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School Of Psychology

THE ROLE OF COGNITIVE FUNCTIONING WITHIN THE HOMELESS POPULATION

by

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ABSTRACT

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Noreen Dowling

Few studies have investigated cognitive functioning within the homeless population but it has been recognised as a significant difficulty within this group. A review of the literature considered studies that investigated the different components of cognitive functioning and their prevalence with the homeless population. The potential factors that may have contributed to the cognitive dysfunction were then discussed. Though associations were not found in many areas, the complexity of this population is highlighted and the need for more comprehensive method of compiling this data is discussed. The influence of the different types of cognitive impairment is then considered and discussed with regard to clinical implications.

Prevalence of childhood abuse, executive functioning difficulties and problem behaviours are high within the homeless population. The relationship between childhood abuse and problem behaviours has been found in a number of previous studies but the mediating effect of executive functioning has not so far been investigated. The empirical paper used a cross-sectional design with a sample of 83 participants recruited from homeless shelters in Southampton to investigate these relationships using self-report questionnaires and psychometrics to assess IQ and executive functioning. Results showed that this population showed scores of IQ and executive functioning that fell below the general population. Bootstrapping methodology suggested that a measure of impulsivity mediated the relationship between childhood abuse and problems behaviours. Further analysis also found associations between some of the subscales of the measures. These findings support the importance of considering these impairments when planning interventions for these population and also assessing interventions targeting these deficits within this group.

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DECLARATION OF AUTHORSHIP

I, Noreen Dowling, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

THE ROLE OF COGNITIVE FUNCTIONING WITHIN THE HOMELESS POPULATION

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed: .....

Date:.....

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Chapter 1

Literature Review

A review of the cognitive deficits found within the homeless population and factors associated with these deficits

Introduction

Homelessness

Homelessness has been defined as the inability to remain in regular housing when housing is desired (Vacha & Marin, 1993). The population as defined within the The Homelessness Monitor (Fitzpatrick et al, 2013) include those people who are sleeping rough or 'roofless', those living within hostels, shelters or temporary supported living and people regarded as the 'hidden homeless' such as those 'sofa surfing' with friends or relatives, squatting, people living within severely overcrowded conditions or those sleeping rough in hidden locations. All of these circumstances make homelessness a difficult issue to assess in terms of its scale and trends occurring. However due to research being conducted in the area, it is clear that homelessness is a growing difficulty the United Kingdom (UK). Figures released in the Homelessness Monitor estimated that approximately 2,414 people sleep rough in England on any one night which demonstrated a rise of 36% since 2010. Given the nature of this group however, the actual number is very likely to be much higher. In 2012, 113,260 people in England told their councils that they were homeless, representing an 11% increase since 2010 (Wilson, 2013). Considering the increasing number of homeless people in the England, the number of bed spaces in hostels has actually been reduced by 4,000 beds since 2010.

Numerous factors have been found to contribute to individuals becoming and remaining homeless in the UK. It has implications for both the individual involved and society as a whole. The homeless population in general has been found to have poorer physical and mental health than the general population (Fitzpatrick, Kemp & Klinker, 2000). The rates of mental health difficulties, drug and alcohol abuse and risk of suicide have also been identified as higher in this population (Shelton, Taylor, Bonner & Van den Bree, 2009).

Government initiatives have been put in place with the aim of reducing homelessness in the UK but a lack of understanding of the underlying issues makes this difficult to achieve. Insufficient studies have been completed which investigate the factors associated with the breakdown of housing and the factors maintaining homelessness. To date, it has been found that some of the contributing factors to a person becoming and remaining homeless are socio-economic difficulties and substance addiction. The

majority of the studies in the area focus on the socio-economic and practical factors which contribute to homelessness but fewer studies have investigated the psychological factors that contribute to homelessness. However several factors related to childhood adversity were found to be highly related to homelessness (Shelton, Taylor, Bonner & Van den Bree, 2009). Among these factors is cognitive functioning.

Cognitive Functioning

The term cognitive functioning is an inclusive term which encompasses a number of cognitive processes including global intellectual performance, verbal and visual memory, executive functioning, attention, speed of processing, spatial processing and general intellectual ability. There are numerous factors that can cause deficits in any of these areas including congenital disorders or environmental factors that occur later in life, such as acquired or traumatic brain injuries (ABI/TBI), neurological disorders, degenerative disorders and mental illness to name a few.

The main areas of focus for this paper will be to investigate global intellectual ability, executive functioning, attention and memory within the homeless population.

Intellectual Ability. Intellectual ability refers to a person's general level of intellectual functioning (Gurd, Kischka, & Marshall, 2010). This is measured using neuropsychological tests, most frequently the Wechsler Adult Intelligence Scale (WAIS; Wechsler, D, 2008) which is now in its fourth version. This measure is commonly conducted in order to achieve a baseline measure of IQ in the case of a diagnosis of a neurological condition, to access whether any deterioration has occurred or to highlight any areas of deficits or strengths which may impact on daily functioning. The causes of deficits in intellectual ability are extensive and can occur throughout the lifespan. For example, associations have frequently been found between low socio-economic status and low intellectual ability (Croizet & Claire, 1998). IQ is one of the measures used to assess for intellectual disability.

Executive Functioning. Executive Functioning is defined by Gurd et al. (2010, p. 25.) as 'the ability to plan and problem-solve, self-monitor and regulate behavior'. These different abilities form the basis of a number of cognitive, emotional and social skills that play a very important part in executing many daily activities and tasks like

adapting to new situations and monitoring behaviour in order to be socially appropriate. Executive functioning is often measured with both neuropsychological tests and practical assessments. Within this population, some of the most frequently used measures of executive functioning are the Wisconsin Card Sorting Test (Heaton, 1981) and Trail making A & B (AITB, 1944).

Attention and Memory. Attention is a term used interchangeably with concentration to refer to the ability to sustain focus on a set piece of stimulus and also the ability to maintain that focus for a prolonged period of time. The memory discussed within this paper will mainly refer to immediate and delayed memory and visual and verbal memory as assessed through measures like the Wechsler Memory Scale (WMS; Wechsler, 2009).

Cognitive Functioning in the Homeless Population

Currently whilst some studies have investigated the cognitive profiles of this population, little information is known of the causes of the deficits found. It is extremely important to understand the cognitive deficits that are present within the homeless population in order to understand the effect that these deficits can have on a person's functioning and how programmes to support them, need to be adapted to account for these deficits. This review will endeavour to outline the cognitive difficulties found in this area and present evidence on potential causes that have been found to be associated with such difficulties.

Aim of the Review

To date, the focus of the research within the homeless population has been on medical, psychiatric and socio-economic factors that have been found to contribute to the pathways to homeless (Solliday-McRoy, Campbell, Melchert, Young & Cisler, 2004). However, less is known of the cognitive functioning of this population and the factors that contribute to cognitive deficits within this group. Two previous papers have performed systematic reviews of the literature outlining the cognitive profiles of the homeless population (Burra, Stergiopoulos, & Rourke, 2009; Spence, Stevens, & Parks, 2004). The aim of this paper is to therefore complete a systematic review of the literature updating the previous papers which investigate the cognitive profile of the

homeless population and which also investigates possible factors associated with cognitive difficulties in this population.

This paper will focus on the studies that have outlined cognitive assessments that have been completed within this population who also have collected background information that provides information on possible associations with cognitive profiles. Additionally this paper aims to identify areas in the literature that need further investigation and finally consider clinical implications of the findings for this population.

Search Strategy

The review paper by Spence, Stevens and Parks (2004) was used as a reference point as they had also identified papers that discussed cognitive functioning in the homeless population. A systematic search was then conducted aiming to identify studies that conducted neuropsychological assessments with the homeless population and also collected supplementary information that showed associations with performance on neuropsychological testing. A systematic search of the online bibliographic databases Psychinfo, Medline and Embase was performed using the following search parameters: 'Homeless' OR 'Homeless Persons' AND 'Cognitive Impairment' OR 'Cognitive Ability' OR 'Cognitive Assessment' OR 'Cognitive Defect' OR 'Memory' OR 'Intelligence' OR 'Intelligence Measures' OR 'Intelligence Quotient' OR 'Neuropsychological Assessment' OR 'Neuropsychology' OR 'Cognitive Disorder' OR 'Psychometrics' OR 'Executive Functioning' OR 'Attention'. Reference lists of the identified studies were thenused as a basis for further searches for any papers that also met the inclusion criteria. This search produced a total of 201 papers which were published between 1994 and 2014. It was decided to use these dates as the majority of good quality papers that reported standardised measures were published after 1994.

Inclusion and Exclusion Criteria

Papers were included if they were in English language, the sample group were single adults aged over 18 years of age and included if they within the paper sufficient detail of the neuropsychological testing that it could be included in this review. Papers were excluded if they focused on mother and child samples. To ensure the quality of the review, only papers that were peer-reviewed were included. It was also decided to

include papers after 1994 to cover the most pertinent psychometrics. A total of 23 papers were deemed to be suitable using these criteria. The selection process is detailed in Figure 1.

Figure 1 Flow Chart of Study Selection Process

Table 1. List of Studies Reviewed

Study Authors and Location	**Sample size**	**Settings of recruitment**	**Sampling methodology**	**Cognitive assessments used**	**Other psychometrics administered**	**Key findings**
Bousman, C. A., Twamley, E. W., Vella, L., Gale, M., Norman, S. B., Judd, P., . . . Heaton, R. K. (2010) San, Diego, California, USA	72	Psychiatric outpatients services and substance use disorder treatment service within Psychiatric Service	Selected from larger study cohort to obtain comparable groups for gender, age and ethnicity.	Processing speed, digit span and symbol search from WAIS-III, WCST, Verbal Fluency (FAS).	Symptom Checklist-90-Revised	High prevalence of neuropsychological impairment but little evidence of differences found when control matched for psychiatric conditions.
Bremner, A. J., Duke, P. J., Nelson, H. E., Pantelis, C., & Barnes, T. R. E. (1996) London, UK	80	Homeless hostel	Consecutive entrants to homeless Hostel	NART, Raven's Progressive Matrices converted to WAIS-R IQ equivalents.		Estimated premorbid IQ, current IQ and processing speed were all significantly lower than the norm. Low IQ is a risk factor for homelessness.
Brown, R. T., Kiely, D. K., Bharel, M., & Mitchell, S. L. (2011) Boston, Massachusetts, USA	247	Homeless Shelters	Opportunity samples	MMSE, Trails B	Patient Health Questionnaire, Addiction Severity Index, Katz Activities of Daily Living Scale, Brief Instrumental Functioning Scale	Geriatric Syndromes including cognitive impairment are found to present at a much higher rate than in the general population.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Brown, R. T., Kiely, D. K., Bharel, M., & Mitchell, S. L. (2013) Boston, Massachusetts, USA	250	Homeless Shelters	Systematic Random Sampling	MMSE, Trails B	Patient Health Questionnaire, Addiction Severity Index, Katz Activities of Daily Living Scale, Brief Instrumental Functioning Scale, The International Consultation on Incontinence Questionnaire.	A high number of geriatric syndromes, including cognitive impairment, were identified as being associated with lower school education, alcohol and drug use and difficulties with ADLs.
Cotman, A. & Sandman, C. (1997) Orange County, Florida, USA	24	Residential New Life Programme	Opportunity sampled	WAIS-R, Test of Variables of Attention, Subscale of WMS, California Verbal Learning Test, Benton Visual Retention Test	THINKable baseline programme	This sample showed lower than average IQ and higher levels of attention and memory problems than found in the general population.
Douyon, R., Guzman, P., Romain, G., Ireland, S. J., Mendoza, L., Lopez-Blanco, M., & Milanes, F. (1998) Miami, Florida USA	33	Inpatient Units of the Psychiatric Service at the Miami Veterans Affairs Medical Centre	Selected through consecutive admissions to the unit.	Quantified Neurological Scale	Homeless Questionnaire, Brief Psychiatric Rating Scale, HIV High Risk Rating Scale	Homeless subjects showed greater levels of neurological deficits than non-homeless control group.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Fichter, M. M., & Quadflieg, N. (2001) Munich, Germany	265	Homeless shelters, street dwellers and service users of meal services and counselling services.	Randomly selected	MMSE	Structured Clinical Interview for DSM-IV (SCID)	Prevalence of SCID axis 1 disorders was 73.4% within homeless males which was 2.4 times more likely than the control group. 9.9% were found to have cognitive impairment.
Fichter, M. M., Koniarczyk, M., Greifenhagen, A., & Koegel, P. (1996) Munich, Germany	146	Homeless Shelter, meal Services, Street Homeless	Randomly sampled	MMSE	Diagnostic Interview Schedule	94.5% of this sample met the criteria for at least one DSM-III axis 1 diagnosis.
Gilchrist, G., & Morrison, D. S. (2005) Glasgow, UK	226	Homeless Hostels	Systematic sample of new residents	ACE	Fast Alcohol Screening Test, Leeds Dependence Questionnaire, CAGE questionnaire	More than 88% of this sample were found to show cognitive impairment. The prevalence of alcohol related brain damage was 21%.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Gonzalez, E. A., Dieter, J. N., Natale, R. A., & Tanner, S. L. (2001) Miami, Florida, USA	60	Persons attending a homeless health care centre	Referred by Staff physicians.	MMSE, Aphasia Screening Test, WAIS-R, Trails A & B, Abbreviated Halstead-Reitan Impairment Index		Large number of homeless people in this sample were found to be cognitively impaired.
Joyce, D. P., & Limbos, M. (2009) Toronto, Canada	49	Community based Shelter	Opportunity Sampled of all men over 55 years	MMSE	15 item Geriatric Depression Scale	37.9% of participants assessed showed cognitive impairment and 11 of these had not been previously identified. Brief screening tools may be useful in assessing this high risk group.
Mercier, C., & Picard, S. (2011) Montreal, Canada	68	Teams dedicated to facilitating homeless access to health and social services	Persons identified as needing specialised support and rehabilitation for LD by the homeless team.	Measure of Adaptive behaviour	Hayes Ability Screening Test	Below average IQ was identified as a risk factors for homelessness and a predisposing factor for vulnerability amongst the homeless population

