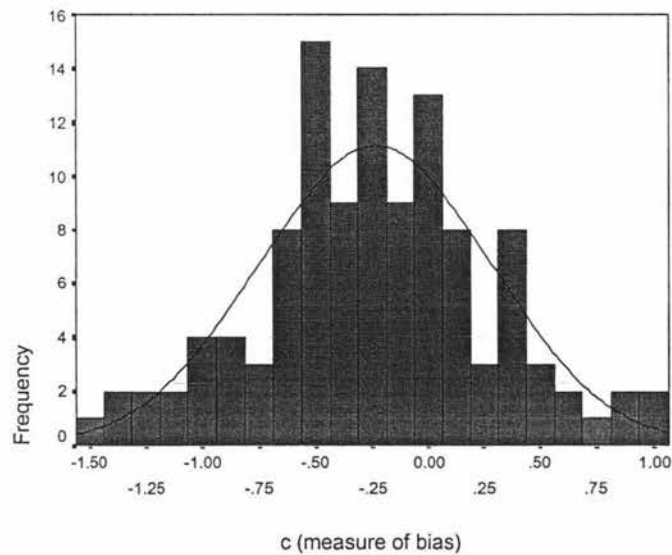

Figure 7. Distribution of *c* measure of bias for participants.

The relationship between d' and c was investigated using the Pearson product-moment correlation coefficient. There was an extremely small negative correlation between the variables which was not significant. This suggests that the d' measure of detectability was relatively independent of response bias, as SDT would predict.

Differences between the variables of age, gender and ethnicity of participants with mean d' were investigated using independent-samples t tests. A statistically significant difference between gender and d' was found, $t(113) = -2.03, p < .05$. Females have a greater d' ($M = 1.11, SD = .65, n = 41$) compared to males ($M = .89, SD = .52, n = 74$) indicating that within this sample, females are able to discriminate better than males. No significant differences were found between age (13, 14 & 15+ years) and d' or between ethnicity (New Zealand Maori, New Zealand European & other) and d'.

The measure of discrimination, d', was calculated for prodromal signs (20 statements) with the 40 neutral statements and for psychotic symptoms (20 statements) with the 40 neutral statements. The distribution of d' for prodromal signs is shown in Figure 8 ($M = .89, SD = .66, n = 113$), 4 participants were deleted as they scored a d' of infinity. The distribution of d' for psychotic symptoms is depicted in Figure 9 ($M = 1.04, SD = .62, n = 109$), 8 participants being deleted as they scored a d' of infinity. The difference between the mean d' value for prodromal signs and the mean d' value for psychotic symptoms was significant, $t(106) = -3.09, p < .003$, indicating that participants were able to discriminate psychotic symptoms more effectively than prodromal signs.
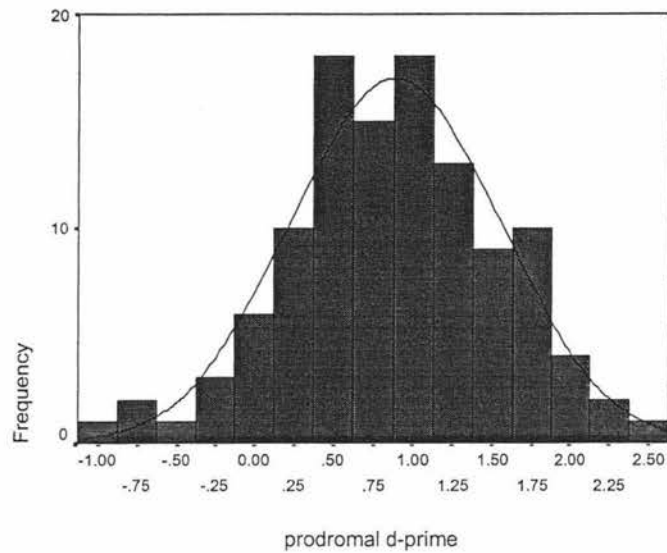
Figure 8. Distribution of *d'* for prodromal signs.
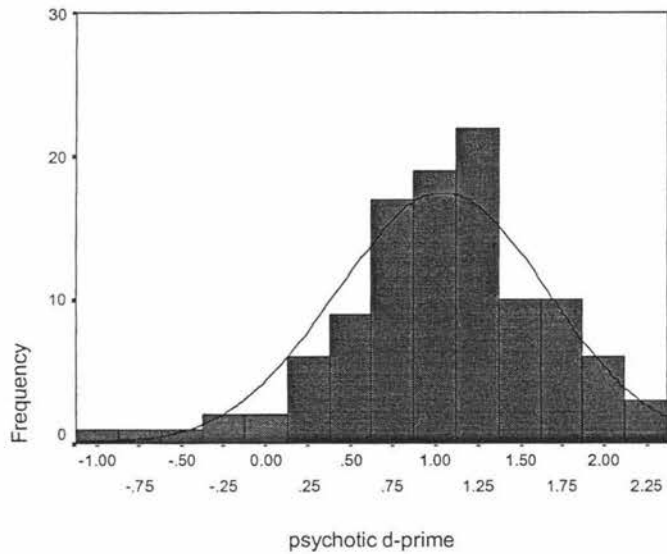

