# Investigating a general risk factor for intergenerational transmission of psychopathology in children in military families

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**Thesis declaration form**

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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## Overview

This thesis investigates the p-factor, as the shared variance common to the many forms of psychopathology (Caspi et al, 2014). It does so by reviewing its possible prognostic value, and as part of a factor analytic approach to examining the relationship between veteran father's psychopathology and that of their children. It is a joint thesis with *'A mixed-method exploration of the impact of PTSD in UK military veterans and their families'* (Jones, 2020).

A growing evidence-base has identified the p-factor as accounting for one's vulnerability to mental disorder, as well as comorbidity, severity and chronicity (Caspi & Moffit, 2018). Whilst it is established as a statistical finding in psychopathology research, uncertainty remains over the meaning of the finding and the nature of the possible construct. Part 1, the literature review, systematically reviews longitudinal studies that can assess the possible future outcomes following measurement of the p-factor. Fourteen studies were identified and provide strong indication of the p-factor's prognostic value, across a range of outcome domains.

A bifactor analytic framework was subsequently used to investigate mental disorder of veterans and their children. Part 2, the empirical paper, used self-report psychopathology data on veteran fathers and parent-report data on their children to examine the relationship between the two. Bifactor models were found to fit the data best and findings suggested there was an association between father's psychopathology and child's psychopathology. Although father's reflective functioning was associated with children's psychopathology, the findings suggest it was a non-significant mediator between father's p and child p.

## Impact Statement

The findings of the literature review (part 1 of this thesis), suggest that there is a prognostic value to the general dimension of psychopathology. It helps emphasise the utility of research seeking to understand this p factor by highlighting a very pragmatic use this general dimension might have in predicting future outcomes. There has been a significant call to improve mental health services to become more efficient and effective in delivering evidence-based treatments with a focus on early intervention (McGorry, Bates & Birchwood, 2013). In light of this, the findings of this systematic review suggest the p factor might provide a target for future measurement tools to best predict individuals that will experience particular adverse outcomes, such as poor school attendance, anti-social problems, and suicide. The findings from the literature review help to validate the construct of the p factor in a practical way and do so by clearly identifying its longitudinal associations with a range of separate objective measures of outcomes. By helping to validate a construct that has increasingly been suggested in research studies (Caspi & Moffit, 2018) it indicates potential scope for interventions to target this construct, such as through the development and implementation of transdiagnostic approaches in clinical practice.

The empirical paper (part 2 of this thesis) reports on a study of the psychopathology of veterans and their children. Using factor analytic methods, it adds support to a growing evidence-base by identifying bifactor models (comprising the general dimension and spectral factors) of psychopathology as the best fitting for data on the veteran fathers and their children. Using path analyses, it suggests father's psychopathology significantly predicts the psychopathology of their children. This highlights the importance of paternal mental health in families and of the intergenerational transmission of psychopathology. Perhaps unsurprisingly, it suggests that veteran children's mental health would be impacted by targeting early intervention of veteran's psychopathology, but also importantly suggests a

direct effect such targeted support could have in reducing child mental disorder through reducing the mental disorder of their fathers. Interestingly, the study identifies that the father's p factor scores, from the bifactor statistical models, more strongly predict the children's p factor scores, compared with using the computed scale scores. This indicates further utility of the bifactor model in predicting intergenerational transmission of psychopathology, and development of an assessment tool to efficiently and accurately capture this statistical construct could better identify parents who may have an increased risk of 'transmitting' psychopathology to a child. Although the study found a relationship between father's reflective functioning and their child's psychopathology, mediation path analyses suggest it was not a mediating mechanism between father and child's psychopathology. The research discusses the importance of further exploring the role of reflective functioning, such as whether it instead has a moderating effect or whether the relationship would be different between mothers and their children.

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Finally, I would like to dedicate this to my grandma, Monambal Shanmugam (1941-2018).

# Part 1: Literature Review

## What is the prognostic value of the *p*-factor and what outcomes might it help predict?

**Abstract**

*Aims:* To review the literature that investigates the prognostic value of the general dimension of psychopathology (p-factor).

*Method:* PsycInfo, Web of Science (core collection) and MEDLINE databases searched for studies that modelled the p-factor and that had a longitudinal study design, identified 13 papers meeting inclusion criteria for review.

*Results:* The p-factor was longitudinally associated with a number of outcomes in areas such as mental ill-health, self-harm and suicide, psychosocial functioning, academic attainment, medical consequences, financial/legal issues, and antisocial problems.

*Conclusions:* The p-factor could be an important dimension of psychopathology to measure to help predict outcomes and inform interventions aimed at reducing future life impairment. The importance of moving towards better understanding of developmental pathways of psychopathology is emphasised.

## Introduction

In the context of psychopathology, there has been a recent resurgence in studies and papers analysing the latent structure underpinning psychopathology (Caspi et al, 2014). The diagnostic system currently used in research and clinical practice conceptualises mental health disorders as separate, categorical and distinct (Caspi & Moffit, 2018). This approach has increasingly been challenged through the recognition of unclear and arbitrary boundaries between 'psychopathology' and 'normality', and similarly between the different syndromes of symptoms categorised as psychiatric diagnoses (Kotov et al, 2017). In addition to these challenges, Kotov et al highlight unreliability of clinical diagnosis, heterogeneity within diagnoses, and comorbidity (the coexistence of two or more disorders or conditions) as limitations and criticisms of the current psychiatric diagnostic systems ubiquitous in research and clinical practice. Wakefield (2016) provides a further conceptual rationale for re-considering the Diagnostic Statistical Manual of Mental Disorders (DSM-5) and other nosologies, based on the concern that diagnostic expansiveness is pathologising normality.

Factor analytic models of psychopathology have been long-established and widely used in research on classification of childhood psychopathology, where findings converged on two primary dimensions initially (Achenbach and Edelbrock, 1981) and later with an additional third (Wright et al, 2013): internalising (referring to symptoms of depression and anxiety), externalising (relating to aggressive and hyperactive-impulsive symptoms and alcohol/substance misuse) and thought disorder (disassociation, unusual beliefs, disorganised thoughts, and hallucinations), respectively. These findings and suggestions point towards the possibility of a more parsimonious structure of psychopathology than currently conceptualised through the DSM and other nosologies.

A growing body of literature appears to be applying pressure to revisit and revise the structure of psychopathology, as it highlights the significant variance shared by different mental health disorders, at a given time (Wright et al, 2013), across the life span (Lahey et al, 2014) and between generations (Martel et al, 2016). These findings have pointed towards the possibility of a general factor underlying the propensity to develop all or particular forms of psychopathology. Caspi et al (2014) built on dimensional research by Lahey et al (2012) to model this proposed general factor of psychopathology, naming it the 'p' factor' due to its conceptual parallel with the 'g' factor of general intelligence, a similar dimension in psychological science. The research used longitudinal data from a whole birth-cohort of over 1000 people born in Dunedin, New Zealand.

Through this research, Caspi and colleagues (2014) used Confirmatory Factor Analysis (CFA) to test three different models typically used to examine such latent constructs. These models were: the correlated-factors model, where three separate dimensions (representing externalising, internalising and thought disorder) correlated with each other and also independently influenced a subset of diagnostic symptoms; the bi-factor model, where one general psychopathology factor (p-factor) influences all the diagnostic symptom factors, whilst the specific dimensions of psychopathology (externalising, internalising, and thought disorder) each also influence a subset of diagnostic symptoms; and a single-factor model, in which the General Psychopathology factor was the only dimension to receive loadings from all diagnostic symptoms. Results revealed that, whilst initially explained by three high-order factors, psychiatric disorders were better explained by the General Psychopathology factor.

This finding, of a proposed general dimension to psychopathology, has been replicated in studies of adolescents (Patalay et al, 2015; Lacuelle et al, 2015). Analysing both self- and parent-reported data, Lacuelle et al (2015) revealed that the structure of

psychopathology was best modelled using both the general psychopathology factor in addition to the spectral factors of externalising and internalising. Patalay et al (2015) analysed data from a large community-based sample of early adolescents to find that the general psychopathology bi-factor model was the best fit to the data. The authors of this prospective study also found that p (rather than residual 'group' symptom factors) best predicted educational attainment and future psychopathology.

There is now a significant evidence-base supporting the proposition of a latent 'p factor' within the structure of psychopathology. It has been identified as a vital concept to explore further although, whilst very promising, it is recognised currently as a statistical abstraction from data analyses that could be developed into a more concrete construct (Caspi and Moffitt, 2018) to help improve its clinical relevance and usefulness.

There have been various proposals for how to conceptualise the p-factor (and higher-order dimensions more broadly) such as a particular 'vulnerability' (Laceuelle et al, 2015) and a transdiagnostic 'proneness towards distress' (Del Giudice, 2016). Whilst greater work is required to conceptually elucidate the p-factor and establish it as a concrete construct, increasing empirical findings reveal its utility as a dimensional measure. This review aimed to explore a particular aspect of this utility. The specific review question was:

1. *What is the prognostic value of the p-factor*

This question was addressed by reviewing research studies that were non-interventional (i.e. studies investigating associated outcomes, not outcomes as a response to an intervention), longitudinal, that modelled the p-factor and could associate it with measures of adverse outcomes.

## Method

Systematic search of studies

To identify all records that met the inclusion criteria, PsycInfo, Web of Science (core collection) and MEDLINE databases were systematically searched for papers published in English that used terms designed to capture two aspects (1) modelling of a general psychopathology factor (p-factor) and (2) use of a longitudinal study design. Having identified a code of terms that were expected to exhaustively and systematically identify eligible studies, a scoping search was carried out to confirm that, for example, two known eligible papers (Caspi et al, 2014; Patalay et al, 2015) were identified using the proposed terms. The following code of terms (and synonyms) were searched in the titles, abstracts and keywords of all records from the databases:

(1) (psychopathology OR psychiatr* OR disorder OR symptom OR diagnosis OR "mental health") AND ("bi-factor" OR bifactor OR "nested factor" OR "p factor" OR "psychopathology factor")
(2) longitudinal OR predict OR study OR prospective OR cohort OR prognostic

All papers were included in the review that fitted the inclusion and exclusion criteria set out in Table 1.

**Table 1: Review inclusion and exclusion criteria**

| Inclusion Criteria | Included | Excluded |
|---|---|---|
| **1. Study type** | Quantitative research studies that used real data | All other types of study and papers. For example: qualitative studies; studies with simulation data; commentary articles |
| **2. Publication Type** | Publications from a peer-reviewed journal | All other types of publication. Such as magazines, books, dissertations |
| **3. Language** | The study was reported in English language | All other languages |
| **4. Research design** | Used a longitudinal study design that had data from at least two time points from the same sample | All papers that only use cross-sectional data |
| **5. Methodology** | The study did not involve any experimental manipulation or intervention | All papers that involved treatments and interventions |
| **6. Analysis** | The study reported on modelling the p-factor from the data | All papers that did not report on the p-factor in relation to the real study data. |
| **7. Results** | The article reported results from measures of outcomes associated with the p-factor. | Studies excluded that exclusively investigate the 'structural stability' or longitudinal invariance of the bi-factor model |