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Muñoz, M., Vázquez, C., Koegel, P., Sanz, J., & Burnam, M. A. (1998) Madrid, Spain & Los Angeles, USA	262 in Madrid, 1563 in LA	Homeless Shelters, Soup kitchens and social Service centre	Randomly selected from homeless services	MMSE	Composite International Diagnostic Interview	The sample from Madrid showed higher levels of cognitive impairment comapred to LA sample. Most participants from both groups reported onset of mental illness before becoming homeless.
Oakes, P. M., & Davies, R. C. (2008) Hull, UK	50	General Practitioner Surgeries	Random sampling	WASI, ABAS		Homeless people are significantly more likely to have an intellectual disability than a member of the general population.
Pluck, G., Lee, K. H., David, R., Macleod, D. C., Spence, S. A., & Parks, R. W. 2011 Sheffield UK	55	homeless Hostels	Recommended by Hostel staff	Frontal Systems Behaviour Scale, WASI	Childhood Trauma Questionnaire, Severity of Dependence Scale	This population showed low levels of IQ and high levels of neurobehavioural impairment. Childhood trauma contributes to these factors.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Pluck, G., Lee, K.-H., David, R., Spence, S. A., & Parks, R. W. (2012) Sheffield, UK	80	Homeless hostels, Day centres and meal services.	Recommended by Hostel staff	WTAR, WASI, WMS	Personality Assessment Screener	This sample showed a reduction in IQ between premorbid and current IQ. Current IQ and memory scores were significantly lower than the normative population means.
Raphael-Greenfield, E. (2012) New York, USA	60	Supported Living Programme	Sample of convenience from one shelter through random selection	Executive Function Performance Test	Global Assessment of Functioning	High levels of cognitive impairment were found. Those who had completed a supported living programme preformed better on measures of executive functioning.
Schutt, R. K., Seidman, L. J., Caplan, B., Martsinkiv, A., & Goldfinger, S. M. (2007) Boston, USA	112	Department of Mental Health Shelters	Opportunity Sampled	WCST, Logical Memory from WMS, Auditory Continuous performance Test.	Life Skills Profile	Executive Functioning, Verbal declarative memory and Vigilance all predicted community functioning.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Seidman, L. J., Caplan, B. B., Tolomiczenko, G. S., Turner, W. M., Penk, W. E., Schutt, R. K., & Goldfinger, S. M. (1997) Boston, Massachusetts, USA	116	Department of Mental Health Shelters	Opportunity Sampled	WAIS-R, WMS-R, Auditory Continuous Performance Test, WRAT-R, Visual-Verbal Test, WCST, Porteus Mazes, Vineland revision	Structured Clinical Interview for DSM-IV (SCID), Global Assessment Score	Neuropsychological performance is impaired within this population of homeless people with severe and enduring mental illness.
Seidman, L. J., Schutt, R. K., Caplan, B., Tolomiczenko, G. S., Turner, W. M., & Goldfinger, S. M. (2003). Boston, Massachusetts, USA	112	Homeless Hostels	Opportunity sampled	WAIS-R, WRAT-R, WCST, Porteus Mazes Test, Benton Line Orientation Test, Verbal-Visual Test, WMS-R Motor Sequencing		After housing intervention between independent housing or supported living, those in supported living showed improvement in cognitive functioning.
Solliday-McRoy, C., Campbell, T. C., Melchert, T. P., Young, T. J., & Cisler, R. A. (2004) Milwaukee, Wisconsin, USA	90	homeless Hostel	Opportunity Sampled	Neurobehavioural Cognitive Status Examination, WASI, Digit Span from WAIS-III, Rey Auditory Verbal Learning Test, Rey-Osterrieth Complex Figure Test, Letter Work Identification and Passage Comprehension subtests of the Woodcock Johnson Battery		80% of this sample showed cognitive impairment. Mean IQ and reading abilities were lower than the normative means. Impairments in verbal learning, memory and attention were high.

Study Authors and Location	Sample size	Settings of recruitment	Sampling methodology	Cognitive assessments used	Other psychometrics administered	Key findings
Stergiopoulos, V., Burra, T., Rourke, S., & Hwang, S. (2011) Toronto, Canada	30	Psychiatric Inpatient Unit	All patients who entered the unit who met the diagnostic criteria for schizophrenia or schizoeffective disorder	NART, Letter-number sequencing, spatial span and digit symbol-coding from WAIS-III, Hopkins Verbal Learning Test, Trail A&B, WCST	Brief Psychiatric Rating Scale, Alcohol Use Disorders Identification Test, Drug Abuse Screening Test, Patients Assessment of Own Functioning Inventory, University of California- San Diego performance-based skills assessment.	Cognitive status and housing status were independent predictors of functional capacity. No significant differences between housed and homeless participants on neuropsychological testing.
Teesson, M., & Buhrich, N. (1993) Sydney, Australia	204	homeless Hostels	Randomly selected from seven hostels	MMSE	Composite International Diagnostic Interview 2.0	20% of participants showed cognitive impairment on the MMSE

Results

The cognitive testing conducted with this population is extremely varied, uses a number of different neuropsychological tests, number of participants and sampling methodology. The studies below are initially grouped on the basis of cognitive domains in the general homeless population; global cognitive functioning, IQ, executive functioning, attention and processing speed, memory and executive functioning. Following this, causal factors and their associated difficulties will then be discussed. These included mental illness, substance abuse, traumatic brain injury, intellectual disability, child abuse and geriatric syndromes.

Global Cognitive Functioning

The majority of studies that investigated global cognitive ability used the Mini-Mental State Examination (MMSE; Folstein, Folstein & McHugh, 1975). The MMSE is a 30 item measure that accesses orientation, immediate and short-term memory, attention, and calculation and visuo-construction skills. It is a brief screening measure which is most frequently used in the assessment of dementia and has a clinical cut-off of 24 any score below is seen as impaired. Scores below 17 indicate severe impairment.

Of the studies, eight used the MMSE as a measure of cognitive impairment. Within these homeless samples, four studies found that between 2% and 10% of the population assessed were impaired on the MMSE (Buhrich, Hodder, & Teesson, 2000; Fichter, Koniarczyk, Greifenhagen, & Koegel, 1996; Fichter & Quadflieg, 2001; Muñoz, Vázquez, Koegel, Sanz, & Burnam, 1998), one study found the 35% of the population was impaired (Gonzalez, Dieter, Natale, & Tanner, 2001). Three of the studies looked at the older population (>50 years) within this group and found between 24.3 and 37.9% to be impaired (Brown, Kiely, Bharel, & Mitchell, 2012a, 2012b; Joyce & Limbos, 2009). Brown et al.(2011) found that the older (>50 years) homeless population scored significantly worse than a population based housed cohort. Munoz et al. (1998) tested two homeless in Madrid, Spain and Los Angeles, USA and compared their MMSE scores. They found that the prevalence of cognitive impairment in Madrid (6.3%) was significantly greater than that in Los Angeles (2.4%). The authors suggest that this difference is due to the differences in the sample. The Madrid population was older and less well educated that the Los Angeles population. This finding of cognitive

impairment in the Los Angeles population was the lowest reported percentage of all the papers found.

Some less frequently used measure were also reported in individual papers. Douyon et al. (1998) used the Quantified Neurological Scale (QNS; Joe de Asis & Evangelista, 1994) which is used to detect neurological impairment. The authors compared three groups; a control group and two homeless groups (acutely homeless and chronically homeless). It was found that the control group scored significantly better than the two homeless groups on this measure. A significant correlation between neurological impairment and levels of hostility was also found.

A third measure used to measure cognitive functioning within this population is the Neurobehavioral Cognitive Status Examination (Cognistat; Kiernan, 1995). On this measure, if any one of the ten subtest scores falls below the average range of performance, the overall performance is seen as impaired. Solliday-McRoy, Campbell, Melchert, Young, & Cisler (2004) tested 90 homeless men in Milwaukee, Wisconsin and found that 80% of their population was found to have impaired cognitive functioning (impaired on one subtest) and that the most likely subtest that was impaired was memory (64%). This study also reported that length of loss of consciousness after a TBI was not found to be correlated with any of the neuropsychological measures performed.

Similar to the previous study, the Addenbrookes Cognitive Examination (ACE; Mathuranath, Nestor, Berrios, Rakowicz & Hodges, 2000) was conducted with 266 homeless participants in Glasgow, Scotland (Gilchrist & Morrison, 2005). On this measure, a score less than 88 indicates cognitive impairment. Eight-two percent of this population was found to be cognitively impaired according to the ACE.

Intelligence Quotient (IQ)

Eight of the studies considered, used a measure of IQ and two of these papers also included a pre-morbid measure (Cotman & Sandman, 1997; Gonzalez, Dieter, Natale, & Tanner, 2001; Oakes & Davies, 2008, Pluck, Lee, David, Macleod, Spence & Parks, 2011; Pluck, Lee, David, Spence, & Parks, 2012; Seidman, Caplan, Tolomiczenko, Turner, W. M., Penk, W. E., Schutt, R. K., & Goldfinger, S. M. (1997) Seidman, L. J., Schutt, Caplan, Tolomiczenko, Turner, & Goldfinger, 2003; Solliday-McRoy,

Campbell, Melchert, Young, & Cisler, 2004). All of the studies used either the Wechsler Abbreviated Scale of intelligence (WASI) or the Wechsler Adult Intelligence Scale-Revised (WAIS-R). Of the three papers that measured IQ using the WASI, the mean IQ scores for the population was found to fall between 83.6 and 89.4. An IQ score falling between 82.7 and 91.9 was found for the five studies that used the WAIS-R. As the mean score within the general population for both the WASI and the WAIS-R is 100 with a standard deviation of 15, all of these scores fell below this score. The WAIS-R and WASI suggest that a score between 85-115 falls within the average range. Although some of these mean scores still fell within the average, two of the studies (Pluck, Lee, David, Spence, & Parks, 2012; G. Pluck et al., 2011) completed analysis of their scores against the general population mean. They found that the homeless population mean was significantly lower than the general population mean. A further two studies used the National Adult Reading Test (NART; Nelson, 1982)) and the Wechsler Test of Adult Reading to gain a estimated measure of premorbid intelligence (Bremner, Duke, Nelson, Pantelis, & Barnes, 1996; Pluck et al., 2012). With these scores, they found that in comparison to premorbid scores, current IQ scores of participants were significantly lower than their estimated premorbid scores. Interestingly, though both studies found a significant drop in IQ, there was not a significant correlation between duration of homelessness and the drop in IQ scores.

Executive Functioning

Seidman et a.l (2003) assessed the executive functioning of 112 participants from homeless hostels in Boston using the Wisconsin Card Sorting Task (WCST). Participants within this study also had a severe and enduring mental illness. They investigated the effect of types of housing on executive functioning comparing those living in group homes to those with independent apartments. It was found that participants who were assigned to independent apartment showed a significant decrease in scores on the WCST while those in group housing showed a slight increase. Authors concluded the importance of neuropsychological assessment within this population when determining housing options for this population. However they concluded that the population still continued to show significant impairments in executive functioning even with housing intervention.

A second paper by Seidman et al (1997) using the same sample group and also assessed substance abuse found that participants were markedly perseverative as measured through the perseveration score on the WCST. They also found that psychosis ratings were strongly correlated with the number of categories achieved on the WCST and concluded that acute psychosis significantly impairs executive functioning. Seidman et al. (1997) also conducted the Visual-Verbal Test (VVT; Feldman & Drasgow, 1960) to assess conceptual-reasoning and found it to be severely limited as compared to the normal control subjects. However Bousman et al. (2010) also used the WCST to compare never homeless to homeless participants where both groups were presenting to a psychiatric outpatient centre for mental illness or substance abuse. Although both groups were impaired on WCST, the homeless group were nearly significantly worse. Authors suggest that this result indicates that the executive impairment is independently associated with homelessness regardless of psychiatric diagnosis or substance abuse. Using the WCST, Schutt et al. (2007)'s findings suggested that poorer executive functioning significantly predicted poorer self-care and more turbulent behaviour.

The Frontal Systems Behaviour Scale (FrSBe; Grace & Malloy, 2001) was used by Pluck et al (2011) to measure neurobehavioural traits including apathy, disinhibition and executive dysfunction with a sample of 55 participants in from both homeless hostels and meal services in Sheffield, UK. The FrSBe is a self-rating assessment that can be used to also assess behaviours at a given point retrospectively. Pluck et al found that the mean scores for all parts of the FrSBe were significantly raised in comparison to the normative mean score. This measure was completed retrospectively to calculate pre-homelessness scores and no significant differences were found.

Brown, Keily, Bharel and Mitchell (2013) investigated executive functioning in participants aged 50-69 in Boston, USA using the Trails B measure. On trails B, increasing time is seen to indicate poorer function and the average normative score being 79 seconds. This measure is a measure of task-switching, a component of executive functioning. In this study, it was found that 28.3% of this population were impaired in comparison to the general population and the mean score for the sample was 130.4 seconds. Although more participants in the homeless sample were found to be impaired when compared to an age matched cohort, this difference was not found to be significant. However, the age matched cohort was found to have a significantly higher mean score across the sample group indicating a slightly poorer performance on average

suggesting that those who were impaired performed a lot worse than the homeless population. Also using Trails B (a measure of executive functioning), Gonzalez, Dieter, Ruby & Tanner (2001) found that Trails B was the most impaired measure of their battery which was conducted with 60 participants through a healthcare clinic in Miami, Florida. Of this sample, nearly 50% scored at or below the 10th percentile indicating high levels of impairment within this population. This study also found a significant relationship between Trails B score and education. The authors commented that unlike previous studies conducted in the area, this population did not display the usual predominance of substance abuse and high levels of psychosis. Within this group, the most common diagnosis was depression and they were considered to be functioning at a higher level than many people who are homeless.

Stergiopoulos, Burra, Rourke & Hwang (2011) and Bousman et al (2010) also used Trails B and the WCST as measures of executive functioning with two groups, homeless and housed participants with a diagnosis of schizophrenia or schizoaffective disorder. This will be discussed further below under the Mental Illness section.

One of the studies used a functional assessment called the Executive Function Performance Test (Baum, Connor, Morrison, Hahn, Dromerick, & Edwards, 2008) where participants are asked to complete four behavioural tasks and are then rated on three components of executive functioning; initiation, execution and termination (Raphael-Greenfield, 2012). Higher scores indicate poorer performance on each subsection. This study used participants from an urban homeless sample in the USA, who also were diagnosed with a substance abuse problem. Again, in comparison to the normative mean, the homeless sample was found to be impaired on measures of organisation/planning and sequencing.

Memory

Two of the studies considered used versions of the full WMS in order to assess the different components of memory. These studies used a general homeless population as their sample (Cotman & Sandman, 1997; Pluck et al., 2012). Cotman & Sandman (1997) used the WMS-R with a sample of 25 participants and found that an average score of 90.5 for verbal memory and 103.8 for visual memory and 93.8 for delayed memory. This would suggest verbal and delayed memory was impaired in comparison

to the normative mean while visual memory fell in line with normative means. Of this population, 33% demonstrated memory impairment on this assessment when compared to the normative data. When participant's IQ was taken into account, it was found that 16.7% of this population had impairments of general memory exceeding what would be predicted by IQ scores. Pluck et al. (2012) found that the average Total Memory score (84.3) on the WMS-III within their population was significantly lower than the population mean score (100). They also compared pre-homeless estimate of memory scores and found a significant drop from the pre-homeless scores to current memory scores. There was no significant correlation between duration of homelessness and drop in scores.

Three of the papers presented the same sample of homeless participants with severe and enduring mental illness and presented verbal and orientation of the group (Schutt, Seidman, Caplan, Martsinkiv, & Goldfinger, 2007; Seidman et al., 1997; Seidman et al., 2003). All three papers presented a verbal memory quotient from the WMS-R and found that this measure was significantly worse than the normative mean. The papers concluded that verbal memory was an area of significant impairment within this population.