Figure 9. Distribution of *d'* for psychotic symptoms.

With regard to the four modifier types which generated the statement as a symptom (10 statements each), *d'* was also calculated for these, with the 40 neutral statements. The distribution of *d'* is shown in Figures 10, 11, 12 and 13 with change having the highest mean value of .92 (*SD* = .62, *n* = 95), followed by high in frequency (*M* = .88, *SD* = .56, *n* = 96), lack of obvious cause (*M* = .85, *SD* = .65, *n* = 98) and rare in youth (*M* = .80, *SD* = .65, *n* = 102). Analysis of variance shows no significant difference between the modifier types.
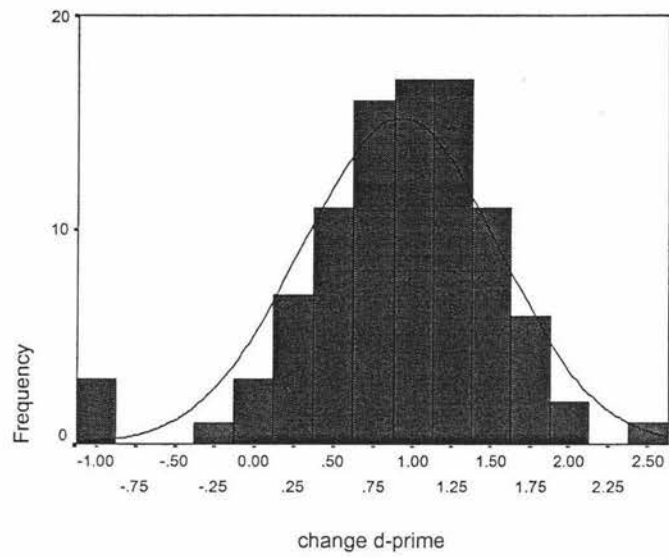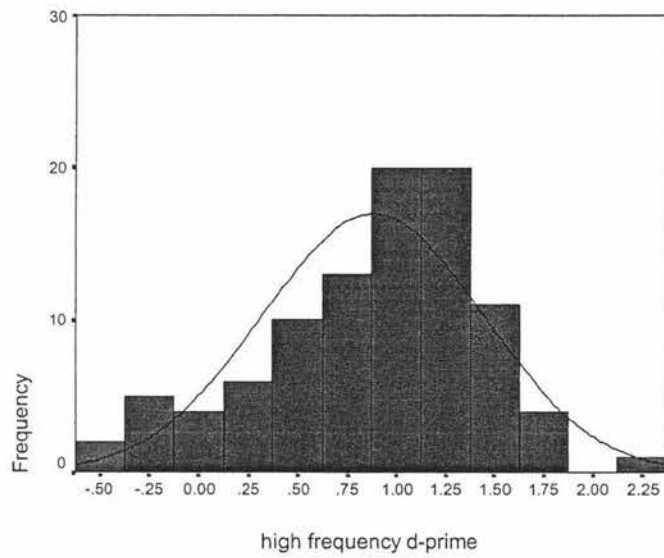
Figure 10. Distribution of *d'* for change.