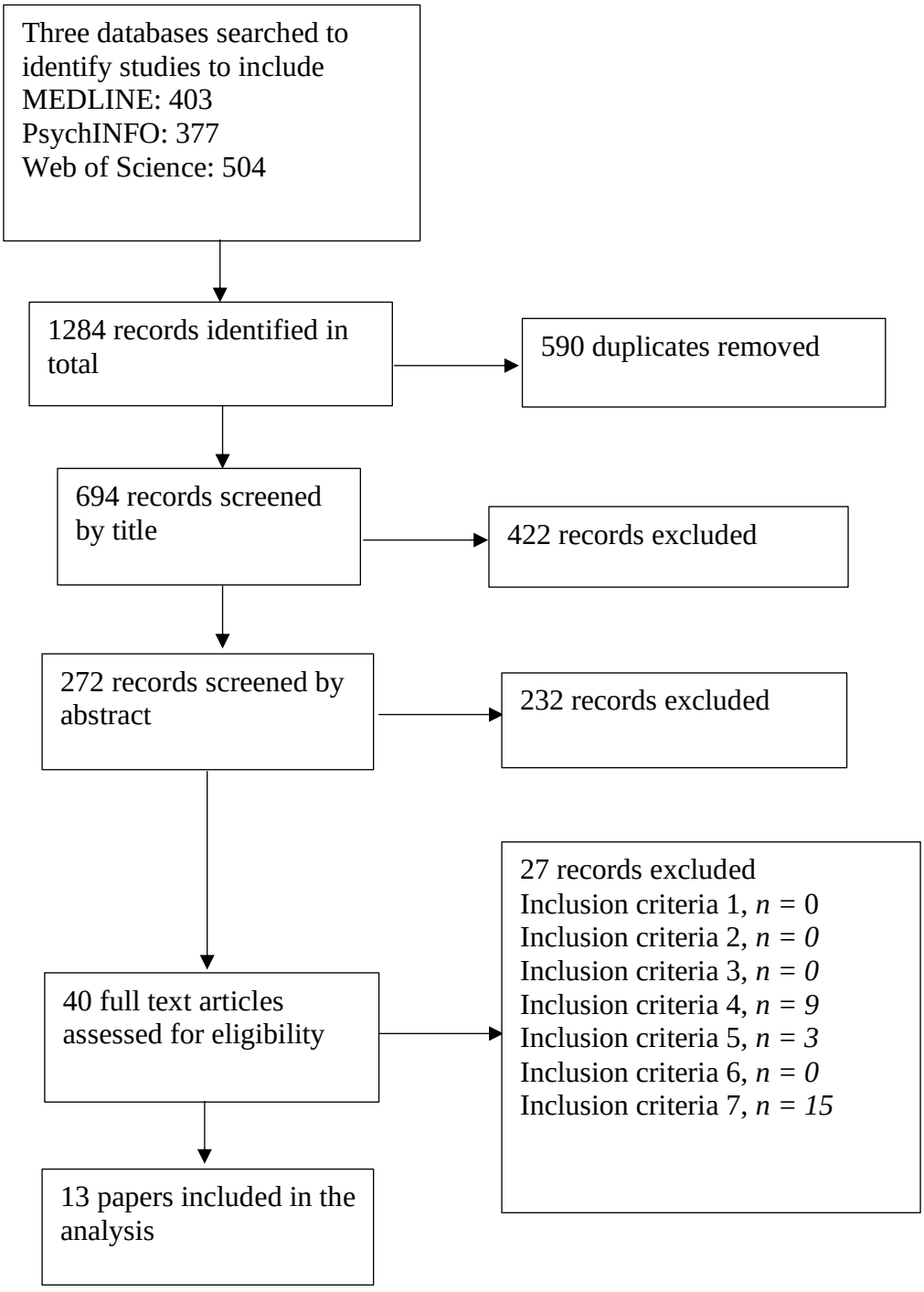
Identification of relevant studies

All results from the searched databases were imported into Endnote X7.7.1 (Thompson Reuters, 2016). According to the inclusion and exclusion criteria (Table 1), these records were then systematically screened initially by title and then, where necessary, by abstract. Critically, papers were included if they reported on outcomes associated with the p-factor (item 7 in Table 1), across time (item 4 in Table 1). As a result, studies were excluded that instead were reporting on the structural stability of the p-factor over time. This subset of the excluded papers, interestingly report, for example, that the bifactor model and correlated factors model demonstrate equal strength of structural stability over time (Gluschkoff et al, 2019) and suggest the importance of bifactor/transdiagnostic factors in understanding the continuity of mental disorder over time (Kim & Eaton, 2015). Full text copies were obtained for all remaining records and these were additionally checked against the inclusion criteria.

Figure 1 summarises this process of identifying relevant studies and details the number of records excluded at each stage.

**Figure 1**

**Flow chart showing included studies**



Methodological limitations of studies

It is important to note some of the methodological limitations of the studies included in the review. As outlined in the results, five of the six papers reporting on adult samples draw on the same study data. Therefore, some of the conclusions made in this review, whilst carefully grounded, are based on limited actual data. All studies were non-interventional cohort studies providing good internal validity. However, only four of the nine studies used by the papers had sample sizes larger than 10,000, with five studies of small-to-moderate sample sizes of less than 2500 (SNYDER2019; LAHEY2015; CASPI2014; DEUTZ2019; LACUELLE2019). As Appendix 1 outlines, all the papers included in the review clearly and transparently provide details of how they modelled and analysed the psychopathology data, although these were invariably reported as supplementary information and often not the focus of the discussion or critique within the papers. The finding of the p-factor across these studies therefore represents relatively contrasting symptomatology. Cross-sectional psychopathology data only was collected for nine of the thirteen papers, with CASPI2014, DEUTZ2019, LACEULLE2019 and SALLIS2019 using repeated measures data collection to model the p factor.

Due to the inclusion criteria set for the literature review, all studies employed robust longitudinal study designs. Since all papers reported on cohort studies, factors such as environmental determinants were not controlled for and therefore the study conclusions must be treated with due caution, particularly in light of the number or actual studies and their sample sizes. The psychopathology data is drawn from a range of indicators across the various studies (appendix 1), and the studies clearly report use of valid measures of subsequent outcomes (table 3) as well as the timeframe between capturing the p factor and assessing the outcomes. With the exception of PETERSSON2018, all studies using child and

adolescent samples had multi-informant designs using both self- and parent-reported data (SNYDER2019; SALLIS2019; LACUELLLE2019; DEUTZ2019; LAHEY2015). All seven studies using adult samples demonstrate limitations within their methodology (Bornovalova et al, 2020) by using single-informant designs.

## Results

### Overview of included studies

Having met the inclusion criteria following screening, thirteen papers were incorporated into the review. These papers differed slightly in the dimensions and group structure of the best-fitting model of the data on psychopathology (Appendix 1), and the CFA analyses determined that the p-factor constituted part of the best-fitting model of psychopathology from eleven studies. The remaining two studies cited previous findings on the structure of psychopathology and so extended these measurement models using Structural Equation Modelling (SEM) that incorporated the p-factor.

Throughout this review, the articles will be referred to by their Study ID: Blanco et al (2019) will be known as BLANCO2019; Caspi et al (2014) as CASPI2014; Deutz et al (2019) as DEUTZ2019; Laceulle, Chung, Vollebergh & Ormel (2019) as LACEULLE2019; Lahey et al (2012) as LAHEY2012; Lahey et al (2015) as LAHEY2015; Hoertel et al (2015) as HOERTEL2015; Hoertel et al (2018) as HOERTEL2018; Pettersson, Lahey, Larsson & Lichenstein (2018) as PETTERSSON2018; Patalay et al (2015) as PATALAY2015; Pascal de Raykeer et al (2018) as PASCAL2018; Sallis et al (2019) as SALLIS2019; Snyder, Young & Hankin (2019) as SNYDER2019.

Sample population

Whilst 13 papers were included in this review, a number of them drew on the same data sets. The 13 research papers included in the review used and analysed data from, in total, nine different population cohort studies. These broader population studies were the National Epidemiological Survey on Alcohol and Related Conditions (NESARC), the Dunedin Multidisciplinary Health and Development Study (Dunedin Study), the Study of Early Child Care and Youth Development (SECCYD), the Tracking Adolescents' Individual Lives Survey (TRAILS), the Pittsburgh Girls Study (PGS), the Me and My School Study (MMSS), the Child and Adolescent Twin Study in Sweden (CATSS), the Avon Longitudinal Study of Parents and Children (ALSPAC), and a community youth and parent study (that will be subsequently referred to as 'CYPS').

The p-factor is a statistical construct that relates to the shared variance amongst items (symptoms) when modelling psychopathology. The p-factor is a general dimension of psychopathology often modelled within what is termed a 'bifactor' or hierarchical model that also includes other established dimensions such as 'externalising', 'internalising', 'thought disorder'. The thirteen papers included in this review extract the p-factor from their modelling of psychopathology data in a range of samples (six adult samples and seven samples of children and/or adolescents). Detailed sample characteristics are provided in Table 2 and highlight that the five of the six papers included in the review that used adult populations draw on the same cohort sample (NESARC).

This is in contrast with the studies using data relating to children and adolescents that were drawn from seven different and separate population samples. Two of the studies using data relating to children and adolescents had narrower eligibility criteria including one using all female participants (LAHEY2015) and another using a sample of twins (PETTERSSON2018). All studies used community samples and the nine separate population

cohort samples were from at least five different countries (one not specifically reported), although only one (CASPI2014) was from a nation not in Europe or the United States. All studies were non-interventional and used community samples and therefore the psychopathology symptom/diagnosis data must be considered in this context due to comorbidity being more prevalent in individuals with severe and enduring mental disorder (Kessler, Chiu, Demler, & Walters, 2005).

## Data

### Type of data

In the five studies that used the NESARC cohort sample, the p-factor was extracted from data on diagnoses. Seven studies used symptom dimensions defined by measure subscales, and one used symptom data at the item-level.

Adverse outcome measures were captured by: self-reported measures [CASPI2014; DEUTZ2019; HOERTEL2015; HOERTEL2018; LACEULLE2019; LAHEY2012; PASCAL2018; PATALAY2015; SALLIS2019; SNYDER2019], parent-reported measures [LACEULLE2019], teacher-reported measures [LAHEY2015], structured interviews [BLANCO2019; CASPI2014; HOERTEL2015; HOERTEL2018; LAHEY2012; PASCAL2018; PETTERSSON2018; SALLIS2019; SNYDER2019], and official records [CASPI2014; PATALAY2015; PETTERSSON2018].

### Cross-sectional and repeated measures data

Three of the studies reported that their CFA measurement models were examined using repeated measures data (Table 3). This is a process that enables possible distinction between chronic and episodic presentations which CASPI2014 state differ in aetiology and trajectory. SALLIS2019 drew data from multiple population samples and modelled the p-

factor from both cross-sectional and repeated measures data. As per the eligibility criteria of this review, associations between the p-factor and outcome measures were all prospective using longitudinal data.

Symptomatology data

All the studies tested their CFA measurement models with symptoms that were loaded on to the factors Internalising (INT), Externalising (EXT) and p-factor (P), whilst studies that used the NESARC sample divided the Internalising dimension in to two factors ('INT I' and 'INT II') although they differed in what diagnoses were loaded on to the sub-dimensions (Table 4). Furthermore, one of these NESARC studies modelled psychopathology using only Axis-1 diagnoses (LAHEY2012).

Whilst the best-fitting measurement models for all studies included the p-factor, three studies additionally found that there were symptoms or diagnoses that exclusively loaded on to the p-factor. The model in CASPI2014 loaded Obsessive Compulsive Disorder, Bipolar Disorder and Schizophrenia only on to the p-factor.

In LACEULLE2019 the symptom dimensions of 'thought disorder', 'obsessive compulsive disorder' and 'psychotic experiences' only loaded on to the p-factor within the model. And, less commonly modelled in the p-factor literature, SNYDER2019 loaded the symptom dimension 'hyperactivity-impulsivity' exclusively on to the p-factor.

As PATALAY2015 notes, the conclusions they can draw might be limited because the measurement instruments comprise item-level data not representative of the full range of symptomatology in child and adolescent psychopathology. The measures of psychopathology varied across the studies. Whilst emphasising that all three of the separate population study samples used broad measures, SALLIS2019 acknowledge the limitation that these were not

all exactly the same for the three cohorts. They concluded, however, that a best-fitting measurement model was the same for all three of the cohort datasets used in the paper.

One study (DEUTZ2019) explored the factors ‘general psychopathology (p-factor)’ and ‘dysregulation profile (DP)’ in their analyses, which they report as being conceptually and statistically very similar but developed independently. The DP model also had the distinction of incorporating attentional problems as an additional specific factor. The analyses from DEUTZ2019 found DP to be a more parsimonious model than the p-factor model because it required a much smaller set of items. All other studies refer to the term that this review also adopts: the general psychopathology factor (p-factor).

The studies used a varying range of measures of adverse outcomes through a range of scales, questionnaires, interviews and national registers (as summarised above). These provide a broad dataset of outcomes to help answer the question for this review: what is the prognostic value of the p-factor? It is important to outline some of the limitations of these measures of adverse outcomes. Outcomes based on National register databases lack the richness of data that can be helpful to answer the review question, particularly with non-clinical samples where the adverse outcomes may not be as clear-cut as, for example, criminal convictions. Although all papers vary on the reporting of their longitudinal analyses, all papers extended the CFA measurement models to become full structural equation modelling (SEM) in order to evaluate the prognostic value of the p-factor.

**Table 2**: **Sample details for studies using CFA to model the p-factor**

| Study ID | Population | Cohort study name | Country | Sample size | Mean age (sd) in years |
|---|---|---|---|---|---|
| LAHEY2012 | Community adult | NESARC | US | 2 time points<br>T1: n = 35,336<br>T2: n = 29,958 | Not reported<br>T1: range 18-65 |
| CASPI2014 | Community adult | Dunedin Study | New Zealand | 5 time points<br>T1: n = 1037<br>T5: n = 957<br>(no other time points reported) | T1: 18<br>T2: 21<br>T3: 26<br>T4: 32<br>T5: 38<br>(sd unreported) |
| LAHEY2015 | Community child/adolescent | PGS | US | 12 time points:<br>n = 2,450 (with data at every time point)<br>participants with missing data were excluded | Not reported, range at T1: 5-11 years |
| HOERTEL2015 | Community adult | NESARC | US | 2 time points<br>n = 34,653 (T1 and T2)<br>participants missing data at T2 were excluded | Mean unreported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 |
| PATALAY2015 | Community adolescent | Me and My School | UK | 2 time points<br>n = 23,477 (T1 and T2)<br>participants missing data at T2 were excluded | 12.05 (0.56) |
| HOERTEL2018 | Community adult | NESARC | US | 2 time points<br>n = 34,653 (T1 and T2)<br>participants with missing data at T2 were excluded | Mean not reported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 |
| PASCAL2018 | Community adult | NESARC | US | 2 time points<br>n = 34,653 (T1 and T2)<br>participants with missing data at T2 were excluded | Mean not reported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 |
| PETTERSSON 2018 | Community child/adolescent | CATSS | Sweden | n = 16,806 (total with no missing data) | Not reported<br>T1: 12 or 9 |

| Study ID | Population | Cohort study name | Country | Sample size | Mean age (sd) in years |
|---|---|---|---|---|---|
| BLANCO2019 | Community adult | NESARC | US | T2: n= 34,653 | Not reported, 18+ |
| DEUTZ2019 | Community children | SECCYD | US | 3 time points<br>n = 1,073 (T1 and T2) participants with missing data were excluded | T1: 8<br>T2:14<br>T3: 15<br>(sd not reported) |
| SALLIS2019 | Community child/adolescent | ALSPAC and GENERATION R and MAVAN | UK, The Netherlands (one unreported) | ALSPAC: n= 11,612<br>Generation R: n = 7,946<br>MAVAN: n = 408 | Not reported<br>T1: range 4-8 |

**Studies that use SEM to test causal model paths using factors including the p-factor**

| Study ID | Population | Cohort study name | Country | Sample size | Mean age (sd) in years |
|---|---|---|---|---|---|
| LACEUELLE 2019 | Community adolescent | TRAILS | The Netherlands | 5 time points<br>n = 2,230 (all time points) participants with missing data from any time point were excluded | T1: 11.1 (0.6)<br>T2: 13.6 (*)<br>T3: 16.3 (*)<br>T4: 19.1 (*)<br>T5: 22.3 (*)<br>* sd not reported |
| SNYDER2019 | Community child/adolescent | CYPS | US | n = 567 (total with no missing data) | T1: 11.79 (2.39)<br>T2: 13.58 (2.37)<br>T3: 15.07 (2.36) |

**Adverse outcomes**

The six studies using child/adolescent samples found the p-factor is associated with a range of subsequent outcomes: adverse levels of 'stress' [SNYDER2019], reduced academic attainment [DEUTZ2019; LAHEY2015; PATALAY2015; PETTERSSON2018; SALLIS2019] and performance [LAHEY2015; LACEUELLE2019], decreased psychological wellbeing [LACEULLE2019; SALLIS2019], future psychopathology [DEUTZ2019; SALLIS2019; PATALAY2015], emotional and behavioural problems [PATALAY2015] and poorer psychosocial functioning [DEUTZ2019]. The same studies (using children and adolescent samples) also suggest the p-factor's impact on real-life severe adverse outcomes such as high Body Mass Index [LACEULLE2019], psychiatric hospitalisation [LACEULLE2019], medication prescription [PETTERSSON2018], and criminal court convictions [PETTERSSON2018].