Stergiopoulos et al. (2009) and Bousman et al. (2010) assessed memory and recognition scores as assessed by the Hopkins Verbal Learning Test (HVLT; Brandt & Benedict, 2001) in participants with mental illness and compared housed and homeless participants. There was no significant difference between these two groups on the memory assessment but no comparison was made to normative mean scores. Stergiopoulos et al. (2009) concluded through regressions that within the group, verbal memory scores were a predictor of functional capacity.

One further study investigated verbal and visual recall using the Rey Auditory Verbal Learning Test (RAVLT, Spreen and Strauss, 1998) and the Rey-Osterrieth Complex Figure Test (RCFT; Osterrieth, 1944; Rey, 1941) with 90 homeless men from a shelter in Milwaukee, Wisconsin (Solliday-McRoy et al., 2004). Their results showed that over half of the sample showed verbal learning and memory deficits on the RAVLT and nearly three quarters of participants (72%) were significantly impaired on measures of visual immediate and delayed recall (RCFT).

Processing Speed

Two of the studies included a measure of processing speed and of those; different measures were used in each case. Bremner, Duke, Nelson, Pantelis and Barnes (1996) measured processing speed in 62 participants who entered a homeless hostel in London, UK using Information Processing Task B from the Memory and Information Processing Battery (AMIPB, Coughlan & Hollows, 1985). On this measure, participants scored significantly lower than the general population normative data. Bousman et al. (2010) extracted the processing speed measure from the WMS-III from their sample when comparing participants with mental illnesses or substance abuse between never homelesss and homeless. This study found a nearly significant difference between the never homeless and homeless participants with homeless participants scoring worse. The authors concluded that although other papers had found significant differences between the homeless population and general population in processing speed, including participants with similar diagnoses allowed them to concur that this impairment may be independently associated with homelessness.

Language

The Aphasia Screening Test (AST; Halstead & Wepman, 1959) was administered to 60 homeless participants in Miami, Florida (Gonzalez et al., 2001). In this sample, language was found to be unimpaired in comparison to the general population and a significant relationship between education level and performance on the AST was found.

Summary of Cognitive Impairments

Overall, these studies have found that a range of cognitive impairments have been found within this population. Using the MMSE, the studies found that up to 35% of the general homeless population was impaired on this measures of global cognitive functioning and up to 37.9% within the older (>50 years) homeless population. Where two other measures used, the Neurobehavioral Cognitive Status Examination and the ACE, studies suggested that up to 82% of the population were cognitively impaired (Gilchrist & Morrison, 2005; Solliday-McRoy et al., 2004). All studies which included a measures of IQ found that this population scored lower than the normative mean with

a significant number of these studies finding the difference significant. Of those who compared pre-homeless IQ scores to current IQ scores, a significant drop in IQ was found. However, on a measure of pre-morbid executive functioning, no difference was found between the pre- and current measures. Focal deficits were found in executive functioning, verbal memory, delayed recall and processing speed in comparison to the general population. A measure of language abilities was found to be in line with the general population and relative to level of education.

Factors Associated with Cognitive Impairment within Homelessness

Mental Illness

A number of the studies investigated the cognitive abilities of homeless participants with mental illnesses and compared them to either housed participants with mental illness or homeless participants without a diagnosis. In relation to the prevalence of mental illness within this population, Fichter et a.l (1996) showed that of their population assessed in Munich, 80.8% received a DSM-III diagnosis in the six months priot to the study and only 5.5% had never had any psychiatric diagnosis. High levels of co-morbidity were also found. The most frequent DSM-II diagnoses were alcohol abuse/dependence (71.2%), affective disorder (24%), anxiety disorder, (14.4%), drug abuse/dependence (10.3%) and schizophrenia (9.6%).

Stergiopoulos et al. (2011) found that on a premorbid and current measure of IQ and other neuropsychological tests, there were no significant differences between housed and homeless participants with mental health diagnoses. On the University of California-San Diego Performance skills Assessment (UPSA), which predicts residential independence of patients with schizophrenia, more participants who were homeless (59%) fell below the cut-off score. This demonstrates a greater level of impairment than housed participants (33%). It was found that measures of verbal memory and executive functioning were predictive of functional capacity. This study collected the data at time of discharge from an inpatient service and thus not directly comparable to other studies. Using multivariate modelling, Stergiopoulos et al. found that 51% of the variance in functional outcomes of patients with schizophrenia is accounted for by performance on neuropsychological testing and 7% of this variance is accounted for by housing status.

One study focused on compiling the cognitive profile of homeless participants with mental illnesses (Seidman et al., 1997). This population was found to be impaired on measures of IQ, reading, spelling, planning, verbal memory, sustained attention and concept formation in comparison to normal control subjects. They were also found to be markedly preservative in comparison to the population mean. It was found that the extent of homelessness or diagnosis was not related to performance however an effect of substance abuse and gender on sustained attention was found. Bousman et al (2010) matched their participants for a number of factors known to affect neuropsychological performance, such as premorbid IQ, substance abuse, age and education. Their study also confirmed the finding that the never homeless and homeless participants were found to be comparable on neuropsychological performance but considerably more impaired than the general population. Bousman et al. highlighted two areas, executive functioning and processing speed where there was a significant difference between the groups, suggesting that these areas were impaired purely due to homelessness and not mental illness like the other areas suggested.

From self-reports taken, many of the studies suggested that the onset of illness precipitated homelessness.

Substance/ Alcohol Abuse

Investigating the prevalence of alcohol-related brain damage (ARBD), Gilchrist and Morrison (2005) recruited 266 participants recruited from six hostels in Glasgow, Scotland and assessed levels of hazardous drinking over both the previous year and over the participants' lifetimes. Of this population, 78% of the population was found to be drinking hazardously and 61% met the criteria for lifetime alcohol dependence. When assessed for ARBD, Gilchrist and Morrison found that of the 76 assessed, 43% were diagnosed with ARBD. It was then extrapolated that the prevalence of ARBD within the homeless population when accounting for age is an estimated 21%. Alcohol related brain damage is a spectrum of amnesic disorders including conditions such as Wernicke's encephalopathy and Korsokoff's syndrome. The prevalence within this community has been found to be between 0.4% and 2.8% and as high as 9% in long-stay mental hospitals. Of the original 266 participants, 82% were found to have a cognitive impairment as assessed by the ACE, though it is not possible to know how much can be attributed to alcohol abuse. However the authors conclude that given the

severity of the effects of ARBD and the fact that some patients can show some recovery with treatment, it is crucially important to diagnose this issue with the population.

Buhrich et al. (2000) found no significant differences in the prevalence of alcohol use between subjects who were found to have cognitive impairments and those who were not. However they did suggest that their assessment of alcohol use only included recent incidences and did not include lifetime use unlike Gilchrist and Morrison (2005). As noted above, Seidman et a.l (1997) found a significant relationship between substance abuse and sustained attention but no significant relationship between any other neuropsychological measures. Bremner et a.l (1996) also found no significant relationship between IQ drop and alcohol consumption suggesting that the link between cognitive deterioration and alcohol is not supported although a limitation of this study was a small sample size. Finally Bousman et al. (2010) found that the rates of alcohol and substance abuse were not significantly different between housed and homeless participants with psychiatric diagnoses and that there was no significant relationship between alcohol or substance abuse and any of the neuropsychological assessments.

Due to the format of the studies conducted to date, it is difficult to separate the neuropsychological problems caused by substance and alcohol abuse in this population. The only measure found to be correlated was sustained attention within one study. What has been found is the relationship between high levels of substance and alcohol abuse and subsequent high levels of ARBD.

Intellectual Disability

Two studies have investigated the prevalence of intellectual disability (ID) in the homeless population in Montreal, Canada and North-East England. The very nature of an ID diagnosis is that there is a cognitive impairment, i.e. IQ less than 70, amongst other requirements; a deficit in adaptive functioning and that these difficulties must be present before the age of 18 are the other requirements used in the UK to assess ID. Oakes and Davies (2008) found that the prevalence of ID within the homeless population is significantly higher than that in the general population. As part of this investigation, 50 participants were randomly recruited from a general practise in North-East England and assessed for eligibility for an ID diagnosis using IQ assessment, adaptive behaviour assessments and interviews in order to exclude difficulties that may

have started after childhood. Oakes and Davies' results found that 12% of their sample was eligible for a diagnosis of ID and the authors commented on how this suggests that learning disabilities are an important cause of cognitive impairment and difficulties with functioning that may precipitate homelessness. Through interviews, it was also discovered that although these participants were assessed as children to have educational needs, this support was not followed up into adulthood, contributing to this group becoming homeless.

Assessments for ID in the USA are slightly different that the UK in that Mercier and Picard (2011) suggest that an IQ of under 85 is within the ID range. Of 200 homeless people assessed as part of their study, 68 (34%) were classed as having an ID. The authors noted that of this group, a very high proportion (90%) of them presented with substance abuse problems. Unfortunately this study was unable to differentiate between those with a firm diagnosis of ID and those who acquired their cognitive impairments in adulthood due to other causes.

Head Injury

Whilst none of the papers highlighted head injury as the main focus of their research, some of them reported head injury as a component and assessed its association with changes in IQ and other areas of cognitive functioning. Solliday et al. (2004) investigated different levels of TBI though self-report of loss of consciousness (LOC) time. The reported rates of TBI were found to be high within this population (48%), though it was reported that no significant differences were found on any of the neuropsychological measures assessed when comparing participants who reported TBI and those who did not. Gonzalez et a.l (2001) similarly investigated documented or self-reported significant head injury and again no significant relationships were found. In the sample assessed by Brown et a.l (2011), 58.8% of the group reported a history of TBI but again no significant relationship was found between TBI and cognitive functioning. Pluck et al. (2011) investigated the relationship between head injury and the difference in pre and current executive functioning skills and in IQ and found no significant associations.

Geriatric Syndromes

Three studies investigated the prevalence and cognitive profiles of older adults in the homeless population. Two of the studies included participants aged 50 and above whilst the other used a cut-off of 55 years. Brown, Kiely, Bharel and Mitchell (2013) assessed the prevalence of geriatric syndromes present in the older adult (>50 years) homeless population including cognitive impairment. Their results show that when compared with an age-matched cohort, the homeless population had higher levels of geriatric syndromes including cognitive impairments though a significant difference was not found for cognitive impairments.

Using the same sample group, Brown, Kiely, Bharel & Mitchell (2011) then investigated the risk factors associated with increased geriatric syndromes found within the older homeless population. One of the geriatric syndromes assessed was cognitive impairment using the MMSE to assess global cognitive functioning and Trails B to assess executive functioning. Of 387 participants from homeless shelters assessed, Brown et al. found that 24.5% of participants showed cognitive impairment as assessed by the MMSE and 28% showed executive functioning difficulties as assessed by Trails B. Overall, more than 40% showed impairment through one of these measures. The authors concluded that there were important differences between the homeless older adult population and older adults in the general population. This study showed that the total number of geriatric syndromes (such as cognitive impairment, falls, major depression and sensory impairment) did not correlate with age as is found in the general population but instead was associated with characteristics associated with the homeless population such as alcohol and drug use problems. It was found that homeless older adults had a significantly higher chance of experiencing more than one geriatric syndrome than the general population and should be assessed for multiple syndromes. In the general population, geriatric syndromes are thought to result from the accumulation of deficits that occur through aging. In the homeless population, Brown et al. suggest that this is not the case but instead that alcohol and drugab use is thought to cause the accumulation of geriatric symptoms in this population.

Joyce and Limbos (2009) also assessed the prevalence of cognitive impairment within the older adult (>55 years) homeless population in Toronto, Canada. Using the MMSE, Joyce and Limbos found that 37.9% of the 29 participants assessed showed cognitive

impairment and 17.2% showed signs of dementia. It was noted that five of these participants had no prior diagnosis of cognitive impairment. Mental illness was also assessed and 37% of the participants were found to have an undiagnosed mental illness. Joyce and Limbos concluded that this population are at higher risk for mental illness and cognitive impairment but also for these issues to go undiagnosed which can lead to further deterioration.

Childhood trauma

One of the papers identified investigated the link between childhood trauma and cognitive functioning in a homeless population from shelters in Sheffield, UK (G. Pluck et al., 2011). All 55 participant were interviewed to assess experiences of childhood trauma, levels of substance abuse, IQ and neurobehavioural functioning. Participant's IQ was measures through the WASI and the FrSBe assessed prefrontal cortex dysfunction including apathy, disinhibition and executive dysfunction. As noted in previous sections, Pluck et al. found that participants performed significantly worse on measures of IQ and executive functioning than the estimated population mean. They also highlighted that when pre-homeless scores were taken for executive functioning, no differences were found between pre and current scores. Numerous correlations were reported that show that significant positive associations were found between emotional abuse, emotional neglect and physical neglect and the Total FrSBe score, indicating that higher levels of trauma were associated with higher impairment on this measure. Sexual abuse, emotional neglect and physical neglect were found to have a significant negative association with IQ; it was found that higher levels of trauma were associated with lower IQ. When controlling for IQ, a significant relationship between the total FrSBe score and emotional abuse and emotional abuse scales were still found. Pluck et al. suggest that there may be other reasons for lower IQ and FrSBe scores such as traumatic brain injury but no associations between FrSBe scores and IQ with head injury were found in this sample. Partial correlations were also completed and when controlling for alcohol and substance abuse, the significant relationship between childhood trauma and IQ and neurobehavioural functioning continues. Overall this group rated that 88.9% of this group experienced some kind of childhood trauma.

Critical Review and Discussion

Summary of results

This review identified that a number of cognitive impairments are found in high percentages of the homeless population and that some papers have strived to identify the factors associated with these deficits. Very high numbers of this population, up to 82%, have been shown to exhibit global cognitive functioning impairments as assessed by the ACE and up to 35% on the MMSE. On measures of IQ, this population was found to score between 82 and 91 on Full Scale IQ and when compared the normative population mean of 100, the majority of the papers found that this group's mean score was significantly lower. When a measure of premorbid IQ was calculated, it was also found that there was a significant drop in IQ score. Various measures of executive functioning were used in the assessment which makes it difficult to compare components of executive functioning. Of the various tests completed, each found focal deficits in executive functioning. Interestingly, executive functioning was the only cognitive ability that did not show a decrease when a pre-homeless measure was taken. It was suggested that that may indicate that this ability is something that instead of being caused by a change occurring after homelessness, may be a factor which contributes to homelessness in the first place. Deficits were also found in visual and verbal memory and measures of processing speed. Language was the only ability assessed that was not significantly lower than the general populations norms and was instead associated with levels of education, similar to the abilities found in the general population. Seidman et al (1997) did investigate the stability of the cognitive functioning and found it be stable over a period of 18 months from which they infer that any impairments found will remain present.

Many factors are hypothesised to be associated with cognitive impairments in both the homeless and the general population. Within these papers, no significant relationships were found between any of the cognitive impairment and mental illness, alcohol or substance abuse or TBI. The only exception was that in one paper, childhood trauma was found to be significantly associated with both IQ and executive functioning. Other factors that have been found to be greater represented in the homeless population is that of intellectual disability which has been suggested to contribute to persons becoming homeless when their support system fails. This in turn is a cause of lower IQ within the

homeless population. Another factor which contributes to lower IQ is geriatric syndromes and mild cognitive impairment (MCI) or dementia. These symptoms associated with older adults have been found to be more prevalent in this population and the papers have suggested that this may be due to the lifestyle of homelessness which encompasses the range of factors previously discussed. None of the papers were conducted in way in which causation can be inferred so at this stage, only associations have been made.