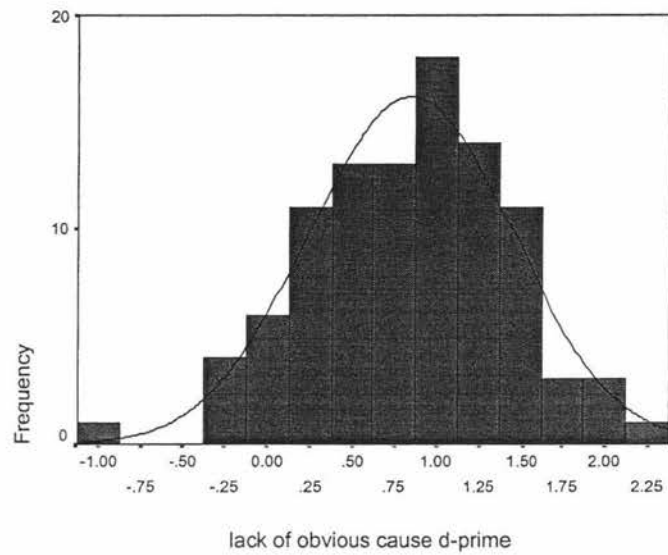*Figure 11.* Distribution of *d'* for high frequency.

lack of obvious cause d-prime

Figure 12. Distribution of *d'* for lack of obvious cause.
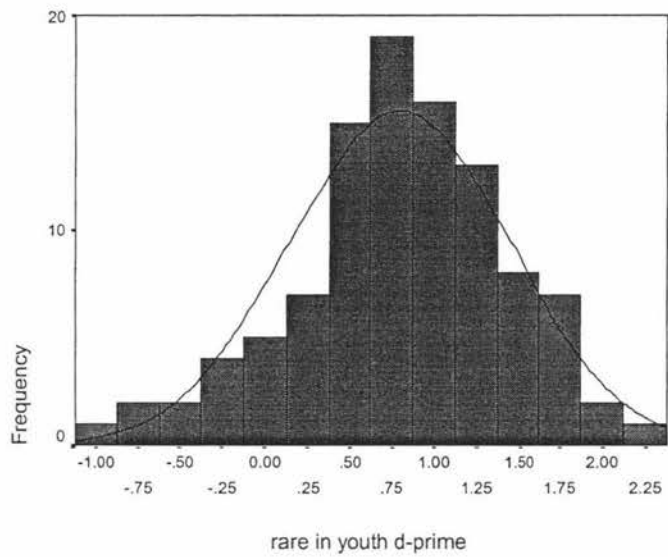

rare in youth d-prime

Figure 13. Distribution of *d'* for rare in youth.

Open Ended Questions

The most important quality in a friend was reported to be trust (13.66%),

followed by honesty (12.02%), fun and humour (10.38%), and loyalty (9.84%), as
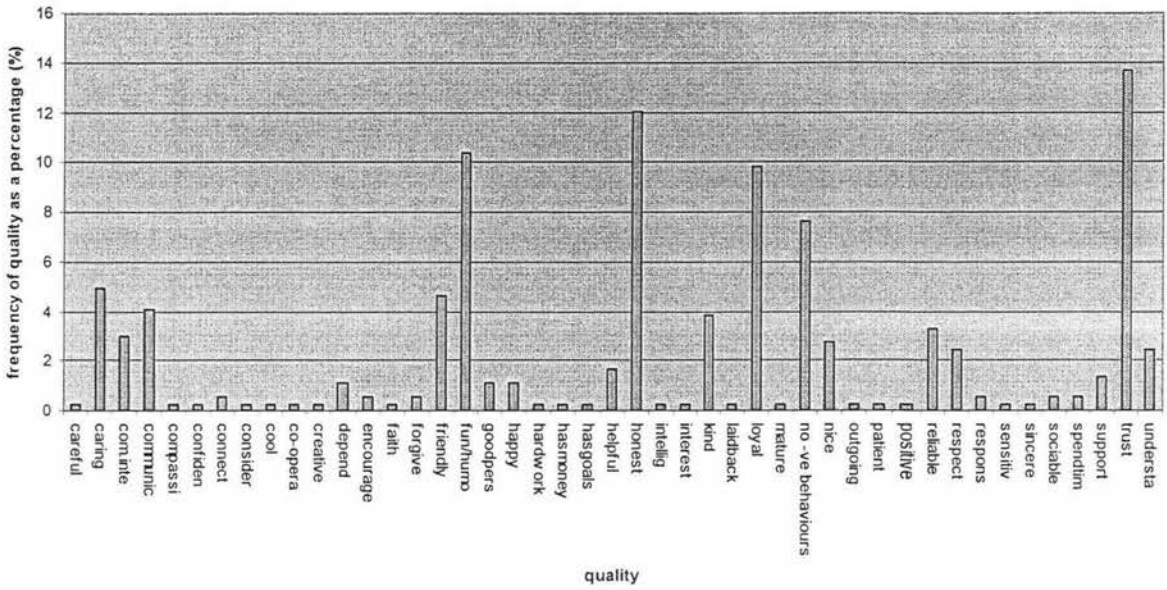
illustrated in Figure 14.