Using adult samples, the other seven studies found the p-factor's association with subsequent: financial and legal problems [BLANCO2019], mental functioning [BLANCO2019], self-harm [CASPI2014 ] and suicide attempts [CASPI2014; HOERTEL2015; HOERTEL2018; PASCAL2018], psychiatric hospitalisation [CASPI2014], violence convictions [CASPI2014], incarceration [CASPI2014], poor general health [BLANCO2019], and reliance on social welfare benefits [CASPI2014].

Table 3: Overview of Outcomes used across studies

| **Outcome** | **Study** | **Measure(s)** | **Timeframe** (t1-t2) |
|---|---|---|---|
| Suicide attempts | CASPI2014 | Standardised clinical interviews and death records. All information combined to create overall variable of any attempted/completed suicide (excl. non-suicidal self-harm). | 20 years |
| | HOERTEL2015 | Participants were asked at t2 'since last interview, did you ever attempt suicide?' | 3 years |
| | HOERTEL2018 | Participants were asked at t2 'In your entire life, did you ever attempt suicide?', and, if relevant, were then asked their age at their most recent time, to determine if it took place between t1-t2. | 3 years |
| | PASCAL2018 | Participants were asked at t2 'since last interview, did you ever attempt suicide?' | 3 years |
| Economic | CASPI2014 | Length of time participants drew on government welfare benefits by assessing records of NZ Ministry of Social Development. | 17 years |
| Financial Crisis | BLANCO2019 | Self-report question relating to the last year, from AUDADIS. ['Have you experienced a major financial crisis, declared bankruptcy, or more than once been unbale to pay your bills on time?'] | 3 years |
| Unemployment | BLANCO2019 | Self-report questions from 'Background Information' section of AUDADIS. ['Were you fired or laid off from a job?', and 'Were you unemployed and looking for a job for more than a month?'] | 3 years |
| Income below the median | BLANCO2019 | Self-report question from 'Background Information' section of AUDADIS. | 3 years |
| Economic | LACUELLE2019 | Four economic measures though single self-report questions: 1) attained/current educational level; 2) receipt of social security benefits due to unemployment or long-term illness; 3) number of days absent from work; 4) 'Trouble making ends meet financially in the past year' | 11 years |
| Personal Income | | Measured through structured interview | |
| Disability income | LAHEY2012 | Measured through structured interview, relating to last 12 months. | 3 years |
| | LAHEY2012 | | |
| Psychiatric hospitalisation | CASPI2014 | Interviewed with the Life History Calendar (Caspi et al., 1996) to assess any treatment for psychiatric/substance condition. 7.3% of the cohort were hospitalised. | 20 years |
| Psychiatric treatment | PETTERSSON2018 | Measured by longitudinal national registers to assess whether participants had any of ten ICD diagnoses. Also assessed for: 1) prescription medication, 2) court convictions, and 3) failure to gain eligibility to start high school, all of which were separately combined into single dichotomous variables. | 1-12 years |

| | | | |
|---|---|---|---|
| Violence | CASPI2014 | Records of participants' court convictions using NZ police database to assess all convictions for violent crime. 10.3% of the cohort was convicted of a violent crime. | 20 years |
| | BLANCO2019 | Self-report through AUDADIS, since t1. There were nine questions relating to this measure | 3 years |
| Adult intelligence | CASPI2014 | The Weschler Adult Intelligence Scale (WAIS-IV) was administered and four index scores reported (Verbal comprehension, Perceptual Reasoning, Working Memory, Processing speed) | 20 years |
| Executive function | CASPI2014 | Three tests: 1) WMS-III Mental Control, 2) Trail making test B, 3) CANTAB Rapid Visual Information Processing. | 20 years |
| Poorer general health | BLANCO2019 | Self-report question from 'Background Information' section of AUDADIS relating to the past year, and from the Short Form 12 Health Survey (SF-12v2) to assess their general health perception. | 3 years |
| Worse mental and physical health | BLANCO2019<br>LAHEY2015 | Self-report question from 'Background Information' section of AUDADIS, and from the Short Form 12 Health Survey (SF-12v2) to assess their perceived mental and physical health functioning.<br>Teacher-reported measures of functioning relevant to psychopathology, taken over the course of the study. | 3 years |
| Global impairment | LAHEY2015 | Overall functioning teacher-assessed using Children's Global Assessment Scale each year. Mean scores computed across the age ranges of 8-11 and 12-16. | |
| Legal problems | BLANCO2019 | Self-report question from 'Background Information' section of AUDADIS. ['Did you or a family member have trouble with the police, got arrested, or sent to jail?', 'have you gotten arrested, held at a police station, or had any other legal problems because of your drinking?', and 'Have you gotten arrested, held at a police station, or had any other legal problems because of your medicine or drug use?'] | 3 years |
| Criminal activity | SALLIS2019 | Self-reported 'involvement with the police'. | 13 years |
| Incarceration | LAHEY2012 | 'Partly prospective' measured through structured interview, relating to lifetime. | 3 years |
| Divorce/separation | BLANCO2019 | Self-report question from 'Background Information' section of AUDADIS over the past year. | 3 years |
| Interpersonal problems | BLANCO2019 | Self-report question from 'Background Information' section of AUDADIS over the past year. ['Have you had serious problem with a neighbour, friend or relative?'] | 3 years |
| Academic functioning | DEUTZ2019 | Principal-reported average grade in 4 core subjects of the current school year. And percentage of days attended in the current school year (age 15). | 6 years |
| | LAHEY2015 | Annual teacher-reported performance in 'reading, spelling, and mathematics', as well as their behaviour in the classroom, relative to child's classmates on a 5-point scale and 7-point scale respectively. Three | 1-11 years |

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|---|---|---|---|
| | | items measured behaviour (diligence, appropriateness, and happiness). Separate mean scores were calculated for each measure across years 5-11 and years 12-16. | |
| Grade retention | LAHEY2015 | Annual teacher-report on whether girl was currently repeating last year's grade in school between ages 5-11 and ages 12-16. | 1-11 years |
| Special education services | LAHEY2015 | Annual teacher-report on whether girl had been evaluated for/received special school services for behaviour or emotional problems between ages 12-16. | 1.5 years<br>8 years |
| Poor academic attainment | PATALAY2015 | National standardised test scores used to determine if participants scored below the government set-standard (level 5 in Key Stage 3). | |
| Educational attainment | SALLI2019 | Indicated by receiving a pass grade (C or above) at English or Mathematics at GCSE. | |
| Mental health | DEUTZ2019 | Aggression was assessed using mean scores from three self-report scales derived from measures used by Doidge and Coie (1987) and Crick and Grotpeter (1995).<br>Depression was assessed by a total score from the self-report Children's Depression Inventory Short Form (Kovacs, 1992).<br>Psychopathy was measured using a total score of the self-report Youth Psychopathic Traits Inventory (Andershed et al, 2002)/<br>Sleep problems measured by a sum score from nine items adapted from the Child Sleep Habits Questionnaire (Owens et al, 2000). | 6 years |
| Depression/ anxiety | SALLIS2019 | Diagnoses of depression and anxiety measured by Revised Clinical Interview Schedule | 10 years |
| Psychological wellbeing | SALLIS2019 | Warwick-Edinburgh Mental Wellbeing Scale | 13 years |
| Work affected by emotion/pain | LAHEY2012 | Measured by structured interview regarding the last 12 months. | 3 years |
| Psychopathology | PATALAY2015 | Psychopathology caseness was measured with both the Me and My School questionnaire and the Strengths and Difficulties Questionnaire. Participants met 'caseness' if they scored higher than 20 overall in the SDQ. And on Me and My School if they scored over 12 for emotional symptoms and/or over 7 on behavioural symptoms. | 1 year |
| Psychosocial | DEUTZ2019 | Friendship quality questionnaire (Parker and Asher, 1993) assessing adolescent's perceptions of their friendship with best friend (using mean scores from 28 statement ratings) to produce total 'friendship quality score'.<br>Loneliness was measured by the sum of 16 items from the Loneliness and Social Dissatisfaction Questionnaire (Asher et al., 1984). | 6 years |

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| Risk taking | DEUTZ2019 | Children's resistance to peer pressure was measured as the sum of nine self-report items derived and adapted from a measure by Steinberg and Monahan (2007).<br>Risk-taking was measured using The Balloon Analogue Risk Task (Leiuez et al, 2007) to create a total index of riskiness. | 6 years |
| Temperament | LACEULLE2019 | Five temperament traits measured by the (parent-reported) Early Adolescent Temperament Questionnaire (effortful control, shyness, frustration, fear, affiliation) | 11 years |
| Social | LACEULLE2019 | Five social outcomes. Total score for 1) Anti-social Behaviour Questionnaire (adolescent-reported), and single self-report questions around: 2) Lifetime pregnancy before age 10; 3) being let down by someone; 4) Serious conflict with someone at least twice; 5) 'Physically assaulted or raped'. | 11 years |
| Psychosocial | LACEULLE2019 | Six psychological outcomes. Index of 1) sleep problems using 5 items of the Nottingham Health Profile, and 2) mean happiness and satisfaction score taken from two items. Single self-report items for: 3) loneliness; 4) use of specialist mental health care; 5) psychiatric hospitalisation; 6) serious suicidal ideation. | 1)-5): 11 years<br>6): 8 years |
| Health behaviours | LACEULLE2019 | Five health behaviours measured by single items: 1) daily smoking (</>10 cigarettes a day); 2) alcohol use (AUDIT); 3) cannabis use; 4) body mass index as measured during physical examination or adolescent report; 5) subjective physical health. | 11 years |
| Alcohol use | SALLIS2019 | Problem-drinking measured by the Alcohol Use Disorders Identification Test (AUDIT) | 13 years |
| Stress | SNYDER2019 | Youth Life Stress Interview (semi-structured) was conducted by trained interviewers to assess multiple domains of stress (academic, behavioural, peer, family, romantic, neighbourhood, and violence). Three coders used the transcript narratives to agree an overall severity score for each domain (1-5) based on manualised objective ratings of the last 18 months. | 3 years |

**Mental ill-health**

This review did not include studies that sought to exclusively assess the stability of the p-factor over time (eg tests of homotypic or heterotypic continuity), instead focussing on studies that used separate measures of adverse outcomes. For some of the studies, the p-factor was predictive of psychopathology and mental health outcomes. By inspecting the factor loadings of both the p-factor and the comparably described/derived 'Dysregulation Profile', DEUTZ2019 indicate that irritability and difficulties regulating mood are at the core of this general factor of psychopathology and can be conceptualised as underlying various forms of psychopathology. The findings from the study's analyses indicate that the p-factor positively predicted mental health outcomes when modelled without the specific factors. LAHEY2012 also found the bifactor model was prospectively associated with psychopathology three-years later, over and above that of the other specific factors. The findings from SNYDER2019 indicate that stress was associated with the p factor and suggest that when controlling for p the association with the specific internalising factor disappears. They comment that this is of interest in the context of previous research that highlights associations between stress, depression and anxiety, and hypothesise that these correlations are instead accounted for by the p-factor.

The p-factor was also associated with future psychopathology, in contrast to the more differentiated associations between specific latent factors and mental health outcomes such as 'Internalising' and 'anxious/depressed' factors mostly predicting higher depression and lower psychopathy, and externalising' and 'aggressive behaviour' predominantly predicting future high levels of forms of aggression (DEUTZ2019). Although LAHEY2012 also found the p-factor was broadly associated with all future mental health problems and functioning, they reveal these outcome were also prognostically predicted by the specific factors of psychopathology: fears and distress factors differentially associated with aspects of

subsequent mental health as well as the externalising factor being associated with almost all of the aspects of adverse outcomes.

BLANCO2019 comment that LAHEY2012 were not able to infer the effects of the p-factor on the development of adverse outcomes because their methodology combined current and lifetime outcomes and therefore did not account for adverse outcomes already present at time-point one.