Limitations and considerations for future research

There are numerous limitations of the research within this population. A wide variety of tests are used to assess each component of cognitive functioning, and a variety of variables and results are then reported making it very difficult to effectively compare the results and draw conclusions from them. The interpretation of the results found is also confounded by the fact that the normative data is not matched to this participant group on age, sex or education level. Furthermore, most of these studies did also not have a control group which makes quantifying the differences between the homeless and non-homeless populations difficult. The measures used to assess TBI and substance and alcohol abuse was variable, using both self-report within an interview, self-report questionnaire or reviewing participant history.

In terms of the factors associated with these cognitive difficulties the range of factors that this population is subjected to makes it very difficult to isolate components when considering just one. As a population, it is known that there are high levels of TBI, substance/ alcohol abuse, malnutrition, childhood trauma and severe and enduring mental illness to name a few (Burra, Stergiopoulos & Rourke, 2009). In other populations, cognitive impairments have been found to be associated with these factors when considered in isolation (Carrey, Butter, Persinger, & Bialik, 1995). The presence of all of these factors at such high levels throughout the population, makes it difficult to narrow the findings, complicates the collection of data and distorts any results. The lack of this clarity also makes it difficult to distinguish what role cognitive impairment plays in the maintenance of homelessness.

The studies considered in the review included a range of recruitment areas, including inpatient mental health patients, shelter and day centres and general practitioner services

with most populations composed primarily by males. The gender differences within this population have not been fully explored to explain the predominance of males and if there are differences between the cognitive abilities in gender or in the factors contributing to homelessness. Future research should be completed in order to clarify the differences.

Considerations

Research with other populations have shown that cognitive impairments are predictive of poor social and occupational outcomes as demonstrated through difficulties in social problem solving and functional abilities which contribute to the ability to live independently. It is highly likely that these cognitive impairments contribute to whether interventions conducted with this population, such as skills training or rehabilitation programmes, are successful. A further area of research would be investigating the effect that these cognitive impairments has on the programmes commonly used within the homeless population and whether further adaption is needed in order for the population to access and benefit from these programmes fully.

Most of the studies used a cross sectional design and correlational analysis to investigate relationships. Using this format is it not possible to infer causation. This area of research would benefit from a longitudinal design which would clarify if any changes occur across time in this population and also if any factors are more clearly involved in the changes.

In order to isolate the various components that contribute to homelessness in this population, it is suggested that further techniques such structural equation modelling could be useful in drawing together the available information as it would then be possible to infer causal relations. Structural equation modelling can be used for estimating causal relationships by using a combination of statistical data and qualitative causal assumptions. This model may allow causal assumptions to be made. Further research should consider this and other models of combining the data collected to date.

Clinical Implications

The primary clinical implication for cognitive impairment within the homeless population is its contribution to the first instance of homeless and the maintenance of

homelessness. Without these impairments being identified and supported adequately, this population may struggle with everyday functioning tasks which are required to maintain housing. These include managing finances, inhibiting socially inappropriate behaviour or maladaptive coping behaviours and household tasks required to maintain independent living. These factors may contribute to housing arrangements being untenable which in turn restarts the cycle of homelessness. Factors that cause homelessness to occur in the first place if not addressed through appropriate interventions and support may contribute to numerous periods of homelessness throughout a person's life. Without the knowledge of whether cognitive impairments are present with an individual, it will not be possible to measure the appropriate type and level of intervention that they can access. An awareness of these impairments with the individual and staff that support them may facilitate future housing endeavours.

Many shelters teach life skills and similar interventions in order to prepare their residents to move to more independent housing situations. It may be that these interventions are taught at a level that is inaccessible to many homeless individuals so they do receive the support that they require. These deficits may mediate whether an intervention is successful or not.

Cognitive impairments may also contribute to the individual's ability to adhere to treatment recommendations. For example, individuals may have difficulty filling prescriptions and taking the right dosage of their medication due to executive functioning difficulties, attention or memory difficulties. Without knowing which type of deficits is present, the strengths of the individual cannot be used to compensate for these difficulties with targeted strategies. Individuals will lower IQ or poor verbal comprehension benefit from more concrete, specific language being used and those with language difficulties would require the repetition of salient points as well as frequent reminders of appointments of important appointments. Unfortunately individuals are often penalised for these errors when they do not receive sufficient support, which in turn may cause rifts between them and their support network. It is suggest that for homeless individuals with severe and enduring mental illness in particular, that they may benefit from being incorporated into assertive community teams, who are skilled in managing these types of difficulties.

For similar reasons to the above, this population may have difficulty assessing medical care due to missed appointments or their non-adherence to their healthcare recommendations. Services as they are established for the general population may be discombobulating for this group. Again this could be supported through an assertive community team or through this care being incorporated into the shelters. Tailoring this service to account for difficulties may in turn produce a more cost effective and efficient service.

These findings also have implications for policies and how these services are developed. At a practise level, services such as substance abuse, mental health and learning disability services need to come together to work towards an integrated assessment and service provision. It would also be important to include health services in order to assess for preventable difficulties caused by alcohol abuse or malnutrition. This may also decrease the number of emergency admissions and acute impatient care required by this population. At a government level, changes are needed to further investigate and develop an assessment toolkit that could be implemented nationwide in order to curtail the increasing issue of homelessness.

Conclusion

This paper aimed to review the current literature on cognitive functioning within the homeless population and the factors that contribute the cognitive deficits. The findings found that a number of cognitive deficits are present within the homeless population samples assessed. In comparison to the general population, high numbers of this population have been found to show global cognitive functioning impairments, intellectual functioning deficits, executive dysfunction and verbal and visual memory deficits. Although many factors have been implicated in causing these deficits, the only relationship found to be significant was between childhood trauma and IQ and executive functioning. As many of these factors occur comorbidly, future research should try to draw together the impact of these factors to form a comprehensive picture of these relationships and also consider the other variables that may be influencing cognitive functioning.

Chapter 2

Empirical Paper

An investigation of the relationship between childhood trauma, problem behaviours and executive functioning in the homeless population.

Introduction

Homelessness

Homelessness is a significant and increasing problem in the United Kingdom (UK). Figures released by the Homeless Monitor estimated that 113,260 people in England alone have declared to their councils that they are homeless. This figure represents an 11% increase since 2010. The homeless population is recognised as a heterogeneous group with multiple complex environmental and individual factors contributing to the maintenance of their homelessness (Morrell-Bellai, Goering & Boydell, 2000). Homelessness has implications for both the individual and society as a whole, and whilst the government is implementing interventions to tackle this growing problem, these have focused on wider issues which address social and economic issues (Jarrett, 2010) but few interventions target the individual issues which contribute to homelessness. The prevalence of the individual issues that contribute to homelessness is being increasingly recognised such as the higher rates of mental health difficulties (Foster, Gable & Buckley, 2012; Gill, Meltzer, Hinds & Petticrew, 1996), drug and alcohol abuse, risk of suicide (Shelton, Taylor, Bonner & Van den Bree, 2009) and cognitive dysfunction (Burra, Stergiopoulos, & Rourke, 2009; Spence, Stevens, & Parks, 2004).

Homelessness and Maladaptive Coping Strategies

High levels of maladaptive coping strategies have also been recognised within this population. Included in these behaviours are drug and alcohol abuse, aggression, self-harm promiscuous sexual behaviour and suicidal behaviour (Goldstein, Luther, & Haas, 2012). Levels of alcohol and substance abuse in particular have been found to be particularly high. Gilchrist and Morrison (2005) found in their population that 78% were currently drinking hazardously and 61% met the criteria for lifetime alcohol dependence. Levels of substance misuse have also been found to be around 70% (Goering, Tolomiczenko, Sheldon, Boydell & Wasylenki, 2002). These factors have been found to contribute to the pathways that start and maintain homelessness and also to mediate the individual's ability to engage and benefit from interventions available (Maguire, Johnson, Vostanis, Keats & Remington, 2009; Gonzalez, Dieter, Natale, & Tanner, 2001).

Childhood Abuse and Homelessness

Childhood adversity has been linked to a number of psychological difficulties in later life. In particular, it has been found that childhood abuse contributes to the development of personality disorders, post-traumatic stress disorder (PTSD), psychosis, deliberate self-harm (DSH), schizophrenia (Spataro, Mullen, Burgess, Wells & Moss, 2004; Stovall-McClough & Cloitre, 2006), internalising and externalising disorders (Muller, Thornback & Bedi, 2012; Malone, Westen & Levendosky, 2011) and maladaptive behaviours including substance abuse, deliberate self-harm, risky sexual behaviours and eating disturbances (Reinhart & Edwards, 2009; Gratz, Conrad & Roemer, 2002; Batten, Follette & Aban, 2001; Zanarini, Ruser, Frankenburg, Hennen & Gunderson, 2000). Childhood traumas have also been found to be linked with a range of cognitive and neurodevelopemental problems in particular those related to executive functioning (De Bellis, 2005) and memory retrieval (Hermans, Defranc, Raes, Williams & Eelen, 2005). Rates of childhood trauma found to be high within the homeless population (Spence, 2009; Spence et al, 2006).

Childhood trauma has also been found to be associated with an increased rate of homelessness (Aliverdinia & Pridemore, 2012; Shelton, Taylor, Bonner & Van den Bree, 2009; Craig & Hodson, 1998). Recent studies have investigated this link between childhood trauma and the factors involved that may make a person more susceptible to homelessness. Day (2009) investigated the relationship between childhood abuse and the use of maladaptive coping strategies in adulthood and how this relationship is mediated by emotional dysregulation. This relationship between childhood abuse and maladaptive coping strategies has also been shown in other studies. This study will investigate another possible mediating factor; neuropsychological functioning.

Link between childhood abuse and neuropsychological functioning.

Trauma and abuse have been shown above to have a significant impact on later psychopathology in children. In one of the first studies investigating this issue in 1981, Green, Voeller, Gaines and Kubie (1981) found that many abused children showed neurological damage without any reports of head injury. As the brain is still developing, abuse at a younger age has been found to have a greater impact than abuse at an older age (Teicher, 2000). Trauma has been found to affect children's anticipation and how

they organise themselves to process information (Van Der Kolk, 2003). It can also affect how they think, feel and behave in response to future threat (Shields, Cicchetti, & Ryan, 1994). As the brain structures develop at different times throughout childhood and adolescence, it has been found that early abuse can have a significant impact on how the various structures develop. Children who have been traumatised numerous times often demonstrate developmental delay in cognition, language and motor skills. One example is that early abuse has been found to have a significant impact how the maturation of the hippocampus, which can cause children to misinterpret sensory information as dangerous and threatening. Further research demonstrated the link between impulse control, aggression, and emotion regulation (Navalta, Polcari, Webster, Boghossian & Teicher, 2006). Ven der Kokl (2003) suggested that normal neurobiological development is disrupted when children are traumatised. One of the circuits that is affected is involved with executive functioning and thus implicated in poor impulse control (Van der Kokl, 2003). Humans learn from their experiences which involve registering information, comparing it with a previous knowledge base and evaluating it in order to decide an appropriate response. The ability to complete these tasks depends on the frontal cortex and abused children have been found to have significant difficulties with many of these task.

Other cognitive impairments, such as memory and language, have been found to significantly increase the risk of a person not being able to gain and retain housing. This requires problem-solving and social skills and the ability to make wise decisions (Backer &Howard, 2007). Studies have investigated the prevalence of cognitive impairment within the homeless population found that it can be as high as eighty percent (Solliday-McRoy et al, 2004). Although it has been shown that childhood abuse could be a pathway towards homelessness, within the homeless population there are often other reasons for the cognitive impairments that maintain their housing status. Cognitive impairments may also be caused by more than one source including traumatic or acquired brain injury, substance abuse, depression, schizophrenia and progressive neurological conditions (Spence et al, 2004, Backer & Howard, 2007).

A neuropsychological understanding of trauma suggests that abuse in early years has a neurobiologcal impact on children's later development causing a range of cognitive impairment. The link between childhood trauma and maladaptive behaviours has more commonly been understood using Linehan's biosocial model (1993) of

borderline personality disorder (BPD; Linehan, 1993). Linehan suggests that BPD emerges in individuals with biological vulnerabilities who are then exposed to an invalidating developmental environment. She proposes that these factors cause the children to be dysregulated in their emotional functioning. This model proposed that this causes the children to develop a higher sensitivity to emotion, a deficit in the ability and motivation to regulate any strong emotional responses and a slower return to emotional baseline than people without this disorder. Crowell, Beauchaine and Linehan (2009) later expanded on this model to include the importance of the trait of impulsivity. They suggested that the biological components of BPD overlap with other impulse control disorders such as conduct disorder, substance use and attention- deficit disorder. It has been found that executive functioning is an important neuropsychological component of these disorders (Clarke, Prior & Kinsella, 2000; Willcutt, Doyle, Nigg, Faraone & Pennington, 2005). Other studies have also demonstrated the link between childhood trauma and executive dysfunction and impulsivity in later life (Brodsky, Oquendo, Ellis, Haas, Malone, & Mann, 2001). Of the few studies completed investigating executive functioning within the homeless population, Gonzalez, Dieter, Natale & Tanner (2001) suggest that 80% of homeless people have executive functioning difficulties.

Current Study

Developing an understanding of the factors that contribute to homelessness is crucial in preventing homelessness and proving appropriate interventions for those already homeless. Childhood trauma has been found to be a strong predictor of maladaptive coping strategies and homeless in adulthood. Many of the confounding variables present are as yet poorly understood and mediators in the relationship are still unknown. A neuropsychological understanding of childhood trauma suggests that many different types of cognitive deficits can be present. The most commonly found are deficits in executive functioning and memory. Within the homeless population, studies have found that with the homeless population there are high levels of both childhood trauma and cognitive deficits.

Current interventions for homelessness focus on life skills and practical issues faced by this population. However, given the levels of cognitive impairments found, it may be that this group are unable to access these interventions due to these difficulties. Further

study in the area may help to highlight the adaptations that may be necessary. The literature that is present in this area highlights the need for further investigation as people with cognitive impairments are often erroneously considered 'non-compliant' or 'in denial' (Gonzalez et al., 2001). This may be seen as not engaging with interventions or not following rules in place, which may lead to exclusion from housing, perpetuating homelessness. People with cognitive impairments have also been found to be more vulnerable to substance abuse and other maladaptive coping strategies because of an inability to regulate their behaviour and impulsivity (Price, 2005). The presence of cognitive impairments can lead to some people being unable to participate in and benefit from traditional substance abuse programmes (Backer &Howard, 2007). Development of knowledge in this area would serve to inform support staff working with this population as to the potential deficits that may be present, support adapting current interventions and skills classes to make them more accessible to those with difficulties. This study aims to provide more empirical support to the presence of cognitive impairments within this population and also how it contributes to the perpetuation of homelessness.