Figure 14. The most important qualities in a friend.

Most participants reported they would tell an adult if they were concerned about a

friend's behaviour (29.03%), followed by trying to help the friend themselves (20.65%),

talking to the friend (18.71%) and seeking professional help (12.9%), as depicted in
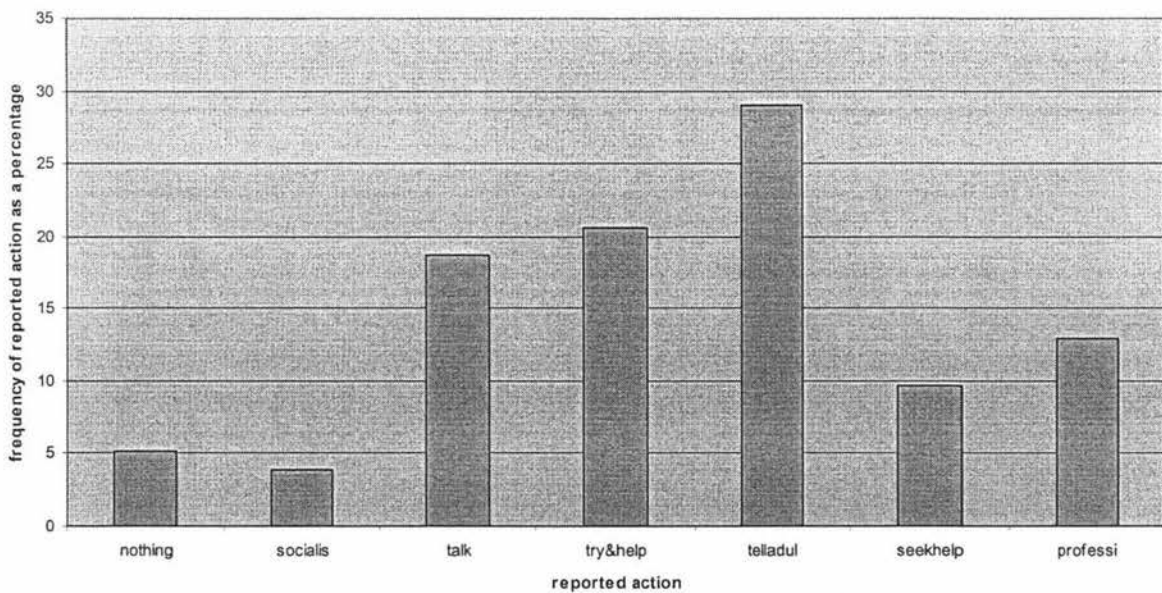
Figure 15.

Figure 15. Reported action if concern expressed.

The relationship between the overall d' and the reported action if concern was expressed, using the 8-point scale, was investigated using a Pearson product-moment correlation coefficient. There was a small positive correlation between the variables ($r = .29$, $n = 115$, $p < .01$), which was statistically significant. This suggests that some of those participants who were able to discriminate well between statements would also pursue appropriate action if they were concerned about their friend.