In their sample of adolescents, SALLIS2019 found that the p-factor predicted subsequent development of a depressive disorder and poorer psychological wellbeing, but not with anxiety specifically. PATALAY2015 also demonstrate the predictive validity of the p-factor measured in childhood with future psychopathology 'caseness', as well as specific emotional or behavioural problems. Furthermore, the effect sizes between the p-factor and the future psychopathology were large and the equivalent predictive effects of the specific factors (externalising and internalising) on psychopathology outcomes were small or moderate. However, the internalising dimension remained prospectively associated with depression anxiety and wellbeing when accounting for the p-factor (SALLIS2019). SALLIS2019 also found that, when modelled along with the p-factor, the specific externalising factor was not prospectively associated with any adverse outcomes. They indicate that, although the internal dimension has separate prognostic value for psychological wellbeing outcomes, the externalising factor's association with later functioning is accounted for by and through the p-factor.

Significant prognostic effects were found of both individual disorders (BLANCO 2019; PASCAL2018; HOERTEL2015; HOERTEL2018) and specific factors (BLANCO2019; CASPI2014; DEUTZ2019; HOERTEL2018; LAHEY2012; LAHEY2015; LACEULLE2019; PATALAY2015; PETTERSSON2018; SALLIS2019) on adverse outcomes. However, these studies found all these associations shifted to the p-factor when

using the bifactor model indicating that these disorder-specific and factor-specific effects were exerted through the shared-variance that constitutes the p-factor.

SNYDER2019 found prognostic value of the externalising dimension of psychopathology as well as the p-factor on the various domains of stress. Stress was measured through manualised ratings of the Youth Life Stress Interview transcripts to obtain severity scores for each domain (Table 3). They capture the p-factor in the context of 'chronic stress' rather than the more researched 'episodic stress' and, owing to the methodological design, note its bidirectional relationship with chronic stress in a range of domains. From their analyses the p-factor was longitudinally associated with higher levels of stress in the domains categorised as academic, peer, romantic, behavioural, family, and romantic, but not violence.

By collecting data at numerous time-points they found that the p-factor ('common psychopathology') captured at time-point one (T1) predicted generation of higher levels of chronic stress at time-point three (T3), with no specific stress domains affected more significantly than others. When controlling for levels of T1 stress, they also found positive associations between the p-factor at time-point two (T2) and 'total stress' at T3. Although these relationships were bidirectional, SNYDER2019 were able to report that by controlling for prior chronic stress, psychopathology factors (including the general factor of psychopathology), predicted higher levels of subsequent chronic stress.

With access to large national registers, PETTERSSON2018 found predictive associations between the general factor of psychopathology and future individual diagnoses assigned by the attending physician using ICD-10 categories. Although the dimensional approach to psychopathology is philosophically opposed to diagnostic categories, PETTERSSON2018 found that these diagnostic outcomes were independently and superiorly predicted by the general factor of psychopathology compared with specific factors of

psychopathology. They discuss this validity of the p-factor as a possible rationale for its use, supplementing primary diagnosis, to help determine the level of support an individual might require in order to improve. The exploratory research of SNYDER2019 similarly highlight the potential impact of being able to disentangle transdiagnostic and specific etiological factors of psychopathology and agree that the p-factor might be a useful measure to indicate particular targets for treatment.

Although just a broad concept, SNYDER2019 suggest, as an example, that interventions aimed at reducing 'stress exposure' and 'stress generation' might particularly benefit those with a broad range of psychopathology symptoms. PETTERSSON2018 add that, for individuals that might not meet diagnostic thresholds, a measurement of their p-factor might help prevent them from being blocked access to support that, based on their prognostic findings, would be an important use of resource. LACEULLE2019 suggest the predictive correlation between the p-factor and psychiatric hospitalisation, as measured by the national register.

**Self-harm and suicide**

The general dimension of psychopathology was found to account for the association between mental disorders and the risk of subsequent suicide attempt assessed three years later (HOERTEL2015). The prognostic value of the p-factor was demonstrated in both genders independently of history of prior suicide attempts and of sociodemographic characteristics such as sex, race/ethnicity, marital status and household income (PASCAL2018; HOERTEL2015). PASCAL2018 additionally demonstrate that prior suicide attempts' and 'lower household income' were longitudinally associated with increased suicidal attempts in those aged 31-40, and for those aged 41-49 being non-white also increased this risk. They also demonstrate that the magnitude of the effect the p-factor had on risk of suicide attempt

was significantly greater for individuals younger than fifty years-old than it was compared to older participants. PASCAL2018 suggest this might be related to cohort effects on particular environmental factors such as healthy lifestyle, and/or the sample selection based on higher levels of premature mortality among individuals with psychiatric disorders. PASCAL2018 state that whilst older adults who have died by suicide may differ in psychopathology to older survivors of suicide attempt, their results suggest the higher rates of suicide amongst older adults may be due to other factors and not due to higher levels of general psychopathology. They consider alternative explanatory factors such as social isolation and frailty reducing odds for recovery from suicide attempts, possible emotional dysregulation related to neuropsychological impairment, and higher prevalence of medical conditions that may affect risk through independent mechanisms like pain and physical disability. Overall, they indicate the importance, particularly among older adult populations, of assessing and addressing risk factors that are at least partly independent of psychopathology.

The data collected to extract the p-factor (PASCAL2018; HOERTEL2015) occurred three years prior to when the adverse outcome data was collected when participants were asked whether they had attempted suicide since their last interview. This relationship also held when analysing data from a subsample of participants demonstrating suicidal ideation at time-point one (HOERTEL2018).

HOERTEL2015 indicate that whilst specific psychiatric disorders have previously been demonstrated as increasing risk of suicide attempts, this relationship is in fact mediated by the p-factor. They interestingly discover the effects of ‘remitted psychiatric disorders’ on suicidal risk occurs through ‘current disorders’ suggesting that current and historic disorders are manifestations of what might constitute the underlying p-factor (general overarching liabilities). They therefore suggest that developing and using interventions targeting broader, transdiagnostic processes of psychopathology could reduce the risk of subsequent suicidal

attempt more effectively than disorder-specific treatments. Many of the studies emphasise the importance of further exploration of possible psychological or biological/genetic mechanisms and processes underlying dimensions of psychopathology such as the p-factor (BLANCO2019; HOERTEL2015; HOERTEL2018; LAHEY2012; LAHEY2015; PATALAY2015; PETTERSSON2018; SNYDER2019; DEUTZ2019; ), particularly given the increasing evidence of the significant shared variance amongst many disorders of psychopathology.

Using a subset of 'heavy-drinkers' from the same sample, HOERTEL2018 found longitudinal associations between two dimensions of psychopathology and the risk of suicide attempt. These dimensions were the 'externalising' dimension, constituting the shared effects of comorbid 'substance use disorders', and the p-factor constituting the shared variance amongst all comorbid psychiatric disorders. They suggest that when treating alcohol use disorder (AUD), there is value in assessing and treating comorbid addiction disorders and psychiatric disorders to reduce the risk of attempted suicide. HOERTEL2018 reveal that 49.3% of heavy drinkers did not meet the DSM-IV diagnostic criteria for AUD and 19.4% of those who attempted suicide did not gain a diagnosis of AUD. These particular findings add meaning to the importance of the p-factor's prognostic value by highlighting the difficulties in predicting such significant risks if relying on diagnostic thresholds. Although HOERTEL2018 are not exploring the effect of the p-factor on 'drinking behaviours', it remains interesting to note that SALLIS2019 found the p-factor prognostically related to a reduced risk of problem drinking.

Each of the specific factors (externalising, internalising, and though disorder) were found to be related to subsequent suicide attempts (CASPI2014), but analyses revealed that the p-factor accounted for these effects. The externalising factor was found to be separately associated with suicide attempts in their large longitudinal cohort study.

**Psychosocial functioning**

The factor 'attention problems' was found to uniquely predict lower 'psychosocial maturity' according to the analyses by DEUTZ2019. As table 3 highlights, this construct comprised measures of 'friendship quality' and 'loneliness and social dissatisfaction'. Furthermore, the findings from HOERTEL2018 indicate that contrary to previous literature implicating psychosocial factors as predictors of risk of suicide, these factors were not significant adjusting for other predictors. Instead, HOERTEL2018 highlighted the p-factor and the externalising dimension of psychopathology as important predictors of risk of suicide. They add, however, that psychosocial functioning may help clinicians and policymakers to identify groups and populations at risk. LAHEY2015 indicate that the p-factor was associated with subsequent disability income, work difficulties (related to pain and/or emotion) and incarceration. Analyses from LACEULLE2019 found that the p-factor predicted future adverse outcomes of 'shyness', alcohol use' and interpersonal conflicts.

**Academic attainment**

The specific Externalising factor was found to account for additional variance in school functioning as rated by teachers (LAHEY2015), when controlling for the p-factor, Internalising factor, and all covariates. This measure of 'school functioning' as an outcome was designed to provide a broad overall assessment of the pupils' behaviour, performance and approach to school. Findings also revealed that (in the bifactor model) the Externalising factor in childhood was longitudinally associated with poorer academic functioning in adolescence during academically demanding school years. Whilst Externalising was an important specific factor in terms of future academic outcome, the p-factor was (concurrently

and prognostically) negatively associated with every measure of academic functioning even after controlling for specific factors and covariates.

Similarly, DEUTZ2019 found that the 'attention problems' factor uniquely predicted lower average grade as well. The study by SNYDER2019, however, revealed the p-factor was associated with 'peer' and 'academic' stress in their study measuring a wide range of stress domains. Differing from some of the other studies included in this review by focussing on academic stress rather than performance or attainment, they explore and establish the importance of this in the context of the increases in academic pressures and importance of peer relations during the adolescence years when these outcomes were measured in their sample. Although SNYDER2019 were exploring the bidirectional associations between multiple stressors and multiple psychopathology outcomes, they discover that both the general p-factor and specific externalising dimensions were broadly bidirectionally associated with the multiple stress domains examined.

PATALAY2015 demonstrate that the internalising-, externalising- and p- factor all significantly predict future academic attainment. However, the general psychopathology bi-factor best predicted future academic attainment. SALLIS2019 highlight that the p-factor was prospectively associated with increased risk of failing Mathematics or English at GCSE. They also found a smaller positive association between the externalising dimension (within a bifactor model) and subsequent better performance at the Mathematics and English GCSE.

**Medical consequences**

LAHEY2012 found the p-factor to be longitudinally associated with body mass index (BMI) and BLANCO2019 indicate the prospective association between the p-factor and 'general health' outcomes. LACEULLE2019 reveal the predictive correlation between the p-factor and 'real-life' and severe adverse outcomes such as BMI (as measured in face-to-face

physiological assessment). They importantly note that the prognostic associations were much smaller between other factors, within any of the model structures of psychopathology, and the same 'severe' adverse outcomes. LACEULLE2019 also found, however, that the externalising factor predicted 'health outcomes' in the model that excluded the p-factor, and that the prognostic association remained in the models that incorporated the p-factor. They interpret this as indicating the specific and separate prognostic value of the externalising dimension not accounted for by the p-factor. There were similar associations found by CASPI2014 where associations between specific factors and psychiatric hospitalisation was accounted for through the p-factor; and the externalising factor also separately predicted future hospitalisation.

**Antisocial**

More differentiated outcomes were predicted by specific latent factors such as 'externalising' and 'aggressive behaviour' predominantly predicting subsequent high levels of forms of aggression (DEUTZ2019). CASPI2014 found that when using the bifactor model and shifting appropriate loadings from the externalising dimension to the p-factor, all the adverse life outcomes were better accounted for by the general psychology factor with the exception of 'violence'. BLANCO2019 found the p-factor at time-point one predicted incarceration. The externalising factor was found to be associated with violence and legal problems to a greater extent than that of the p-factor. In contrast, they did not find direct associations between specific disorders and adverse outcomes. The p-factor was found to predict the specific use of 'cannabis' (LACEUELLE2019) as well as general 'drug use' (PETTERSSON2018) as measurements of adverse outcomes.

**Financial and legal**

From the analyses of BLANCO2019, the p-factor was longitudinally associated with future: poorer general health, worse mental and physical health, and having problems with a neighbour friend or relative. They found that it was also longitudinally associated with financial crisis and legal problems, but their analyses indicated that the p-factor did not predict 'divorce/separation', unemployment, and income. However, LAHEY2012 found that it was prospectively associated with personal income, and both LACEULLE2019 and CASPI2014 revealed it predicted subsequent reliance on social welfare benefits. SALLIS2019 found the p-factor not to be associated with criminal activity, although CASPI2014 found it predicted violence convictions. The externalising dimension was found (CASPI2014) to also predict this independent of the p-factor.

**Dimensionality of psychopathology**

The studies included in the reviews modelled a wide range of structures of psychopathology. As reported in this review of the studies, other dimensions of psychopathology were longitudinally associated with adverse outcomes. Although not a specific research question addressed in this review, the included studies also found that various factor structures fitted the psychopathology data similarly. All studies chose the bifactor model, and all but two studies indicate this model fitted their data best. PETTERSSON2018 did not compare the fit of the bifactor model with their alternative 'four factor correlated factors model' (factors: inattention; hyperactivity-impulsivity; conduct problems; anxiety/emotionality), and LACEUELLE2019 indicate that differences of fit were small between four measurement models (three-correlated-factors model; bifactor model; revised-bifactor model; higher-order model).

Although the externalising dimension was found to predict particular adverse outcomes beyond that of the general p-factor, SALLIS2019 found the externalising dimension did not demonstrate any associations (of large magnitude) with adverse outcomes.