Given these high rates of executive dysfunction, and preceding links found between childhood abuse and maladaptive behaviours, this study will aim to investigate if executive functioning is one of the factors that mediates this relationship. This may help to explain one of the pathways towards homelessness but also some of the maintaining factors and why there is a high prevalence of maladaptive behaviour within the homeless population.

These are main hypotheses for this study.

1. This population will show poorer cognitive functioning on measures of general intellectual ability and executive functioning in comparison to the general population.

2. There will be significant relationships between childhood abuse, executive functioning and problem behaviours within this population.

3. Executive functioning will mediate the relationship between childhood trauma and maladaptive behaviours.

Method

Design

This study uses a within, cross-sectional design using self-report questionnaires and psychometric test to assess childhood trauma, maladaptive behaviours, impulsivity and executive functioning.

Participants

Participants were recruited using opportunity sampling from four hostels across Southampton. Data was collected over 22 sessions across all four locations. Participants were eligible for this study if they were an adult (>18 years) registered as homeless with these hostels. Individuals were excluded from this study if they had any cognitive impairment significant enough to make them unable to understand and complete the questionnaires with support or to remember their childhood experiences. Exclusion criteria also included the inability to understand written or spoken English as there was no access to interpreters or the standardised measures in other languages. Participants were asked to attend a different session if they were felt to be intoxicated but were not excluded for current alcohol or drug dependence.

Fritz and Mackinnon (2007) suggest that when using a bootstrap method in mediation models, 71 subjects are needed to detect a medium effect size with .8 power.

Demographics

Eighty-three participants were recruited across the four hostels. Table 1 displays the demographic information of the final participants. The majority of participants were male (N=70, 84.3%) and White British (N = 75, 90.4%). Average age was 38.4 years (SD= 10.9) and the majority of participants had experienced between two and five episodes of homelessness (N=36, 43.4%).

Table 2 –Demographic information of participants

	N	Frequency (%)
Gender		
Male	70	84.3
Female	13	15.7
Ethnicity		
White British	75	90.4
White Irish	1	1.2
White Other	1	1.2
White Asian	2	2.4
Welsh	1	2.4
Black Carribbean	2	2.4
Black African	1	1.2
Age at first episode of homelessness		
<18	36	43.4
18-25	16	19.3
26-35	13	15.6
36-49	15	18.1
50+	3	3.6
Number of episodes of homelessness		
One	16	19.3
2-5	36	43.4
6-10	22	26.5
11-19	3	3.6
20+	6	7.2
Length of current episode of homelessness		
< 1 month	11	13.3
1-6 months	27	32.5
7-12 months	14	16.9
1-5 years	27	32.5
5+ years	4	4.8

Measures

Demographic Information. Participants were asked to complete a demographic questionnaire which included questions regarding gender, age, ethnicity, age when first time homeless and number of times homeless.

Childhood Abuse. The Child Abuse and Trauma Scale (CATS; Sanders & Becker-Lausen, 1995) is a 38 question self-report measures which investigates the frequency of different types of negative childhood experiences. It consists of four subscales; sexual abuse (6 questions), physical abuse (6 questions), emotional questions (7 questions) and neglect (14 questions). It also includes six further questions which are included in the total score. Participants are asked to rate the frequency of a range a traumatic experiences throughout their childhood and adolescence on a five point scale. The answers range from never (0) to always (4). Each subscale produces a subscale score based on the mean score within that measures. The CATS has been found to have high internal consistency for the total score (Cronbach's Alpha = .63 to .88) (Kent & Waller, 1998; Sanders & Becker-Lausen, 1995). The test-retest reliability of the subscales has been found to have Pearson's r coefficients from .71 to .91 (Sanders & Becker-Lausen, 1995; Kent & Waller, 1998). This measure has been used previously in this population when investigating psychological difficulties and has been developed to reduce the risk of distress.

Maladaptive Coping Strategies. The Composite Measure of Problem Behaviours (CMPB; Kingston, Clarke, Ritchie & Remington 2008) is a 66 question self-report questionnaire in which participants rate how likely they would participate in a range of behaviours. Kingston identified behaviours that were classified as being 'problematic' or 'at risk'. The questionnaire is divide into 10 subscales; Nicotine Use (5 questions), Deliberate Self-harm (4 questions), Excessive Internet/Computer Game Use (5 questions) Drug Use (6 questions), Excessive exercise (5 questions), Excessive Alcohol use (5 questions), Binge Eating (4 questions), Sexual Promiscuity (3 questions), Aggression (4 questions) and Restrictive Eating (5 questions). The questionnaire asked participants to rate how characteristic each behaviour was of them, using a 6 point scale ranging from 'very like me' (1) to 'very unlike me' (6). This form of questioning allowed all participants to respond to all the questions even if they had

never engaged in the behaviour. Subscales can also be calculated using the mean score for each question in the subscale. The CMPB was found to have high internal consistency for the total score (Cronbach's Alpha = .8) and has been shown to have high test-retest reliability.

Cognitive Functioning.

Executive Functioning. The Wisconsin Card Sorting Test (WCST; Heaton, 1981) is a psychometric assessment measures that is primarily used to assess perseveration and abstract thinking skills. It is considered a measure of executive functioning as it assessed planning, moderating behaviour to feedback, organised searching and impulsivity. The WCST was administered using a computerised version developed through Inquisit by Millisecond Software. Participants are presented with four stimulus cards which incorporate three types of stimulus (form, number and colour). They are then presented with test cards which they are asked to sort into one of the four original reference cards. Participants are given feedback as to whether their selection was correct based on rules unknown to them. They must then adjust their responses to feedback indicating a change in the rules. The results of this measure is a calculation of the number of categories completed (six maximum), the number of trials needed to complete the task (128 maximum) and number of total and perseverative errors.

The Iowa Gambling Task (IGT; Bechara, 2007) is a computerised psychometric assessment that measures decision making impairments. Participants are asked to select a card from one of four decks presented on the computer screen with the aim to maximise the profit starting with $2000. With each choice, participants are told what money they have won and lost. Two of the decks are classed as 'good decks' in that they will win less money on each turn but overall will have a net gain. The other two decks will provide a larger immediate gain but overall will have a net loss. These are classed as 'bad decks'. Participants are given 100 trials to select cards from any deck. The overall score in calculated by subtracting the number of 'bad deck' choices from 'good decks'. The Iowa gambling test is a widely used measure of decision making in participants thought to have prefrontal cortex damage.

Intelligence Quotient (IQ). The Wechsler Abbreviated Scale of Intelligence (WASI) was administered in order to gain a measure of intellectual functioning and

produces a full scale IQ standard score. The shortened 2-test version was administered which is comprised of the subtests Vocabulary and Matrix Reasoning. The WASI 2-test version has been found to have high internal consistency (Cronbach's alpha = .96) (Axelrod, 2002).

Procedure

Recruitment. Participants were recruited from four homeless hostels in Southampton between October 2013 and January 2014. Hostel managers were first approached during the summer of 2013 to explain the purpose and nature of the study and for discussion of practicalities of conducting the studies and issues of risk and consent. After agreeing to participate in the study, each hostel was given posters (Appendix A) advertising the study and a signup sheet with dates that the study would take place at that hostel. The poster informed participants of the nature of the study and also that they would be compensated for their time with a £9 supermarket voucher.

Potential participants were given the study information (Appendix B) verbally and in written form and if they still wanted to participate were then given the consent form to sign (Appendix H). At this time, a screening questionnaire (Appendix C) regarding reading and writing ability and support preferences were completed. The questionnaires and psychometric assessments were completed independently, with some help from the researcher or in an interview format (Appendix D, E, F & G). All interviews were completed in a 1:1 setting in a private room to ensure confidentiality. The researcher was present at all times during completion and support offered was to clarify the scales or questions asked. After completion of the questionnaires and psychometrics, participants were provided with a mood repair task (Appendix J). In this task, participants were asked to read four cartoons and rate how funny they found each cartoon on a 4-point Likert scale. Participants were then given a debrief sheet and supported to read this if required (Appendix I). Each psychometric and consent form was given a unique ID number and all responses were stored separately to ensure confidentiality. After a pilot run of five participants, it was decided that further measures were needed to ensure participant wellbeing. A grounding exercise was added for use with participants who were reporting distress following completion of the study. It was also agreed with staff and participants that staff at the hostel would be notified if

there was any concern for the participant's well-being. After the pilot run, information and debrief sheets were further clarified to ensure that participants were fully aware as to the nature of the study before they consented to participate. After completion of the study, participants were verbally debriefed and given a debrief sheet, then given the opportunity to ask questions. They were also provided with a £9 supermarket voucher to compensate them for their time.

Recruitment and data collection was conducted jointly with another researcher who was investigating self-esteem and psychological inflexibility and their links to childhood trauma and maladaptive coping strategies in the homeless population. Due to this, overlapping questionnaires were the CATS and the CMPB were completed and this data was shared. If participants completed one study, they were informed that there was a second study they could also participate in. The research design, research questions and analysis and interpretation was all completed independently.

Ethics. The study was given ethical approval by the Ethics Committee of the University of Southampton and was insured and sponsored by the University of Southampton Research and Development Committee. An amendment was made to the study proposal after the pilot run and the changes discussed above were detailed to ensure participant well-being. A Clinical Psychologist who was experienced in working with this population was also available for consultation or follow-up with participants if needed. These changes were also given ethical approval.

Analysis Strategy. Data analysis was completed using Statistical Packages for Social Sciences Version 21 (SPSS). Missing data was found to be minor (>1%) and was mean substitution was used to calculate these figures in order to maintain the sample size. Initially preliminarily analysis was completed to prepare the data for analysis, produce descriptive statistics and identify outliers. Distribution of the data was assessed using plots of skewness and kurtosis and Kolmogorov-Smirnov tests. Tests of normality were conducted in order to assess distributions within the data. Correlational analysis was used to define which maladaptive behaviours were associated with the executive functioning measures. Mediation analysis was then performed using the bootstrapping approach.

Mediation Analysis. Mediation analysis is used to investigate the relationship between the independent variable and dependent variable indirectly through a mediator

variable. In a simple mediation model as shown in Figure 2 below, the causal effect of the Independent Variable (IV) can be distributed between its indirect effect on the Dependent Variable (DV) through the mediator and its direct effect on the DV (path c'). Path a demonstrates the effect of the IV on the mediator and path b demonstrated the effect of the mediator on the DV without the effect of the IV. The indirect effect of the DV on the IV can be expressed as the sum of the direct and the indirect effects. Therefore, c' is the difference between the total effect of the DV on the IV and the indirect effect of the DV on the IV through the mediator (Hayes, 2009).

There are many methods of mediation analysis available. Previously the most commonly used method was the Baron & Kenny (1986) causal steps strategy. In recent years, this has been criticised for having low statistical power and requiring a normal distribution. The bootstrapping method (Bollen & Stine, 1990) uses resampling and has been argued to have more statistical power and can be used with smaller sample sizes (MacKinnon, Lockwood & Williams, 2004). The bootstrapping method does not assume normal distribution and has been demonstrated to show greater power when testing for indirect effect within multiple mediation models (Hayes, 2009).

Posthoc Analysis. Supplementary analysis will be conducted to investigate the relationships between the subscales of the CATS and the CMPB using correlational analysis. Associations with IQ will also be investigated.

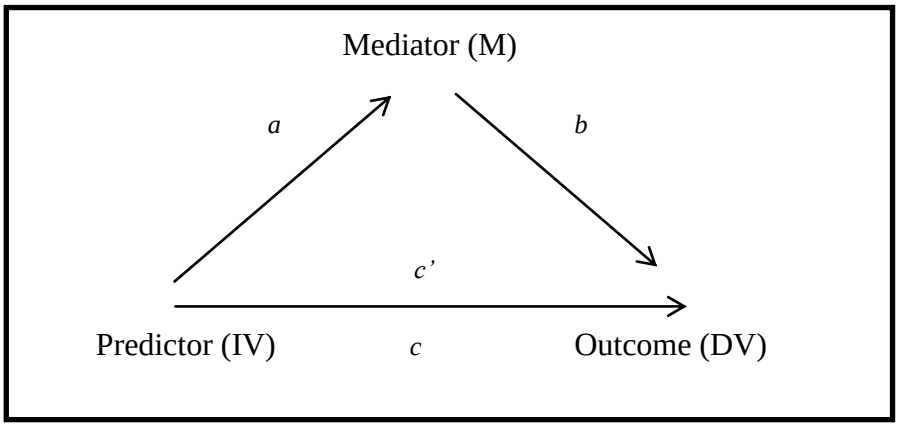

Figure 2 Mediation Model

Results

Preliminary Statistics

Preliminary analysis assessed whether data conformed to assumptions of normality. Total scores for CMPB and FSIQ were identified as being normally distributed. The CATS total score, IOWA score and WCST scores were found to be abnormally distributed as found by the Kolmogorov-Smirnov test and Shapiro-Wilks tests. Square root transformation was performed and the result still showed slight kurtosis. Non-parametric tests were used when the assumptions were not made to complete parametric tests.

Descriptive Statistics

Chronbach's alpha coefficients and means were calculated for all of the subscale and total scores (Table 3). All total scores reached an acceptable level of reliability of greater than .7 as did the majority of subscale scores except from excessive exercise and binge eating subscales on the CMPB and the Attention and Motor Subscales of the Barrett Impulsivity Scale. These measures are therefore considered with caution as the low score implies poor internal consistency. It is not possible to calculate the Chronbach's alpha scores for the IGT, the WCST or the WASI due to the nature of the data being collected.

Table 3. Chronbach's alpha and mean scores

	α	M (SD)	Range
Childhood Trauma (CATS)			
Neglect	0.914	1.98 (0.38)	0-4
Emotional Abuse	0.919	1.98 (1.17)	0-4
Physical Abuse	0.778	2.03 (0.94)	0-4
Sexual Abuse	0.893	.64 (0.95)	0-4
Total CATS	0.966	1.65 (0.95)	
Composite Measure of Problem Behaviours (CMPB)			
Nicotine Use	0.756	4.36 (1.29)	1-6
Deliberate Self-Harm	0.830	2.40 (1.55)	1-6
Excessive Internet/Computer Game Use	0.630	2.67 (1.38)	1-6
Drug Use	0.940	3.69 (1.87)	1-6
Excessive Exercise	0.670	2.87 (1.24)	1-6
Excessive Alcohol use	0.920	3.87 (1.75)	1-6
Binge Eating	0.649	2.55 (1.27)	1-6
Sexual Promiscuity	0.871	2.43 (1.67)	1-6
Aggression	0.734	3.48 (1.32)	1-6
Restrictive Eating	0.514	2.27 (1.02)	1-6
Total CMPB Score	0.800	3.12 (0.60)	
Wechsler Abbreviated Scale of Intelligence (WASI)			
Vocabulary Subscale	-	35.28 (11.59)	1-100
Matrix Reasoning Subscale	-	45.38 (11.38)	1-100
Full Scale IQ	-	85.55 (14.82)	0-200
Iowa Gambling Task			
Good Decks	-	44.66 (17.4)	0-100
Bad Decks	-	55.33 (17.4)	0-100
Good decks minus Bad decks	-	-10.6 (35.26)	-100 - 100

Wisconsin Card Sorting Task			
Number of Categories Achieved	-	3.73 (2.18)	0-6
Number of Perseverative Errors	-	7.90 (6.26)	0-128
Total Errors	-	60.53 (21.19)	0-128
Number of Trials	-	108.32 (23.20)	
Barrett Impulsivity Scale			
Cognitive Impulsivity	0.603	18.75 (4.02)	8-36
Motor Impulsiveness	.0.607	18.23 (3.98)	11-44
Non-planning impulsivity	0.710	29.92 (5.79)	11-44
Total Score	0.816	69.42 (11.07)	30-120

Childhood trauma. The total CATS score (M= 1.65, SD= 0.95) is consistent with previous research within this population with levels higher than those found in the non-clinical population (M=0.72, SD = .42) (Sanders & Becker- Lausen, 1995) but lower than those diagnosed with multiple personality disorders (M=2.7, SD = .84). In this population, the highest mean score was the physical abuse subscale followed by neglect and emotional abuse. Sexual abuse subscale had the lowest mean score.

Composite Measure of Problem Behaviours (CMPB). The total CMPB score was found to be higher in this population (M=3.12, SD= .60) than both the clinical (M=2.61, SD = .64) and nonclinical scores (M=2.42. SD = .52) reported by Kingston et al (2011). These results from this sample population more closely match the results of other studies using the CMPB in the homeless population (Day, 2010, Bohane, 2013). Nicotine Use was found to have the highest mean score followed by alcohol use and drug use.

IQ. Similar to previous studies within the homeless population (Pluck et al., 2011), the FSIQ as assessed by the WASI was found to be below the normative data standard score, which is a mean of 100, standard deviation of 15 (M= 85.55, SD= 11.38). On both t-scores for the Vocabulary (M=35.28, SD = 11.59) and Matrix

Reasoning subscales (M=45.38, SD = 11.38), the mean for this population also fell below the normative data (M=50, SD = 10).

Executive Functioning.

Iowa gambling task. This measure found that the mean score (M=55.33, SD=17.4) for bad decks chosen was considerably higher than had been found in the normal population (M=41.72, SD=16.95) (Lakey, Goodie, Campbell, 2007). Overall the mean score for the bad decks was found to be higher than the mean score for good decks. Participants in this population overall chose the negative decks more frequently than the positive decks.

Wisconsin Card Sorting Task. The score for number of categories achieved (M=3.73, SD= 2.18) was below control participants' results in a previous study (M=5, SD= 2) but in line with the OCD participants results (M=3, SD=2) (Lucey, Burness, Costa, Gacicnvic, Pilowsky, Ell…..& Kerwin., 1997). This population made a considerably higher number of errors (M=60.52, SD = 21.19) than the control subjects (M=10.5, SD=10.7) and OCD subjects (M=36.1, SD=30.5). The number of trials completed (M=108.32, SD = 23.2) was also in line with the OCD participants (M=115.2, SD=21.7) in comparison to the control group (M=85.5, SD=21.8).

Barrett Impulsivity Scale. The highest scoring subscale was on the non-planning impulsivity subscale (M=28.92, SD=5.79) which was found to be higher than the normative data (M=23.6, SD=4.9). Scores for the other scales were found to be in line with normative data. This was also found to be the case for the total score (M=69.42, SD=11.07) and attention subscale (M=18.75, SD=4.02) in comparison to the normative scores (M=62.3, SD=10.3; M=16.7, SD=4.1).

Correlational Analysis

Spearman's correlations were calculated to test the relationships between childhood abuse, executive functioning and maladaptive functioning. At this stage, only total scores were used. Only significant relationships are presented below (Table 4). Spearman's correlations were used as not all measures conformed to the assumption of normality.

Table 4 Correlations

		CATS Total Score	Total CMPB score
Problem Behaviour	Total CMPB Score	.261**	-
Executive Functioning			
Barrett	Attention	.316**	.209*
	Motor	.241*	.196*
	Planning		.217*
	Total	.253*	.263*

*p< .05, **p< .01

CATS = Child abuse and Trauma Scale, CMPB = Composite Measure of Problem Behaviour.

Childhood Abuse and Problem Behaviours. These results show that there are significant positive correlations between total CATS and total CMPB score (r = .261, p =.01) suggesting that higher levels of childhood trauma are associated with higher levels of problems behaviours.

Child abuse and Executive Functioning. A significant positive correlation was found between the total CATS score and the total Barrett score (r = .253, p=.05) indicating that higher levels of childhood abuse are associated with higher levels of impulsivity. The total CATS score did not correlate significantly with the WCST scores and IGT total score.

Executive Functioning and Problem Behaviours. The total CMPB score was found to be significantly associated with all of the Barrett subscales and total score (r = .263, p = .05) indicating that higher levels of impulsivity are associated with higher levels of problem behaviours. The total CMPB score did not correlate significantly with any of the WCST subscales or the IGT.

Mediation Analysis

It was hypnotised that executive functioning (measured by the IGT, WCST and Barrett Impulsivity Scale) would mediate the relationship between childhood abuse and

problem behaviours as identified by the CMPB. As there is no one composite total for the WCST task, the four scores were used, total errors, total categories and number of trials, total perseverative errors. Thus, six mediation analyses were conducted using four of the scores produced by the WCST and the total score from the IGT and total Barrett Impulsivity Scale. These were conducted using the bootstrapping macro for SPSS (Preacher and Hayes, 2008). Bootstrapping is a method which involves repeatedly randomly sampling large numbers (usually 5000) from the data set with replacement. Due to this, the bootstrapping method does not violate assumptions of normality and can be used with smaller sample sizes. A significant indirect effect is assumed if the confidence interval does not include zero. This method is considered the most robust for measuring the indirect effect of the mediator (Hayes, 2009).

In this study, the mediation analysis was conducted on the six proposed models. It was found that the Barrett Impulsivity scale significantly mediated the relationship between childhood abuse and problem behaviours. A significant indirect relationship was found (*b* = .05, bootstrapped SE = .03, BCa CI [.004-.13]). No significant indirect effect was found when the relationship was mediated by the WCST total errors score controlled for by IQ (*b* = .0014, bootstrapped SE = .0135, BCa CI [-0216-.0375]), WCST Categories score controlled for by IQ (*b* = .0052, bootstrapped SE = .0167, BCa CI [-.0188 - .0543]), WCST trials score controlled by IQ (*b* = -.0002, bootstrapped SE = .0097, BCa CI [-.0231- .0192]), WCST perseverative errors controlled by IQ (b= -.007, bootstrapped SE = .0148, BCa CI [-.0591 - .009]) and IGT (*b* = .00, bootstrapped SE = .0079, BCa CI [-.017 - .0171]).

Table 5 Mediation Analysis

			Effect of IV on *M* *(path a)*	Effect of *M* on DV (path b)	Total effects (path c)	Direct effects (path c')	Indirect effects	95% CI Bias corrected	
Independent variable (*IV*)	Dependent variable *(DV)*	Mediator *(M)*	*Coeff (SE)*	*Coeff (SE)*	*Coeff (SE)*	*Coeff (SE)*	*Coeff (SE)*	Lower	Upper
CATS Total	CMPB Total	WCST Total errors^	-0.362 (2.51)	.019 (.07)*	.19 (.07)*	.19 (.07)*	.00 (.01)	-0.02	0.03
CATS Total	CMPB Total	WCST Categories^	.42 (.26)	.01 (.03)	.19 (.07)*	.19 (.07)*	.00 (.02)	-.02	0.05
CATS Total	CMPB Total	WCST Trials^	.11 (2.81)	-.00 (.00)	.19 (.07)*	.19 (.07)*	-.00 (.00)	-.02	0.05
CATS Total	CMPB Total	WCST Trials^	1.01 (.76)	-.00 (.01)	.19 (.07)	.19 (.07)	-.00 (.01)	-.05	.01
CATS Total	CMPB Total	IGT total^	.-.07 (4.31)	.00 (.00)	.19 (.07)*	.19 (.07)*	.00 (.00)	-.02	.02
CATS Total	CMPB Total	Barrett total score	3.54 (.1.26)*	.01 (.00)*	.18 (.07)*	.13 (.07)	.05 (.03)	.00	0.13

^ controlled for by IQ. CATS = Child Abuse and Trauma Scale, CMPB = Composite Measure of Problem Behaviours. *p< .05, **p< .001

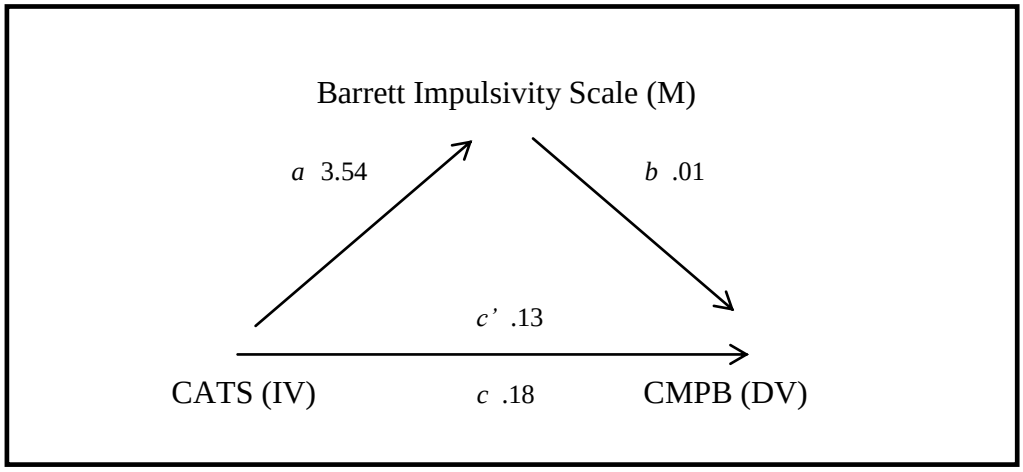

Figure 3. Mediation Model using Barrett, CATS and CMPB totals

Post Hoc Analysis

Subscales of the CATS and CMPB. Previous research has found links between childhood sexual and physical abuse and risky sexual behaviours and high levels of alcohol consumption as adults (Bensley, Van Eenwyk, & Simmons, 2000). Emotional, physical or sexual abuse has also been found to be linked to a number of risky

behaviours in adults which may cause severe health difficulties including death, including alcoholism, drug abuse, sexual promiscuity and eating disorders (Felitti, et al., 1998). As such, further analysis was completed on the subscales scores of the CATS and CMPB in order to investigate the relationship between different types of abuse and problem behaviours within this population. As normal distribution was not achieved with some subscale measures, Spearman's correlation was used to investigate the relationships**.**

Table 6. Posthoc Correlations

	Emotional Abuse	Physical Punishment	Atmosphere neglect
Nicotine Use			.227*
Deliberate Self-Harm	.327**	.377**	.312**
Drug Use			.232*
Sexual Promiscuity		.230*	
Aggression	.259*		

*p< .05, **p< .05 (two-tailed)

Contrary to the research in this area, no relationships were found with sexual abuse and any of the problem behaviours of the CMPB. Deliberate self-harm was found to be strongly correlated with all subscales of the CATS indicating that higher levels of emotional abuse (r=.327, p=.001), physical abuse (r=.377, p= .000) and neglect (r=.312, p=.002) were significantly related to the levels of self-harm within this population. Emotional abuse was also found to be significantly correlated with aggression (r= .259, p= .009).

Research has found that trauma in childhood is associated with a number of emotional, cognitive and behavioural difficulties. Links have been found between childhood trauma and aggressive behaviour (Sarchiapone, Jaussent, Roy, Carli, Guillaume, Jollant… & Courtet, 2009). Regression analysis was conducted to investigate this link within this study and found that the childhood abuse total score significantly predicted the aggression score (b = .22, $t(82)$ = 2.07, p < .05). Childhood abuse total score also explained a significant proportion of variance in aggression scores, R2 = .05, F(1, 82) = 4.28, p < .01.

IQ. Analysis was conducted to investigate the relationship of IQ to the problem behaviours and a significant negative correlation was found between FSIQ and aggression ($r = -.246$, $p = .016$). This suggests that as IQ increases, aggression decreases within this sample.

Discussion

This study aimed to investigate the relationship between childhood trauma, maladaptive coping strategies and executive functioning in a population of homeless adults. It was hoped to develop the literature base on some of the possible pathways that contribute to and maintain homelessness by investigating the contribution of neuropsychological factors that may contribute to these pathways. It is also hoped to develop the understanding of how the neuropsychological factors are related to the maladaptive behaviours frequently associated with homelessness. Developing the understanding of these factors may contribute to the adaption and development of interventions that may better suit the needs of this population.

Summary of Key Findings

As shown in previous studies, this paper found that the IQ of this sample group fell almost one standard deviation below the normative data. On the measures of executive functioning, this population also scored below the normative means on many of the measures.

As hypothesised, it was found that there are significant correlations between the experience of childhood trauma, maladaptive coping strategies and some of the measures of executive functioning including impulsivity as measured by the Barrett Impulsivity Scale. A number of significant correlations were found between the subscales of the CATS, CMPB and the executive functioning measures.

Of the six mediation models that were proposed and tested, only one executive functioning measure was found to significantly mediate the relationship between childhood trauma and maladaptive coping behaviours. This was the measure of impulsivity. Further analysis investigated the relationship between the subscales of the childhood trauma scale and the problem behaviours scale and found a number of significant relationships. The relationship between IQ and problem behaviours was also considered and a significant negative relationship was found between IQ and aggression.

Interpretation of Key Findings

Cognitive Functioning within the homeless population. Descriptive statistics of the neuropsychological measures were found to be consistent with previous studies investigating cognitive functioning within this population. The mean IQ for this sample was found to be 85.55 (SD = 14.82) which is nearly one standard deviation below the normative mean (M=100, SD = 15). Previously research within this area has found the mean IQ to fall between 83.6 and 89.4 (Burra, Stergiopoulos, & Rourke, (2009). In terms of executive functioning, the results were also found to be in line with previous research in the area. Scores on the WCST showed that participants struggled to complete as many categories as a control sample (Lucey, et al., 1997) which was also previously found in a homeless population (Seidman et al, 1997). This population also was found to make considerably higher number of errors than a control group. The WCST task was developed as a measure of abstract reasoning and the adaption of responses strategies to changing contextual cues (Barcelo, 2001). Deficits in this area could have significant impact on daily functioning and in particular on an individual's ability to make different choices.

Another psychometric measure assessing executive functioning used was the IGT. Within this sample, participants consistently chose the bad deck more frequently than the good decks. The bad decks were more likely to give higher rewards in the short term over a number trials had much higher costs. This group of participants were less likely to learn from these costs and switch to the lower cost, lower reward good decks. Again this measure tests novel problem-solving (Lin, Song, Chen, Lee, & Chiu, 2013) and could be demonstrative of choices being made in daily life and the detrimental decisions being made due to the deficits in this area.