LACEULLE2019 found that although the Thought Problem dimension was prospectively correlated with many adverse outcomes these associations decreased in magnitude when adding the p-factor to the model. They suggest this may bolster the notion, proposed by CASPI2014, that the p-factor relates to disordered form and content of thoughts that captures the severity of most specific disorders. On the other hand, LACEULLE2019 find that when including the p-factor within the model, the Internalising dimension becomes associated with a range of subsequent adaptive outcomes such as higher educational attainment, and lower interpersonal conflict. This prompts the notion that incorporating the p-factor increases the prognostic value of other dimensions of psychopathology. The Internalising dimensions' longitudinal association with adaptive outcomes.

By including data on childhood experiences into their data analyses and revealing the prognostic significance of the p-factor, CASPI2014 suggest in their discussion, in summarising their broad findings, the possibility that childhood maltreatment raises the risk of a specific psychiatric disorder because it increases the p-factor. Although not a specific question of this review, CASPI2014 speculate that the p-factor has value as a possible mediating aetiological mechanism between risk factors such as childhood adversity and adult psychopathology.

**Discussion**

The studies included in this review consistently report the prognostic value of the p-factor across a range of contexts. The p-factor, measured between 1-20 years earlier, was longitudinally associated with a range of health and life outcomes that indicate its significant

utility as a prognostic indicator. All thirteen studies' analyses revealed associations between the p-factor and adverse life outcomes that help to elucidate the predictive value of this general dimension of psychopathology. The specific findings suggest its unique value, as well as its utility in augmenting the value of specific psychopathology factors and separate diagnoses, in identifying particular risks.

**Importance of the p-factor in predicting outcomes**

Although specific domains such as internalising and externalising factors have associations with future outcomes, the reviewed studies indicate that these associations drop after taking account of the general p-factor. The associations that have traditionally been tested and established as being domain specific may rather reflect an individual's general vulnerability to develop psychopathology. For example, SNYDER2019 comment on the established association between internalising symptoms and chronic stress and show that these associations are likely accounted for by the p-factor. They consider that depression and many anxiety disorders, whilst being distress disorders, are mostly captured by the p-factor. Current specific disorders can be conceptualised as manifestations of latent factors such as the externalising, internalising and p-factor.

Findings from HOERTEL2015 suggest that remitted psychiatric disorders, considered by them a constituent of the p-factor, exerted its effect on the risk of suicide through current disorders. If interventions only target specific disorders, whilst they may reduce those associated symptoms, this may not therefore reduce the risk of adverse outcomes associated with the p-factor whilst other disorders continue to load on to the general psychopathological dimension. These findings also suggest the potential value of collecting comprehensive data on psychopathology at the assessment stage in clinical settings, versus gaining limited information pertaining only to suspected disorders only.

The evidence indicating the prognostic value of the p-factor, helps to reconcile similar associations found between both internalised disorders (such as major depressive disorder) and externalised disorders (e.g substance use disorders) with various adverse outcomes (BLANCO2019). These findings support the use of dimensional models of psychopathology and highlight the role of comorbidity in understanding risk of, for example, psychiatric hospitalisation and suicide. If, as our review findings suggest, the general factor of psychopathology is an important predictor of life impairment outcomes, then further work could be carried out to understand the nature of the p-factor as general liability to psychopathology with its associated outcomes. Adding to the significance of the prognostic value of the general dimension of psychopathology, a number of the review studies indicate longitudinal associations in samples of children. Associations were also established with key outcomes outside the domain of 'psychopathology' such as academic attainment, school attendance and lower friendship quality.

The findings of this review indicate the importance of further testing of the well-grounded hypothesis that the p-factor reflects mechanisms and aetiologies generally shared by the various disorders of psychopathology. In attempting to explain the association between psychopathology and subsequent outcomes, particular attention has been given to the possibility of shared genetic factors that could be important to investigate in light of the review findings. Genetic influences on several outcomes were suggested by the findings of BLANCO2019.

This review has highlighted how other latent variables are associated with life impairment and outcomes only to the extent that they are linked to a general liability to psychiatric disorder. It could be helpful, therefore, to consider any previous studies' inconclusive or inconsistent findings, on the relationship between latent variables and future outcomes, in the context of these findings. Comorbidity has been indicated as central to the

relationship between psychopathology and adverse life outcomes. By focussing on the clinical aspect of 'comorbidity' expressed through the p-factor, BLANCO2019 suggest efforts should be made to treat and prevent comorbidity to alleviate adverse functional consequences, and that to focus on individual disorders would limit progress in this endeavour.

**Developmental pathways and targeted treatment**

The findings from this review suggest that dimensional models of psychopathology, and in particular the measurement of the p-factor, can improve our understanding of how best to improve life impairment outcomes through intervention. The increasing evidence of the p-factors' prognostic value points to its clinical use and calls for further research to explore the developmental pathways that might inform effective targeted treatment.

Identifying children that present symptoms of both internalising and externalising dimensions, whom are at greater risks of future adverse outcomes (SALLIS2019), would be important to better understand developmental pathways and inform targeted treatments that might prevent such adverse outcomes. Similarly, for adults (PETTERSSON2018), this measure could help determine the level and extent of support patients might require in order to improve. For those that do not meet diagnostic criteria, the p-factor could, if established as an important prognostic indicator, help enable access to care for those that would not otherwise be eligible.

It is suggested that clinicians do not yet estimate individual scores of p-factor (PETTERSSON2018), and that this could be developed and achieved by establishing norms for standardised clinical interviews and developing an algorithm to identify the contribution of each symptom towards the p-factor. Whilst the p-factor has been implicated as an important predictor of significant outcomes, the strength of these associations varied within

and across studies, and specific factors were independently associated with particular outcomes beyond the effect of the p-factor. For example, SALLIS2019 find the internalising factor was longitudinally associated with depression, anxiety and wellbeing independently of the p-factor. This highlights the value in utilising the p-factor alongside other dimensions of psychopathology to best predict outcomes for individuals.

The finding (Cichetti & Rogosch, 1996) that various different pathways, or factors, may result in the same outcome, and that certain specific factors might result in a range of outcomes seems relevant to the findings of this review. However, if there are a multitude of developmental pathways of psychopathology, it remains key that the general dimension of psychopathology is investigated as a factor clearly implicated. Future research should focus on mediating mechanisms that may help explain both multifinality and equifinality in developmental psychopathology and, as discussed by SNYDER2019, should investigate possible associations between both specific and general factors of psychopathology and outcomes. These mediating links might help to improve conceptual understanding of the broad transdiagnostic dimensions such as the p-factor and could facilitate development of targeted treatments. This review suggests that individuals at greater risk of future adverse outcomes will present with internalising and externalising symptoms. This also suggests the importance of identifying these individuals, particularly earlier in childhood (SALLIS2019), as an important way of investigating developmental pathways that might help in any transdiagnostic approach to treatment.

When excluding loadings from the 'Thought Problems' domain, the general factor of psychopathology has been referred to as a 'general behavioural/emotional dysregulation dimension' (Castellanos-Ryan et al, 2016). CASPI2014 had proposed that, as a dimension of severity, the general psychopathology factor comprises symptoms of Thought Disorder at its pinnacle. Further research would be important to help establish the way and extent in which

thought problems are implicated in one's general susceptibility to psychopathology and could help to identify effective transdiagnostic treatments. This hypothesis was extended to consider possible sequential comorbidity of disorders of psychopathology, increasing in severity. CASPI2014 reveal that the longitudinal p(factor) had a stronger association with suicide attempt and psychiatric hospitalisation compared with the cross-sectional measure of p(factor), emphasising that sequential comorbidity is also relevant.

An interesting finding was that the internalising dimension became associated with a range of adaptive outcomes (e.g. higher educational attainment and lower interpersonal conflict) only when modelled with the p-factor (LACEUELLE2019). This provides a step towards interpreting the meaning of the factors by using what the different factors are associated with.

**Limitations**

There remains a vital and debated question about whether the general dimension of psychopathology is a statistical artefact of measurement error (Lahey et al, 2017). By employing confirmatory bifactor analysis, this study uses analytic methods critiqued for involving the use of global fit statistics that have a tendency to 'overfit' and therefore favour bifactor models (Bonifay & Cai, 2017). It is argued these global fit statistics favour the flexibility of a bifactor model because it can enable so much of item variance to be loaded on to either general or group factors thus inflating the result of fit (Bornovalova et al, 2020). Although this is debated within this field of psychopathology research, it raises the need for careful attention and moderation when drawing conclusions from the findings; it is important to not reify the general factor which simply represents the shared variance of all the indicators of mental disorder (Laceulle et al, 2015). Although this systematic review did not employ, for example, a particular sample size threshold for included papers, the criteria did

require longitudinal research design, to strengthen the criterion validity of the construct of the p factor.

It is also argued that research using bifactor analytic methods neglect the inconsistencies typically present across studies, meaning that the construct of the p-factor therefore actually represents highly contrasting symptomatology (Bonifay & Cai, 2017). This is also a contention debated within the literature but helps signify the need to report clearly on the indicators of psychopathology used in analyses of p factor studies to support the scientific/conceptual work seeking to understand the nature of this hypothesised general dimension of psychopathology.

Often psychopathology and outcomes are both measured using reports from the same informant, risking correlated measurement error in the associations (LACEUELLE2019). Although some of the studies used self-report psychopathology data and teacher-reported outcome data. For example, the prospective associations between the p-factor and school functioning in adolescence  provide, according to LAHEY2015, a stringent test of the criterion validity of the general psychopathology factor due to the academic outcomes being assessed by teachers that did not know and were not the informants for the dataset of psychopathology symptomatology. However, the vast majority were not able to avoid the risk of correlated measurement error. Some of the outcome measures, such as those using register data, also lack the richness of data that is gained from, for example, clinical interviews.

Another important limitation is that the designs of the studies, despite being prospective/longitudinal, cannot establish a causal relationship between the general dimension of psychopathology and the subsequent outcomes. Despite this, the findings provide helpful indication of an important association that warrants further research and exploration.

## Summary

This review highlights an important association between a general dimension of psychopathology (p-factor) and a multitude of significant outcomes. These studies point towards the prognostic value of the p-factor that could be widely utilised both in clinical practice and in ongoing research into the developmental pathways of psychopathology. The p-factor has been shown to independently predict a range of outcome, above and beyond other latent factors and specific disorders. However, other latent variables have also been shown to have important prognostic value. Perhaps most interestingly, the internalising dimension became associated with a range of adaptive outcomes only when modelled with the p-factor. The p-factor should be further utilised both in developmental psychology research and in clinical practice as an important prognostic measurement.

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## Part 2: Empirical Paper

# Investigating a general risk factor for intergenerational transmission of psychopathology in children in military families

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**Abstract**

*Aims:* To examine the mental health of a veteran population and the relationship between veteran fathers' psychopathology and that of their children.

*Method:* Bifactor analytic methods were used as a framework for investigating the structure of psychopathology from data on 111 veterans. Path analyses were subsequently conducted to examine the effect of father's psychopathology on their child's psychopathology directly and indirectly via the veterans' reflective functioning.

*Results:* The bifactor model fitted the data best for both veterans and their children. Veteran's general factor of psychopathology (p factor) significantly predicted their children's p factor and more strongly than by using computed scale scores. Whilst veteran's scores from the Reflective Functioning Questionnaire correlated significantly with their children's p factor, it was found not to mediate the relationship between the father's p and child's p.

*Conclusions:* It is suggested that p factor scores, yielded from bifactor analyses, provide a meaningful construct that can help better predict intergenerational transmission of psychopathology. The findings highlight questions about the mechanisms of this specific relationship, and whether reflective functioning might instead, for example, moderate this relationship, or have a different role in mothers.

## Introduction

Although most armed forces personnel do not experience mental disorder, research has suggested links between military deployments and mental health problems (Fear et al, 2010). What constitutes effective and efficient mental health support for veterans, as a subset of the general population, is a widely researched and important question and one that has emphasised the necessity of considering the family system (Wadsworth et al, 2013; Wagner, Monson & Hart, 2016). This study investigates veteran mental health and specifically the relationship between veteran fathers' psychopathology and that of their children.

### *Paternal mental health*

It is reported (Hogg, 2013) that many children whose parents have mental health difficulties are able to develop and live without significant impairment, usually when their parents receive the right support at the right time. However, there remains risk of negative consequences for children with parents with mental health difficulties. A recent LSE report that found that 72% of the cost of perinatal mental health problems (estimated at £8.1 billion per year in the UK) relate specifically to the child as opposed to the mother (Bauer et al, 2014).

It is important to acknowledge that the existing literature has established a strong association between maternal psychopathology and child psychopathology (Cummings & Davies, 1994; Ackard, Neumark-Sztainer, Story & Perry, 2006). Whilst the role of paternal psychopathology on child psychopathology had previously been examined, Flouri (2010) highlights how progress in researching this has only occurred since the 90's. Connell & Goodmans' (2002) meta-analysis established that children's problematic 'externalising' behaviours appeared to be similarly associated with both maternal psychopathology and paternal psychopathology, whilst concluding that internalising behaviours were associated

more significantly with maternal psychopathology. A more recent meta-analysis suggests that offspring of mothers with depression have increased risk of experiencing both internalising and externalising problems compared with children of non-depressed mothers (Goodman et al, 2011). This data suggests maternal depression as a general risk factor for broader psychopathology in offspring,

Research indicates that a father's positive parenting and increased time spent caring for their child moderated the long-term negative impact of maternal depression on the infant's level of depression and anxiety (Chang et al, 2009), but not on 'externalising' behaviours such as aggression (Mezulis et al, 2004). A large longitudinal study discovered that severe postnatal depression in fathers was associated with high levels of mental health difficulties in their children (particularly boys) at three-and-a-half years old (Ramchandani et al, 2005) and at seven years old (Ramchandani & Stein, 2008). This effect on the children's mental health was subsequently indicated outside of the perinatal period and more broadly affecting the children's mental health (Wilson & Durbin, 2010), even within a sample of fathers reporting relatively mild symptoms of depression.

Lewis et al (2017) analysed data from two representative prospective cohorts in Ireland to more robustly assess the relationship between paternal depressive symptoms and the depressive symptoms in their children at adolescence. Their findings demonstrated that an increase (of one standard deviation) in paternal depressive symptoms (using well established self-report measures), was associated with increases in the adolescent symptoms, as measured through the Short Mood and Feelings Questionnaire (SMFQ), for both cohorts (0.24 SMFQ points and 0.18 SMFQ points, respectively). This finding was independent of, and comparable to, the relationship between the depressive symptoms of mothers on their offspring's depression symptoms in adolescence.

***Military mental health***

Rowe et al (2014) built on previous findings (Andres & Moelker, 2010), to reveal that 51% (of over 3000 veterans surveyed) perceive their military career to have had a negative effect on their children. Having also introduced in this paper some of the research exploring paternal psychopathology, it is interesting to note that 90% of those currently registered as military personnel within the UK Armed Forces are male (Dempsey, 2018). Veterans' reported perceptions of the impact of their service on their children were affected by factors such as: being deployed for more than 12 months over a 3-year period; not being in a relationship; experiencing symptoms of common mental health disorders; and experiencing symptoms indicative of PTSD. Being a military reserve and being ranked as a commissioned officer were both found to reduce the likelihood of reporting negative effects of the military career on their children. Data from a large Australian survey (Wade et al, 2017) demonstrated that military deployment and exposure to potentially traumatic events were associated with increased risk of poor mental health indicators. The findings from a UK veteran cohort study suggests that, whilst the majority of British military personnel do not experience psychopathology, there are links between military deployments and mental disorder (Fear et al, 2010).

Interestingly, analysis of data from the Adult Psychiatric Morbidity Survey of England in 2007 found no significant differences between veterans' and non-veterans' treatment-seeking behaviours, indicators of mental health, or social disadvantage (Woodhead et al, 2011). This appears to be contrary to the findings indicating the varied impact of the military career, and veterans' ill-perception of that impact.

Andres and Moelker (2010) have even emphasised the positive impact of a military career on children of military personnel, citing the similar or lower levels of psychopathology, less juvenile offending, higher median IQs, and greater educational grades compared with

children of civilian families. Theories of resilience in military children and families, have been developed to explain these positive consequences, improved by factors such as enhanced healthcare, subsidised education, financial security and strong social networks associated with the military family lifestyle (Palmer, 2008). Overall the evidence is mixed and there are likely to be both risk and protective factors.

***Intergenerational transmission of psychopathology***

Research has begun to examine the intergenerational transmission of psychopathology suggesting that the likelihood of experiencing a psychiatric disorder by young adulthood was significantly more probable for children with a depressed parent (Leis et al, 2010) and at pre-school age (Reck et al, 2016) compared with offspring of nondepressed parents. Pathways of intergenerational transmission of psychopathology have also been examined, with the transdiagnostic internalising factor of mothers being found to strongly predict the same factor in their offspring compared with pathways comprising specific disorders (Starr et al, 2014). More specific components such as parental traits characterised by self-regulatory difficulties (Gromatsky et al, 2017) and post-traumatic stress disorder (Star et al, 2014) have also been implicated in intergenerational transmission of psychopathology, associated with aetiology of adolescent non-suicidal self-harm and symptoms of post-traumatic symptoms respectively.

In developmental psychopathology research there has been an emerging body of work identifying and conceptualising a general factor of psychopathology (p-factor). This p-factor has been defined as "one underlying dimension that summarised individuals' propensity to develop any and all forms of common psychopathologies" (Caspi et al, 2014, p.131). Using a large longitudinal cohort study and building on dimensional research by Lahey et al (2012), Caspi et al (2014) identified how vulnerability to mental disorder was better accounted for by one general psychopathology factor than by three spectral factors of

psychopathology (internalising, externalising and thought disorder). The p-factor was longitudinally associated with a multitude of adverse outcomes and increased life impairment. Many studies (Lacuelle, Vollebergh & Ormel, 2015; Lahey et al, 2015; Patalay et al, 2015; Del Giudice, 2016; Constantinou et al, 2019) have since replicated this higher-order p-factor, and it is suggested that it constitutes a vulnerability to psychopathology.

### *Role of reflective function as intergenerational mediator*

Reflective functioning refers to an individual's mentalising capacities; their ability to understand the mental state of oneself or others that underlie overt behaviours (Katznelson, 2014). Mentalising has been shown to be implicated in developmental psychopathology (Fonagy et al, 2011) and has been targeted in treatment (Fonagy & Bateman, 2007). Before the Reflective Functioning Questionnaire (RFQ) was developed and validated (Fonagy et al, 2016), it was only possible to measure through coding of interviews. It was when Fonagy and colleagues developed and validated the RFQ that quantitative studies of mentalising were possible. Reflective functioning, as a construct, emerged within the areas of psychoanalysis and attachment theory where there was interest in intergenerational transmission of attachment security (Fonagy, 1991; Fonagy et al, 1991). Parental reflective functioning has been indicated as a moderating factor of child internalising difficulties in the context of child sexual abuse (Ensink et al, 2017), and infant attachment style with abused and neglected mothers (Fonagy et al, 1994; Berthelot et al, 2015).

Studying the longitudinal impact of maternal reflective functioning on infant attachment, Ensink et al (2016) found that higher reflective functioning positively affected their parenting and subsequent infant attachment. The authors suggest these findings indicate that mothers' reflective functioning enable them to screen and moderate or inhibit negative parenting behaviours that would otherwise negatively affect infant attachment security.

There has been very limited research assessing parental reflective functioning on child development and psychopathology (Camoireno, 2017). Exploratory findings have shown that low maternal reflective functioning (measured via the Adult Attachment Interview Reflective Functioning scale) (AAI-RF) predicted higher levels of anxiety in their offspring (Esbojorn et al, 2013). Whilst the study did not conclude an equivalent finding for the father's reflective functioning, paternal psychopathology and higher levels of attachment avoidance were associated with child anxiety. Furthermore, Esbojorn et al acknowledge the small clinical population of the study and emphasise the importance of including fathers in future research in this area.

### *Current study*

This study seeks to investigate intergenerational transmission of mental disorder, and specifically test how much variance can be explained through the p-factor. Using a sample of military veterans, the p-factor will be modelled from parent-reported data on the psychopathology of their children. A secondary hypothesis that will be tested is that reflective functioning will capture some of the shared variance between parent and child.

The two research questions are:

1- Whether the factor structure of psychopathology in children is best accounted for using a bifactor model that includes a 'general' psychopathology factor
2- Whether the Reflective Functioning Questionnaire captures some of the shared variance between parent and child psychopathology.

## Methods

### *Recruitment*

The study used a cross-sectional correlational design and therefore it will not establish any causal relationships. Recruitment to the study occurred between June 2019 to March 2020

and the development of the survey, and the workload and strategy for recruitment was completed by both the author and fellow trainee (Jones, 2020) (Appendix A). The electronic survey was held on UCL's secure web-based Patient Outcome Database (POD) which required participants to use unique login credentials. Using a purposive sampling method, all participants were self-selecting by emailing us directly, having heard of the study, to enquire and/or receive details of how to log in and complete the survey. In total, 31 military organisations/charities confirmed that they would help circulate the study invitation to their networks of veterans. Appendix B shows a breakdown of the number of organisations that were contacted and that disseminated the advert. These organisations distributed the invitation/advert (Appendix C) via a range of social media channels, newsletters, and emails. In addition to this, the study established an active Twitter Account to advertise the research and invite eligible veterans to contact us. Figure 1 shows the flow of participants from those that contacted us to those that completed the survey.

A range of findings from a Cochrane review (Edwards et al, 2009) were utilised to increase response rates. This included using shorter, more personalised e-mail messages tailored for each network of participants and incentivising with a monetary lottery. The invitation message briefly summarised the aims of and eligibility criteria for the study; inviting them to respond via e-mail to participate, if interested. An Information Sheet (appendix D) with further details was attached. Following the receipt of additional external funds, and to improve study recruitment, a £5 gift voucher was given to all participants including 40 who participated prior to this incentivisation.

Respondents contacted the researchers via e-mail to indicate interest and were sent user credentials to access the study on UCL's secure web-based Patient Outcome Database

(POD). The use of the secure web-based POD adhered to the questionnaire provider's requirement that the administration of GHQ-28 is username and password protected.

**Table 1 – Inclusion and exclusion criteria**

| | |
|---|---|
| **Inclusion Criteria** | - Veteran (served for at least one day in Her Majesty's Armed Forces, and now no longer serves)<br>- Adult male (aged 18-65)<br>- Father of at least one child aged between 4-17 years old<br>- Fluent in writing and understanding English |
| **Exclusion Criteria** | - Female<br>- Still serving in the armed forces<br>- Does not have a child aged between 4 and 17 years old |

***Participants***

The study used data from 111 male veterans who completed a series of online questionnaires about themselves and their child(ren). Eligible participants were male veterans who had at least one child aged 4-17 years old and were no longer serving in the Armed Forces. The study used the definition of 'veterans', as used by the Ministry of Defence (2017), as being anyone who has served for at least one day in Her Majesty's Armed Forces, and now no longer serves (i.e. is now a civilian). The study applied an age restriction for the children as this is the age group the Strengths and Difficulties Questionnaire has been designed for. Respondents with more than one child within this age-band were asked to give responses pertaining to their oldest eligible child.

The average age of the participants was 43.7 years (SD=7.661) and the average age of their child was 11.9 years old (SD=4.134). Average length of military service was 14.7 years (SD = 84.44), and Figure 3 highlights the broader spread amongst the sample. Table 2 highlights the military branch of participants, with 70% having served in the Army. A total of 92.8% of participants were deployed operationally, and 94.6% reported that they had a partner.

**Figure 1 – Participants length of military service**

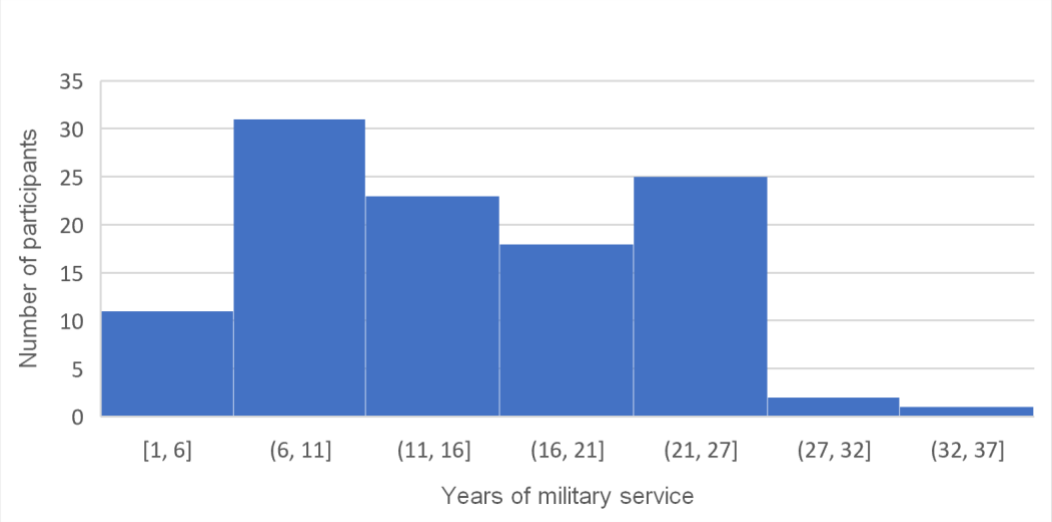


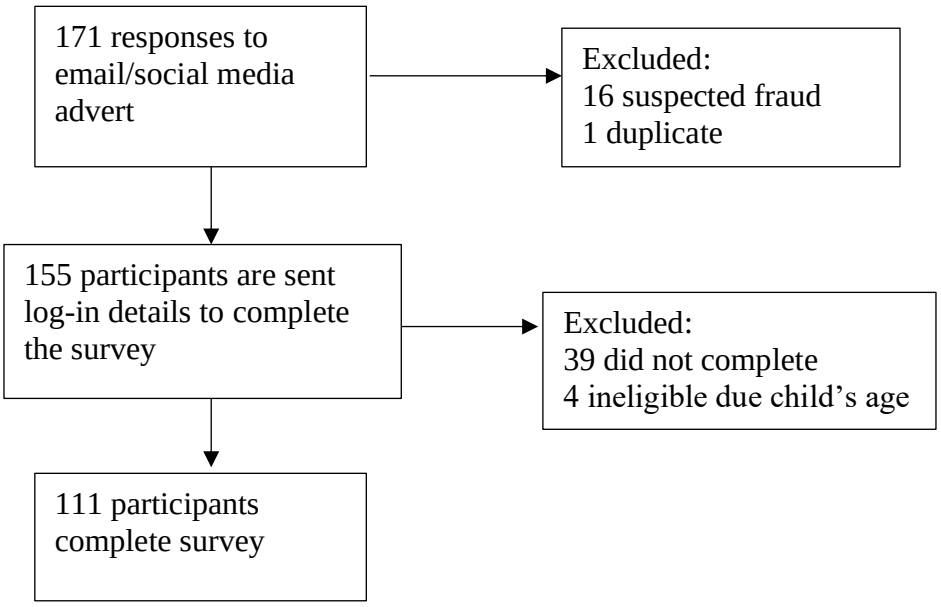

**Table 2 – Number and percentage of participants by military branch**

| Military Branch | Number of participants | Percent |
|---|---|---|
| Royal Navy | 10 | 9 |
| Army | 78 | 70.3 |
| Royal Air Force | 10 | 9 |
| Royal Marines | 12 | 10.8 |
| Other | 1 | 0.9 |
| Total | 111 | 100 |

**Table 3 – Number and percentage of participants by military role**

| Military role | Number of participants | Percent |
|---|---|---|
| Combat Arms | 64 | 57.7 |
| Combat Support | 29 | 26.1 |
| Combat service support | 9 | 8.1 |
| Other | 9 | 8.1 |
| Total | 111 | 100 |

**Figure 2 – Flow of participants completing survey**




**Power**

Given that this study requires confirmatory factor analysis (CFA) to estimate the p factor for both the fathers and children, a power calculation would require a series of simulation studies (e.g. Monte Carlo analyses) that were deemed outside of the scope of this DClinPsy project (Wolf et al, 2013). A decision was made that, for reasons of pragmatism, alternative 'rules of thumb' would be considered instead when identifying the required sample size needed for this study. Therefore, the literature was explored for recommendations

on what sample size is optimal for CFA and factor analysis, in general (Marsh, Hau, Balla, & Grayson, 1998; Myers, Ahn & Jin, 2011; Comrey & Lee, 1992). Myers et al. (2011) recommends N≥ 200 and Comrey and Lee (1992) suggest that roughly a sample of 100 is poor, 200 is fair, 300 is good and 500 is very good for factor analyses.