The third executive functioning measure, the Barrett impulsivity scale, was a self-report questionnaire assessing impulsivity within this population. On all subscales and total score, this group scored higher than the normative data indicating higher levels of impulsivity. This is concurrent with the results of the psychometrics and could play an important role in identifying factors that contribute to this population becoming and staying homeless. All three measures showed the mean scored for this population fell below those expected within the general population. Although it is not possible to determine where the general intellectual functioning and executive functioning derive

from in this group, there are several factors that could play a part. Some factors suggested within the literature include substance and alcohol abuse, traumatic or acquired brain injury, mental health difficulties, progressive neurological disorders, developmental disorders (Backer &Howard, 2008) or childhood trauma (Pluck et al., 2011). For many homeless people, they are exposed to more than one potential cause of impairment (Backer & Howard, 2007), it makes it more difficult to differentiate between the exact cause.

Role of Executive Functioning. This study and previous research have demonstrated the presence of executive functioning difficulties within this population. The link between childhood trauma and executive functioning have been shown within this population previously (Pluck et al., 2011) however, the author believes that this is the first study investigating the mediating effect of executive functioning between childhood trauma and maladaptive behaviours. Considering Crowell, Beauchaine and Linehan (2009)'s model of BPD, they suggest that impulsivity and executive functioning plays an important role in the development of poor emotional regulation which in turn contributes to the use of maladaptive strategies to cope with these difficult experiences.

Although this sample was found to show poor executive functioning skills on the psychometrics, it was the self-report measure of impulsivity that mediated the relationship between childhood trauma and maladaptive behaviours and not the psychometrics. Although the WCST and the IGT showed impairments in executive functioning, these findings were not significantly correlated with the measure of childhood trauma. These findings seem to support the importance of impulsivity within this population as suggested by Crowell, Beauchaine and Linehan (2009)'s extended model of BPD. These findings may have significance for understanding how some people become homeless as these impulsive behaviours may indicate lower levels of self-awareness as they struggle to respond flexibly to the demands of the situation.

Implications for Clinical Psychology

The current study furthers the research on homelessness and some of the possible pathways that contribute to homeless, in particular the influence of childhood trauma and problem behaviours. It also develops the knowledge of neuropsychological profiles

that may be present within the homeless population and the subsequent difficulties that may occur with these. This information on cognitive deficits that can occur within this group can further support the development of interventions that are used within this population. Current groups, such as the life skills or alcohol or drug programmes, may not be suitable or accessible for some of this population who present with cognitive difficulties. Previous research has highlighted that many groups designed for the general population are inaccessible for people with cognitive deficits and may cause drop-out or non-compliance with the programme. Key examples of this are the substance and alcohol abuse programmes which are frequently an area of difficulty for the homeless population. Homeless hostels also provide groups and interventions on life skills which may be inaccessible for some of this population.

Another consideration for this group entering homeless hostels is that those demonstrating executive functioning difficulties may struggle to monitor their behaviour and conform to hostel regulations (Benson & Wilkerson, 2000). Their impulsive behaviour correlates with their engagement with maladaptive coping strategies, the use of which may cause their expulsion from these environments due to disruption behaviour or failure to comply with prescribed treatments (HCH Clinician's Network 2003). However further knowledge and the dissemination of this knowledge to staff groups working with this population can assist in intervening in the processes which should have an impact on the resulting behaviours. Maladaptive behaviours frequently occur comorbidly (Kingston et al, 2011) and therefore an intervention which does not target an individual behaviour but instead the precipitating factors may be more successful.

Overall, this study highlights the importance of cognitive assessment of homeless people in order to successfully tailor the intervention and provide the correct levels of support. Cognitive impairments within this population are frequently not assessed (Osher, 2006; Solliday-McRoy et al, 2004) and staff are rarely trained in performing assessments. If cognitive impairments are not recognised, needs can frequently go unnoticed and unaddressed. People with cognitive impairments can frequently be mistaken as being 'in denial' or 'non-compliant' because they struggle to fully participate in the service (Gonzalez et al, 2001). Although the findings of this study suggest that many of this group struggle with executive functioning difficulties, assessment is required in order to distinguish the difficulties that may be present.

The identification of any cognitive deficits then has implications for interventions that may be applicable. Some strategies that have been trialled with this group include supported housing which is adapted for those with cognitive impairments, adapting service modalities to be less cognitively demanding, setting well-defined goals, repetition of all rules and instructions and for these to be presented in concrete concise language (Solliday et al, 2004). Other strategies suggested include continuous behavioural reinforcement, cognitive rehabilitation techniques to be used when possible and the services provided are all conducted in a structured way. Cognitive remediation has been found to be a successful intervention for improving both general cognitive function and specific cognitive impairments (Medalia & Richardson, 2005).

To date, there is a lack of research on interventions that may improve cognitive functioning within this population (Burra et al., 2009), however drawing from current therapeutic interventions used in clinical practise, dialectical behaviour therapy (DBT) can be used to address impulsive behaviour. Dialectical behaviour therapy is the most recognised treatment for borderline personality disorder (BPD) which is recognised to contain components of executive functioning deficits. An adapted version of this treatment, which promotes emotion regulation, core mindfulness, and self-management skills, has been found to be successful in targeting impulsive aggression in a forensic population (Shelton, Sampl, Kesten, Zhang, & Trestman, 2009). Within this adapted model, the focus was on developing the skills of DBT and not the individual therapy that accompanies it in the general application. A component of DBT which is also being developed as a standalone therapy for executive functioning deficits is Mindfulness. The development of mindfulness skills has been found to contribute to participants becoming more self-aware and more able to successfully monitor their behaviour (Zeidan, Johnson, Diamond, David, & Goolkasian 2010.). Manly and Murphy (2012) also suggest that the use of mindfulness in order to increase self-aware in combination with practical strategies and increase executive functioning abilities.

A recent intervention that has been found to improve executive functioning in combination with mindfulness practise is Goal Management Training (GMT; Robertson, 1996). Currently found to show significant improvements in populations such as abstinent polysubstance abusers (Alfonso, Caracuel, Delgado-Pastor, & Verdejo-García, 2011) and patients with frontal lobe brain damage (Levine, et al., 2011), this programme promotes a mindful approach to complex tasks that pose real-life

problems for patients with the goal of ceasing ongoing behaviour and switching to monitoring and adjusting goals. This programme has not yet been trialled within the homeless population but demonstrates a possible method of intervention for the executive functioning difficulties clearly present within this population.

Unfortunately, staff members working with this population are currently not given the training to work with all aspects of difficulties that may occur with this complex group. There are multiple challenges that may present within this population including cognitive impairments and mental illness and it may be that staff are ill equipped to recognise and adapt to the comorbid difficulties that this population may present with.

Limitations of this study

There are a number of limitations of this study which need to be considered. Firstly the use of a cross-sectional design and correlational analysis means that it is not possible to infer causality. The sample of people all recruited from hostels in the city of Southampton means that it is difficult to say if the results can be generalised to the UK homeless population as they derive from a small geographical location. All participants within this study were also recruited from hostels, and none were street homeless (roofless). This also impacts on generalising as it may be that a certain group of homeless people are more likely to seek hostel accommodation and therefore, there may be two separate groups within this population. As the recruitment made use of opportunity sampling may have resulted in a selection bias, though hostel staff did encourage a number of participants to participate who may not have volunteered themselves. The majority of this sample was male, which meant that it was not possible to draw conclusions based on gender differences within the sample.

Another limitation was the type of measures used in this study. Due to the low literacy levels found within this population, many participants struggled with some of the questions on this measure, in particular questions where a double negative was present. This measure also does not suggest a timeframe to which it refers so some participants struggled to address some questions where there had been a change of lifestyle recently (i.e. stopped using alcohol or drugs). The neuropsychological tests used, the WCST and the IGT were both conducted using a computerised version. Although this reduces the possibility for human error in administration, it also makes it

difficult to monitor effort of the participants during testing. As a measure of effort was not completed, it is difficult to assess the validity of these measures conducted. Also no formal measure of perception was used to assess visual acuity, and although this was asked of each participant, it may be possible that some participants did not report perceptual difficulties and struggled on these measures. A limitation of the other measures collected is that they were self-report measures. It is possible that these measures were impacted through social desirability bias as they were all administered in the presence of the author. Participants were reassured that all information given was confidential and encouraged to give honest answers in order to address this bias. It was also reiterated that these measures would have no impact on any external factors like housing or treatment received in order to address this bias also.

A limitation which needs to be considered with this population is their current drug and alcohol use. The CMPB clearly demonstrates that many participants identified high levels of drug and alcohol use and it is possible that some may have been under the influence of substances whilst participating in this study. In order to address this, staff were asked to remind participants not to consume alcohol or drugs before the testing session and if participants were seen to be consuming alcohol or seemed to be under the influence of substance, they were asked to return to the subsequent testing session.

Areas for future research

As one of the first studies investigating the relationships between executive functioning, childhood trauma and problem behaviours, this study would need to be replicated using a larger sample that would be more representative of this population. To achieve this, future samples should included a broader range of ethnicities, a higher sample of females and include those who are roofless as well as homeless. To date, the most frequently used method of research is correlational so this area of study would benefit from more robust methods being applied.

Future studies would also benefit from considering a broader range of factors that contribute to cognitive difficulties within this population as a number of factors are implicated. Longitudinal studies are also required to investigate how the relationship between these factors and cognitive functioning over time. There are currently no longitudinal studies investigating the effect of homelessness on cognition. Longitudinal

research should also investigate the impact of cognitive functioning on health and social outcomes, such as length of homelessness and quality of life.

One potential factor that has been found to contribute to the relationship between childhood trauma and neuropsychological functioning is mental health. Previous research has shown that traumatic events in childhood have a relationship to mental illness in adults (Crane & Duggan, 2009). It has also been shown that mood disorders and psychotic illness can impact on the same neurobehavioural symptoms that are investigated in this study (Brown & Pluck, 2000). Future studies should account for this relationship by investigating the current relationships whilst controlling for mental health.

An important area of research that is absent with this population is the efficacy of different interventions for the difficulties present. Little research has explored the different types of interventions available for the carrying difficulties found within this group. Few studies have assessed interventions aimed to improve cognitive functioning. One study has found evidence of improved executive functioning when supported living environments are provided but this finding is yet to be replicated (Seidman et al., 2003).

Conclusion

Homeless is an increasing problem in the UK but the pathways to homelessness are poorly understood. Developing an understanding of how these pathways develop and are maintained is imperative for developing successful interventions for the future. This cross-sectional study explored the cognitive functioning within this population and the relationships between childhood trauma, executive functioning and problems behaviours. In line with previous studies, the mean IQ of this population was found to be below the normative mean. This sample also showed impairment on measures of executive functioning. Impulsivity was shown to mediate the relationship between childhood trauma and problem behaviours though no mediating relationship was found when using the psychometric measures. This highlights the importance of assessing cognitive functioning (general intellectual functioning and executive functioning) within this population. These areas need to be considered when designing interventions necessary for challenging the development and maintenance of the pathways to homelessness. Further investigation is required to replicate these findings and replicate them with a larger and more general sample with the aim of reducing some of the methodological issues of the present study. It is also necessary to assess interventions which focus on developing these skills that are lacking in a high number of this population.

List of Appendices

Appendix A

Poster Advertising Study

UNIVERSITY OF Southampton

Do early life events lead to maladaptive behaviours by affecting brain function?

Researchers: Noreen Dowling & Dr Nick Maguire

What is this study about?

- To look at some of the things that may maintain homelessness including; how the brain works, difficult childhood experiences and how people cope.
- To provide information that should help to improve services supporting homeless people.

What will happen if I take part?

- You will be asked to complete some questionnaires and tasks on a computer with the researcher.
- It may take up to an hour and a half of your time.
- To say thank you for completing the questionnaires, you will be offered a £9 supermarket voucher.

How can I take part?

- Ask a member of staff to register your interest and to give you an information leaflet!

School of Psychology, Doctoral Programme in Clinical Psychology, Building 44a, University of Southampton, Highfield Campus, Southampton. SO17 1BJ. 02380 59532

Appendix B

Information Sheet

UNIVERSITY OF Southampton

Participant Information Sheet (Version no 2, date 31/10/13)

Study Title: Do early life events lead to maladaptive behaviours by affecting brain function

Researcher name: Noreen Dowling
Study reference: ND6
Ethics reference: 8191

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?
I am conducting this study as part of my doctorate in clinical psychology. The purpose of the study is to look at the factors that maintain homelessness including childhood trauma, changes in the way the brain works, and maladaptive coping strategies. This project is funded by the University of Southampton.

Why have I been chosen?
You have been selected as you have recently been homeless and are over the age of 18 years.

What will happen to me if I take part?
You will be asked to complete a series of questionnaires including measures of childhood trauma, impulsivity (acting without thinking) and maladaptive coping strategies. You will then be asked to complete two computerised tasks and provide some demographic information. These will all be completed in one session which will take no more than an hour and a half.

Are there any benefits in my taking part?
After taking part in the study, you will be compensated for your time with a £9 supermarket voucher. It is hoped that this research will help us develop an understanding of why people become homeless and some of the factors that maintain homelessness.

Are there any risks involved?
There are no physical risks but some people find the questionnaires upsetting because they focus on difficult childhood experiences. Examples of questions that some people have found distressing in the past are; ‘as a child were you punished in unusual ways (e.g., being locked in a closet for a long time or being tied up)?’ and ‘did you have traumatic sexual experiences as a child or teenager?’. However, the staff at the hostel know about this and will be available to support you after the session if you would like them to. Other people you could speak to are:

- Your service's healthcare GP
- The Samaritans on **08457909090**

Will my participation be confidential?
All data will be stored in compliance with the University of Southampton policy. Your data will be kept confidential. It will be data coded and stored on a password protected computer. All data will be stored anonymously.

What happens if I change my mind?
You have the right to withdraw from the study at any time without any adverse effects.

What happens if something goes wrong?
In the unlikely case of concern or complaint, you may contact the Chair of the Ethics Committee, Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: 023 8059 4663, email S.L.Boak@soton.ac.uk

Where can I get more information?
If you would like further information, please contact myself through the Clinical psychology department on

Telephone: 023 8059 5320

Clinical Psychology
Building 44a
University of Southampton
Highfield Campus
Southampton
SO17 1BJ

Appendix C

Screening Form

Investigation of the relationship between childhood trauma and maladaptive behaviours mediated by executive functioning within a homeless population

Noreen Dowling and Dr Nick Maguire

SCREENING FORM

ARE YOU ABLE TO READ ONE OF THE DAILY NEWSPAPERS (E.G. THE MIRROR, THE INDEPENDENT)?

☐ **YES** ☐ **NO**

ARE YOU ABLE TO FILL IN YOUR OWN BENEFIT FORMS WITHOUT ANY HELP/SUPPORT?

☐ **YES** ☐ **NO**

FOR THIS STUDY, HOW WOULD YOU PREFER TO FILL IN THE QUESTIONNAIRES?

Please tick one box. You will be able to change your mind on the day, if you wish.