**Variables and measures**

*Paternal mental health*

Mental health symptomatology in participants was measured with standardised and widely used psychometric instruments with good validity and reliability. Firstly, the General Health Questionnaire 28-item version (GHQ-28; Goldberg & Hillier, 1979) (Appendix E) was administered to detect a wide range of psychiatric symptoms. The psychometric properties of the GHQ-28 have been shown to be equivalent when administered online compared with paper-and-pencil (Vallejo et al, 2007). The GHQ-28 has been found to have high reliability and validity (Sterling, 2011) and is very commonly used. The measure consists of four subscales: somatic symptoms, anxiety and insomnia, social dysfunction and severe depression (Goldberg & Hillier, 1979). The GHQ-28 has been widely used in prevalence surveys providing a good idea of whether psychopathology in veterans is similar to the general population.

In addition to these standardised psychometric measures, a screening questionnaire was used to confirm respondents' eligibility to participate in the study as well as two measures not used in this study, the Alcohol Use Disorder Identification Test (AUDIT) (Saunders et al, 1993), and Impact of Events Scale (IES-R) (Weiss, 2007). Finally, a short questionnaire was used to capture demographic data pertaining to age, gender, number and ages of children, whether they have a partner, and details of their military service. Military service details included their branch, type of role, highest rank, and deployment details.

*Reflective Function*

The reflective function of fathers was measured using the Reflective Functioning Questionnaire 8-item version (RFQ-8; Fonagy et al., 2016) (Appendix F). This is a short self-report instrument validated to measure an individual's mentalising capacities (e.g. ability to understand the mental state of oneself or others that underlies overt behaviours). Two separate scales have been derived from the RFQ-8 that assess Certainty (RFQ_C) and Uncertainty (RFQ_U) about the mental states of self and others. The construct of mentalisation is complex and difficult to measure. Since the scale requires self-knowledge, the raw scores (from a seven-point Likert scale) are recoded to help mitigate the confounding effect from respondents' misperception of their mentalising capacity. Higher scores on the RFQ_C and lower scores on the RFQ-U are intended to reflect more genuine mentalising capacity. This is in contrast with lower scores on the RFQ_C considered to indicate hypermentalising, and higher scores on the RFQ_U intended to indicate hypomentalising (Fonagy et al, 2016). This questionnaire is widely used as a measure of mentalising, and has been shown to have good construct validity, and test-retest reliability was between satisfactory and excellent for the two subscales (Fonagy et al, 2016; Handeland et al, 2019).

*Child mental health*

Children's mental health was measured using the parent-reported Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), completed by the fathers. The SDQ (Appendix G) is designed for ages 4-17. The SDQ has been shown to have moderate test-retest reliability (Yao et al, 2009) and good concurrent validity (Muris et al, 2003). The SDQ consists of five subscales: emotional, peer problems, behavioural, hyperactivity, and prosocial. However, there is theoretical rationale and empirical support for merging the

emotional and peer subscales into an 'internalising' factor, as well as the behavioural and hyperactivity subscale in to an 'externalizing' subscale particularly in community samples (Di Riso et al, 2010; Van Leeuwen et al, 2006) and with a second-order three-factor model in low-risk (non-psychiatric) samples (Goodman, Laming & Ploubidis, 2010). Like the GHQ-28, the SDQ is widely used in prevalence studies so gives a good idea of whether psychopathology in children of military families is similar to those in the general population. For participants with more than one child, they were asked to report on their eldest child within the age range 4-17.

**Research governance and ethics**

This study was approved (see Appendix H) by the UCL Research Ethics Committee (Project ID): 15069/001. This study was also reviewed and approved by the Help for Heroes' Research Approval Committee (Appendix I), in order for them to distribute the information to their veteran network. It was acknowledged that the researchers would not be able to verbally provide information to participants, debrief participants, or answer any questions while they completed the study. Therefore, an information sheet, a consent form (Appendix J) and a debrief form (Appendix K) were all provided online. Participants were told clearly of their opportunity to contact the researcher via email during any stage (before or after participating in the study).

This study was considered to be low risk in terms of participant safety. Although the study measures participants' mental health and their rating of their children's mental health, these were widely used standardised psychological instruments (e.g., GHQ-28, SDQ). Debriefing procedures were arranged electronically and were clearly highlighted within the online study on POD. Once participants completed the survey, they again received information about the background, aims and predictions of the study, the researcher's contact

e-mail, and links to general support such as the ‘Samaritans’ and ‘combat stress’ (see Appendix I).

**Analysis**

The analysis for this study was purely quantitative. The planned analyses to answer the both research questions, a series of confirmatory factor analyses (CFA), ideally required a larger sample size than the 111 that was available. A judgement was made that the data on this hard-to-reach group warranted continuing as planned with the factor analyses of both the psychopathology data for veterans (GHQ-28) and the psychopathology data for their children (parent-reported SDQ). The data was processed and prepared using SPSS 25 (SPSS, 2017), and the factor analyses were conducted using Mplus 8 (Muthén & Muthén, 2017). A Weighted Least Squares Estimate (WLSMV) was performed since the dependent variables were defined as categorical (Geiser, 2012).

The fit of four confirmatory factor analysis (CFA) models (orthogonal group factor; correlated group factor; single factor; and bifactor (including a p-factor)) of the fathers’ self-reported symptom data (GHQ-28) were compared. The fit of five CFA models (orthogonal group factor; correlated group factor; hierarchical factor; single factor; and bifactor) of the parent-reported child symptom data (SDQ) were compared.

The data from the GHQ-28 constitutes the veteran psychopathology data and the measurement models that were fitted to the data were derived from the established literature (Shayan et al, 2015), as specified in the methods section (Figure 2). The child psychopathology data comprised of the SDQ data and the models tested were also identified from the literature (Goodman et al, 2010). These measurement models are shown in Figure 2. The association between paternal p and reflective function was also estimated as well as the correlation of the latent paternal p and child p factors. To estimate correlations between the

general and spectral factors from father's and child's psychopathology data, the factor scores were estimated through the analyses on MPlus and exported as a data file into SPSS. Correlations were subsequently estimated using SPSS.

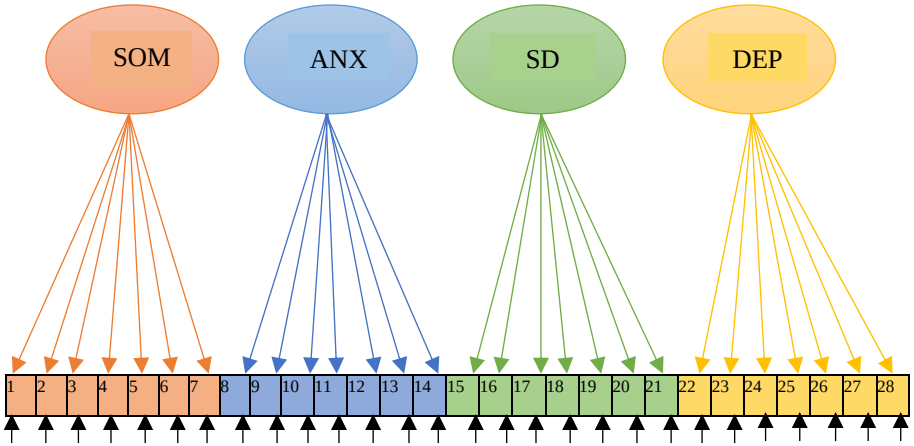
Following correlational tests between the father and child factors, and to answer research question two, mediation path analysis was conducted using the PROCESS Macro (Hayes, 2018) on SPSS testing whether paternal p affects child p directly and indirectly through reflective functioning. This was performed separately using the Uncertainty (RFQ-U) and Certainty (RFQ_C) subscales of the RFQ.

Three indices of model fit and model parsimony were used to determine the fit of the models: Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardised Root Mean Square Residual (SRMR).

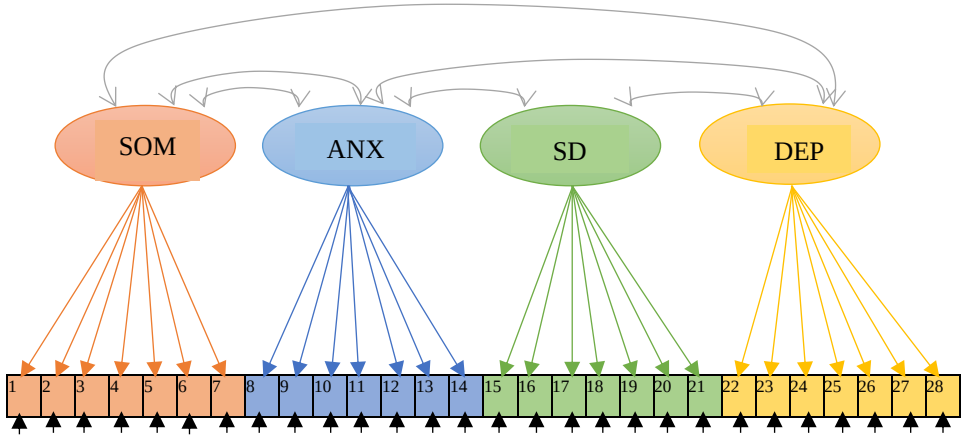
The CFI indicates the how much more significantly a model fits the data compared to a null model. A model fit with a CFI value of 0.90 constitutes a model with a good fit to the data (Hu & Bentler, 1999). The RMSEA identifies the extent to which a particular model fits the data, with a value greater than 0.05 suggesting a well-fitting model. The SRMR measures the standardised difference between the predicted and observed correlations within a particular model. An SRMR value of below 0.08 suggests the model fits the data well.