☐ FILL IN QUESTIONNAIRES BY MYSELF

☐ FILL IN QUESTIONNAIRES WITH SOME HELP

☐ FILL IN QUESTIONNAIRES IN AN INTERVIEW

Participant name: **ID number:**

Appendix D

Demographic Questionnaire

INFORMATION ABOUT YOU (demographics form)

1. What is your current age? _____

2. Are you male or female? **(please tick)** Male ☐ Female ☐

3. What is your ethnicity? **(please tick one box)**

White British ☐	White & Black Caribbean ☐	Indian ☐	Chinese ☐
White Irish ☐	White & Black African ☐	Pakistani ☐	Caribbean ☐
White other ☐	White & Asian ☐	Bangladeshi ☐	Black African ☐
	White & Other ☐	Asian other ☐	Other ☐

4. What is your current circumstance with regards to accommodation? **(please tick one box)**

Sleeping on the streets ☐	Staying in a squat ☐	Staying in a shelter ☐
In derelict buildings ☐	Staying on friends sofa's ☐	Staying in homeless hostel ☐
Other outdoor _____ ☐	Overcrowded housing ☐	Other _____

5. When was the first time you became homeless? Approximate date _____

6. How old were you when you first became homeless? Approximate age _____

7. Roughly how many different times you have been homeless? Approximately _____ times

8. Roughly how long have you been homeless this time? Approximately __ years ___ months

Appendix E

Childhood Abuse and Trauma Scale

Home environment Questionnaire (CAT)

In responding to the following questions, please circle the appropriate number according to the following definitions:
0 = never 1 = rarely 2 = sometimes 3 = very often
4 = always

To illustrate, here is a hypothetical question:

Did your parents criticize you when you were young? 0 (1) 2 3 4

If you were rarely criticized, you should circle number 1.

	0 = never	1 = rarely	2 = sometimes	3 = very often	4 = always
1. Did your parents ridicule you?	0	1	2	3	4
2. Did you ever seek outside help or guidance because of problems in your home?	0	1	2	3	4
3. Did your parents verbally abuse each other?	0	1	2	3	4
4. Were you expected to follow a strict code of behaviour in your home?	0	1	2	3	4
5. When you were punished as a child or teenager, did you understand the reason you were punished?	0	1	2	3	4
6. When you didn't follow the rules of the house, how often were you severely punished?	0	1	2	3	4
7. As a child did you feel unwanted or emotionally neglected?	0	1	2	3	4
8. Did your parents insult you or call you names?	0	1	2	3	4
9. Before you were 14, did you engage in any sexual activity with an adult?	0	1	2	3	4
10. Were your parents unhappy with each other?	0	1	2	3	4
11. Were your parents unwilling to attend any of your school-related activities?	0	1	2	3	4
12. As a child were you punished in unusual ways (e.g., being locked in a closet for a long time or being tied up)?	0	1	2	3	4
13. Were there traumatic or upsetting sexual experiences when you were a child or teenager that you couldn't	0	1	2	3	4

speak to adults about?					
14. Did you ever think you wanted to leave your family and live with another family?	0	1	2	3	4
15. Did you ever witness the sexual mistreatment of another family member?	0	1	2	3	4
	0 = never	1 = rarely	2 = sometimes	3 = very often	4 = always
16. Did you ever think seriously about running away from home?	0	1	2	3	4
17. Did you witness the physical mistreatment of another family member?	0	1	2	3	4
18. When you were punished as a child or teenager, did you feel the punishment was deserved?	0	1	2	3	4
19. As a child or teenager, did you feel disliked by either of your parents?	0	1	2	3	4
20. How often did your parents get really angry with you?	0	1	2	3	4
21. As a child did you feel that your home was charged with the possibility of unpredictable physical violence?	0	1	2	3	4
22. Did you feel comfortable bringing friends home to visit?	0	1	2	3	4
23. Did you feel safe living at home?	0	1	2	3	4
24. When you were punished as a child or teenager, did you feel "the punishment fit the crime"?	0	1	2	3	4
25. Did your parents ever verbally lash out at you when you did not expect it?	0	1	2	3	4
26. Did you have traumatic sexual experiences as a child or teenager?	0	1	2	3	4
27. Were you lonely as a child?	0	1	2	3	4
28. Did your parents yell at you?	0	1	2	3	4
29. When either of your parents was intoxicated, were you ever afraid of being sexually mistreated?	0	1	2	3	4

30. Did you ever wish for a friend to share your life?	0	1	2	3	4
31. How often were you left at home alone as a child?	0	1	2	3	4
32. Did your parents blame you for things you didn't do?	0	1	2	3	4
33. To what extent did either of your parents drink heavily or abuse drugs?	0	1	2	3	4
34. Did your parents ever hit or beat you when you did not expect it?	0	1	2	3	4
35. Did your relationship with your parents ever involve a sexual experience?	0	1	2	3	4
36. As a child, did you have to take care of yourself before you were old enough?	0	1	2	3	4
37. Were you physically mistreated as a child or teenager?	0	1	2	3	4
38. Was your childhood stressful?	0	1	2	3	4

Please answer all the questions below.

Appendix F

Composite Measure of Problem Behaviour

Maladaptive behaviours Questionnaire

This questionnaire is designed to ask you about a range of behaviours that you may, or may not, engage in. It includes 46 statements and you are required to rate the extent to which each statement characterises you, using the scale below

1	2	3	4	5	6
Very unlike me	Quite unlike me	A little unlike me	A little like me	Quite like me	Very like me

For example, if you read a statement and think "it's very unlike me to do X" you would write a "1" next to the statement. If you think "that's only very slightly like me" write '4', or if you think "it's very like me to do that", write '6'.

Before completing the questionnaire, please take note of the following points: Where questions refer to internet use, this means non-work related use such as chat rooms, surfing the net etc. Where questions refer to sexual behaviours, this includes both foreplay and all forms of sexual intercourse. Where questions refer to drugs, this means the use of illegal drugs. This would include, for example, Cannabis, Cocaine, Ecstasy etc. Where questions refer to smoking, this means tobacco.

Please read each statement carefully and answer as honestly as possible. **All answers are anonymous. Please do not leave any answers blank**.

		1. very unlike me	**2. Quite unlike me**	**3. A little unlike me**	**4. A little like me**	**5. Quite like me**	**6. Very like me**
1	It's like me to say no to drugs (this includes cannabis)	1	2	3	4	5	6
2	It's like me to be pre-occupied by thoughts about smoking when smoking is prohibited	1	2	3	4	5	6
3	It's like me to sometimes consume more than 6 alcoholic drinks in one evening	1	2	3	4	5	6
4	It's like me to ignore dietary details (e.g., calorie content) when choosing something to eat	1	2	3	4	5	6
5	It's like me to exercise even when I am feeling	1	2	3	4	5	6

	tired and/or unwell	
6	It's like me to sometimes intentionally prevent scars or wounds from healing	1 2 3 4 5 6
7	It's like me to smoke tobacco	1 2 3 4 5 6
8	It's like me to surf the net/play computer games before doing something else that needs doing	1 2 3 4 5 6
9	It's like me to generally have no interest in taking drugs (this includes cannabis)	1 2 3 4 5 6
10	It's like me to sometimes engage in sexual activities with someone I have only just met	1 2 3 4 5 6

		1. very unlike me	**2. Quite unlike me**	**3. A little unlike me**	**4. A little like me**	**5. Quite like me**	**6. Very like me**
11	It's like me to find that my work performance or productivity suffers because of my internet/video game use	1	2	3	4	5	6
12	It's like me to never resort to violence	1	2	3	4	5	6
13	It's like me to sometimes actively seek out drugs for personal use (this includes cannabis).	1	2	3	4	5	6
14	It's like me to feel irritation/frustration if I am in a non-smoking environment.	1	2	3	4	5	6
15	It's like me to sometimes scratch or bite myself to the point of scarring or bleeding	1	2	3	4	5	6
16	It's like me to sometimes feel pre-occupied with the internet/computer games	1	2	3	4	5	6
17	It's like me to skip doing exercise for no good reason	1	2	3	4	5	6
18	It's like me to drink a lot more alcohol than I initially intended	1	2	3	4	5	6
19	It's like me to have a long list of things that I dare not eat.	1	2	3	4	5	6

20	It's like me to feel excitement and/or tension in anticipation of getting drunk	1	2	3	4	5	6
21	It's like me to be content if I am prevented from exercising for a week	1	2	3	4	5	6
22	It's like me to always stop eating when I feel full	1	2	3	4	5	6
23	It's like me to prefer being in places where smoking is prohibited	1	2	3	4	5	6
24	It's like me to control my temper	1	2	3	4	5	6
25	It's like me to deliberately take small helpings as a means of controlling my weight	1	2	3	4	5	6
26	It's like me to exercise more than three times a week	1	2	3	4	5	6
27	It's like me to sometimes eat to the point of physical discomfort	1	2	3	4	5	6
28	It's like me to sometimes feel tension and/or excitement in anticipation of doing exercise	1	2	3	4	5	6
29	It's like me to sometimes cause myself direct bodily harm by, for example, cutting or burning myself	1	2	3	4	5	6
30	It's like me to only eat when I am hungry	1	2	3	4	5	6
		1. very unlike me	**2. Quite unlike me**	**3. A little unlike**	**4. A little like me**	**5. Quite like me**	**6. Very like me**
31	It's like me to unsuccessfully try to cut back my use of the internet/computer games	1	2	3	4	5	6
32	It's like me to be excited by the opportunity of taking drugs (this includes cannabis)	1	2	3	4	5	6
33	It's like me to sometimes get so angry that I break something	1	2	3	4	5	6
34	It's like me to sometimes have more than one sexual partner	1	2	3	4	5	6
35	It's like me to sometimes engage in sexual actives	1	2	3	4	5	6

	with someone when really I shouldn't	
36	It’s like me to easily limit my use of the internet or video games	1 2 3 4 5 6
37	It’s like me to feel the urge to have a cigarette.	1 2 3 4 5 6
38	It’s like me to sometimes feel that I need to take drugs (this includes cannabis)	1 2 3 4 5 6
39	It’s like me to go out with friends who are drinking, but opt to stay sober	1 2 3 4 5 6
40	It’s like me to sometimes think that I might have a drugs problem (this includes cannabis).	1 2 3 4 5 6
41	It’s like me to avoid eating when I am hungry	1 2 3 4 5 6
42	It’s like me to find it difficult to stop eating after certain foods	1 2 3 4 5 6
43	It’s like me to be aggressive when sufficiently provoked	1 2 3 4 5 6
44	It’s like me to feel the urge to intentionally harm myself	1 2 3 4 5 6
45	It’s like me to sometimes feel that I need an alcoholic drink	1 2 3 4 5 6
46	It’s like me to sometimes claim I have already eaten when this is not true	1 2 3 4 5 6

Kingston, J. L., Clarke, S., Ritchie, T., & Remington, B. (2011). Developing and validating the “composite measure of problem behaviors”. *Journal of Clinical Psychology, 67,* 736-751.

Appendix G

Barrett Impulsivity Scale

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

	① Rarely/Never	② Occasionally	③ Often	④ Almost Always/Always
1	I plan tasks carefully.			① ② ③ ④
2	I do things without thinking.			① ② ③ ④
3	I make-up my mind quickly.			① ② ③ ④
4	I am happy-go-lucky.			① ② ③ ④
5	I don't "pay attention."			① ② ③ ④
6	I have "racing" thoughts.			① ② ③ ④
7	I plan trips well ahead of time.			① ② ③ ④
8	I am self controlled.			① ② ③ ④
9	I concentrate easily.			① ② ③ ④
10	I save regularly.			① ② ③ ④
11	I "squirm" at plays or lectures.			① ② ③ ④
12	I am a careful thinker.			① ② ③ ④
13	I plan for job security.			① ② ③ ④
14	I say things without thinking.			① ② ③ ④
15	I like to think about complex problems.			① ② ③ ④
16	I change jobs.			① ② ③ ④
17	I act "on impulse."			① ② ③ ④
18	I get easily bored when solving thought problems.			① ② ③ ④
19	I act on the spur of the moment.			① ② ③ ④
20	I am a steady thinker.			① ② ③ ④
21	I change residences.			① ② ③ ④
22	I buy things on impulse.			① ② ③ ④
23	I can only think about one thing at a time.			① ② ③ ④
24	I change hobbies.			① ② ③ ④
25	I spend or charge more than I earn.			① ② ③ ④
26	I often have extraneous thoughts when thinking.			① ② ③ ④
27	I am more interested in the present than the future.			① ② ③ ④
28	I am restless at the theater or lectures.			① ② ③ ④
29	I like puzzles.			① ② ③ ④
30	I am future oriented.			① ② ③ ④

Appendix H

Consent Form

UNIVERSITY OF Southampton

CONSENT FORM (*Version 2, 31/10/13*)

Study title: **Investigation of the relationship between childhood trauma and maladaptive behaviours mediated by executive functioning within the homeless population**

Researcher name: Noreen Dowling

Study reference: 8191

Ethics reference: ND6

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (date 31/10/13/version no.2) of participant information sheet and have had the opportunity to ask questions about the study.	☐
I agree to take part in this research project and agree for my data to be used for the purpose of this study. I understand that data collected from this study may be used in future analysis by the	☐
I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.	☐
The 'validity' of my consent is conditional upon the University complying with the Data Protection Act and I understand that I can request my data be removed from this database at any time.	☐

Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of participant (print name)……

Signature of participant……..

Date……

Appendix I

Debriefing Form

UNIVERSITY OF Southampton

Investigation of the relationship between childhood trauma and maladaptive behaviours mediated by executive functioning in the homeless population

Debriefing Statement *(written or verbal)*

(Version 2, 10/10/13)

Thank you for taking part in this study and providing us with lots of valuable information.

The aim of this research was to investigate if the different ways people understand information changes how they cope with difficult situations. It has been found that childhood problems may cause people to have difficulties with planning and controlling some parts of their behaviour. This study is looking at whether these planning difficulties are a factor that can cause people to become and stay homeless. It is expected that we will find a link between childhood trauma, ways in which the brain works and coping strategies. Your data will help our understanding of how the cycle of homelessness is kept going. It is hoped that it will help to improve services in the future. Once again results of this study will not include your name or information about you.

Once this research is complete, it may be published and presented at conferences to other researchers or professionals. Reports will not include any information about you but instead will group together the results of all participants. If you would like a copy of the reports, please inform us and we will be happy to forward a copy to you.

Some of these questions may produce strong feelings or thoughts. It is normal, however if you feel that this is a concern for you, please speak to a member of staff. If you should need further help and support, any of these people will be able to help you:

- Your key worker at this service
- Your service's healthcare GP
- The Samaritans on 08457909090

If you have questions about your rights as a participant in this research, or if you feel that you have been places at risk, you may contact the

Chair of Ethics Committee,

Department of Psychology,

University of Southampton,

Southampton,

SO17 1BJ,

02380595578.

Or Researchers

Noreen Dowling or Dr. Nick Maguire

Clinical Psychology
Building 44a
University of Southampton
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Southampton
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Telephone: +44 (0)23 8059 5320

Appendix J

Mood Repair Task

UNIVERSITY OF Southampton

Do early life events lead to maladaptive behaviours by affecting brain function?

Researchers: Noreen Dowling & Dr Nick Maguire

This is an optional task which can be completed any time after taking part in the research study. Please read each of the jokes below and rate how funny you found each one on the scale provided

Not funny at all 1_____2_____3_____4 Very funny

Not funny at all 1_____2_____3_____4 Very funny

Not funny at all 1_____2_____3_____4 Very funny

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