**Figure 3 – CFA measurement models for GHQ-28 data and SDQ data**

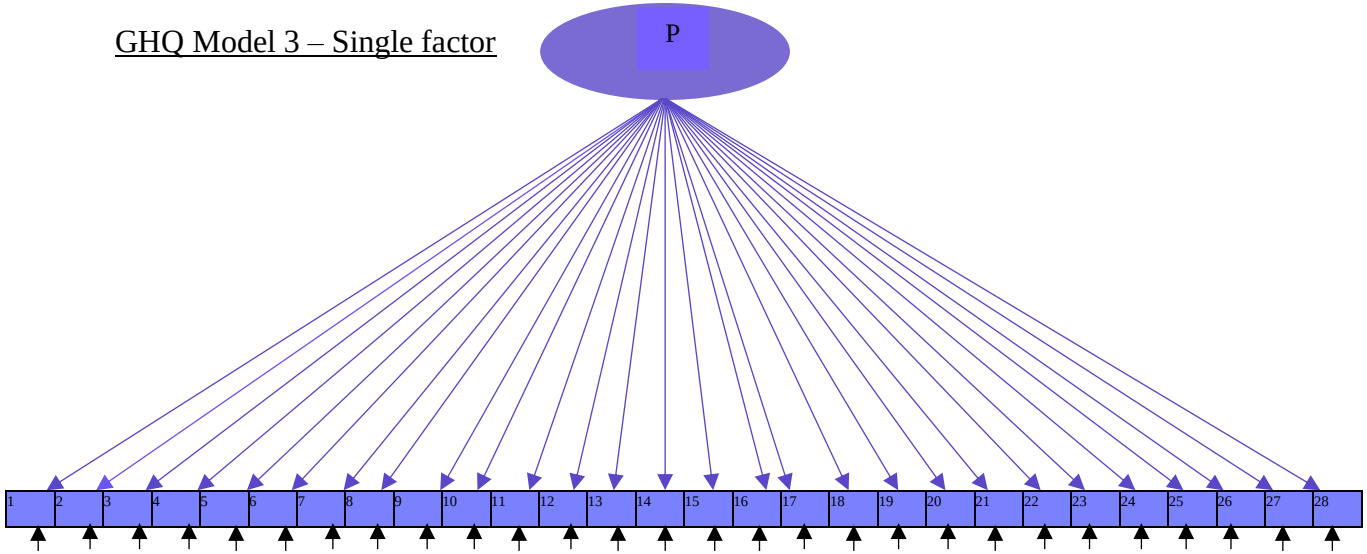
GHQ Model 1 – Orthogonal



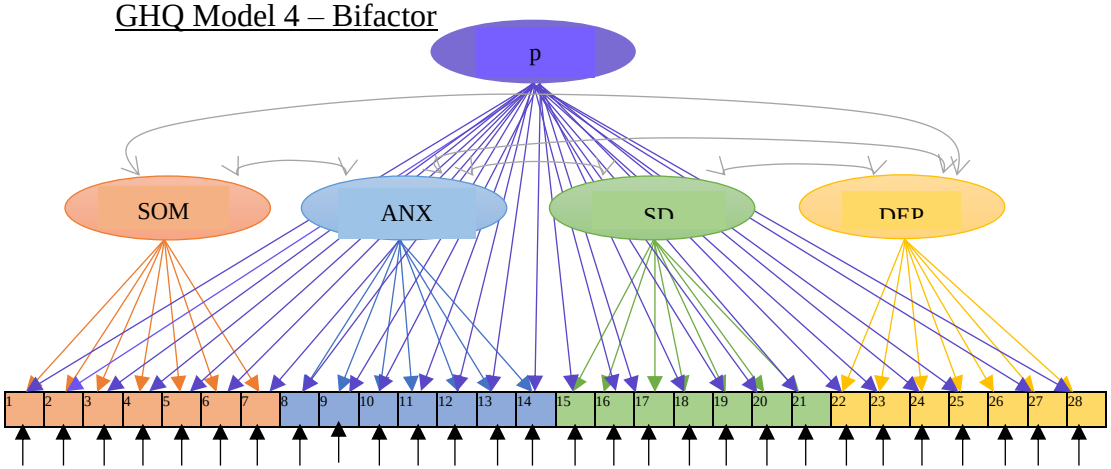

GHQ Model 2 – Oblique



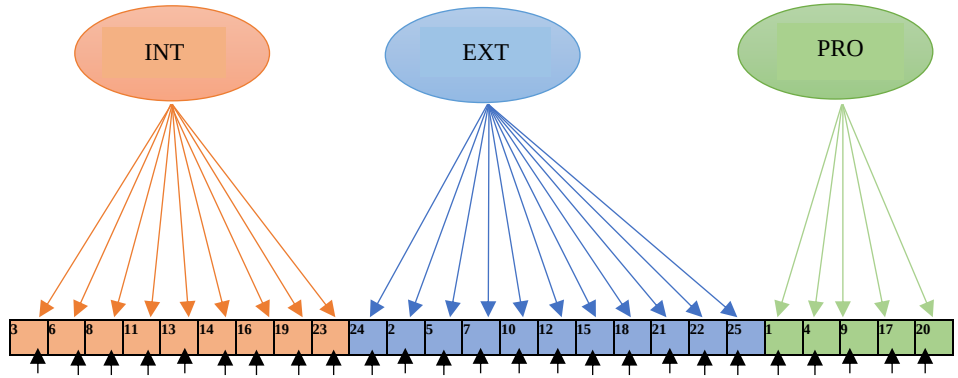

GHQ Model 3 – Single factor



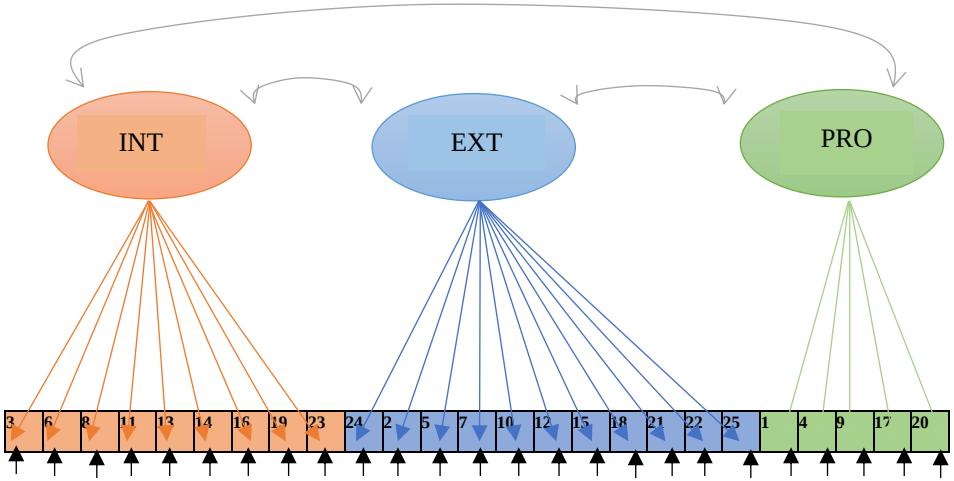
GHQ Model 4 – Bifactor



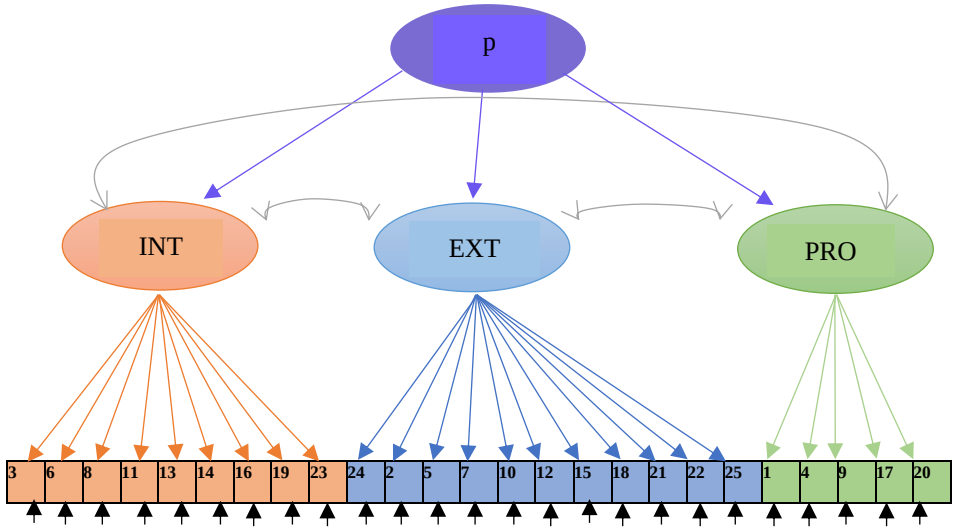

SDQ Model 1 – Orthogonal



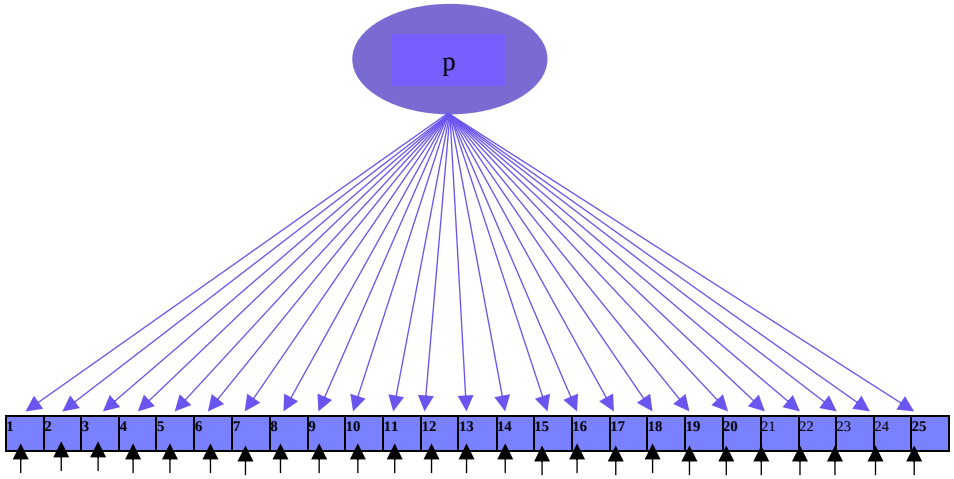

SDQ Model 2 – Oblique



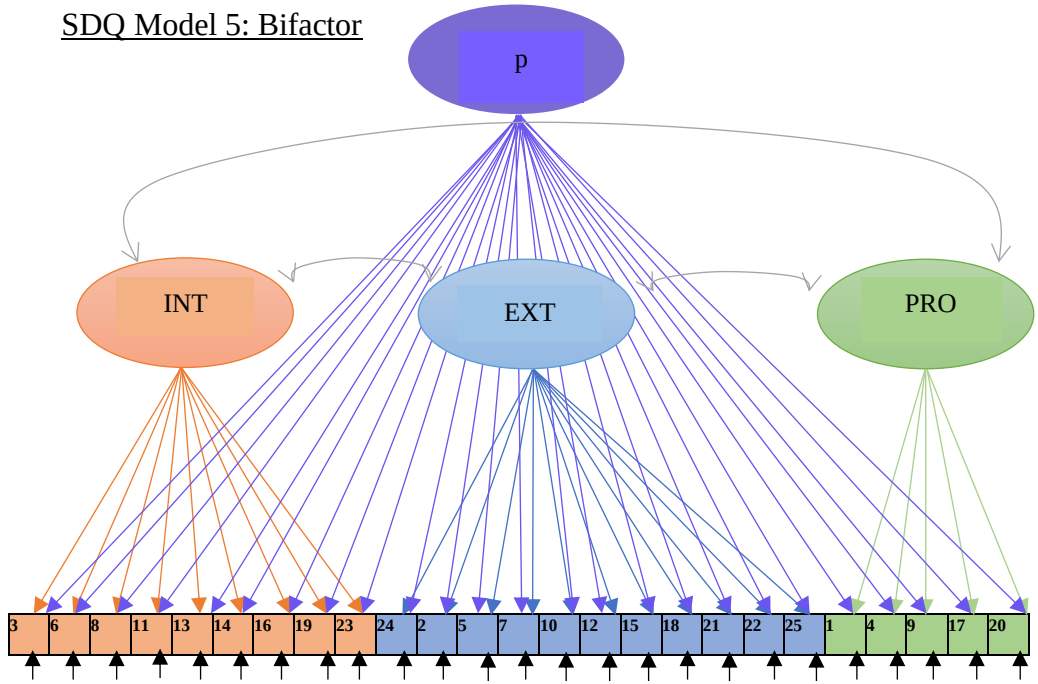

SDQ Model 3 – Hierarchical



SDQ Model 4: Single factor




SDQ Model 5: Bifactor




*Key*

Squares/rectangles: observed data (items from GHQ-28 or SDQ); Circles: latent variables; Straight single arrow: factor loading/residual variance; Curved double-headed arrow: factor covariance

## Results

### Pre-analysis data checking

Data was cleaned and prepared in SPSS. This included recoding the RFQ data and establishing the two subscales (as noted in the Methods section), subscale scores were also produced for the GHQ-28 and SDQ for all participants. All participants completed the GHQ-28, but two participants had not completed both the RFQ-8 and the SDQ. Missing data was managed in the Factor analyses as detailed below.

### Descriptive data

**Table 4 – Mean total scores and indices of normality for each measure**

| | N | Mean | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|
| GHQ-28 TOTAL | 111 | 34.67 | 17.67 | 0.46 | -0.67 |
| RFQ_U Total | 109 | 1.06 | 0.81 | 0.41 | -0.92 |
| RFQ_C Total | 109 | 0.75 | 0.86 | 0.96 | -0.26 |
| SDQ TOTAL | 109 | 15.02 | 7.93 | 0.23 | -0.55 |

Since the study used the GHQ-28, widely used in prevalence surveys, the findings (see Table 4 and 5) suggest that the levels of psychopathology in this veteran sample are higher than the average population. Using the measures' threshold of ≥23 to indicate psychological distress (Goldberg, 1978) the findings indicate 72.1% of veterans experienced levels of psychological distress. This is compared to prevalence data suggesting the proportion is 18% in the general population based on the GHQ-12 (NHS Digital, 2017). Using the measures' threshold of ≥17 to indicate 'abnormal' levels of emotional and behavioural problems (Goodman 2001), the findings indicate 43.1% of veteran's children experienced abnormal levels of emotional and behavioural problems. This is compared with

11.2% of 5-15-year-olds assessed in the 2017 prevalence survey comprising the SDQ (NHS Digital, 2017).

**Table 5 – *Descriptive statistics for GHQ-28***

| | N | Mean | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|
| **Somatic** | | | | | |
| **Item 1** | 111 | 1.41 | 0.743 | 0.129 | -0.225 |
| **Item 2** | 111 | 1.32 | 0.776 | -0.046 | -0.498 |
| **Item 3** | 111 | 1.64 | 0.872 | 0.022 | -0.735 |
| **Item 4** | 111 | 1.17 | 0.933 | 0.402 | -0.677 |
| **Item 5** | 111 | 0.88 | 0.96 | 0.677 | -0.726 |
| **Item 6** | 111 | 0.92 | 0.974 | 0.646 | -0.757 |
| **Item 7** | 111 | 0.88 | 0.979 | 0.712 | -0.701 |
| **Anxiety & Insomnia** | | | | | |
| **Item 8** | 111 | 1.57 | 0.911 | 0.016 | -0.794 |
| **Item 9** | 111 | 1.43 | 0.997 | -0.007 | -1.052 |
| **Item 10** | 111 | 1.59 | 0.825 | 0.116 | -0.576 |
| **Item 11** | 111 | 1.55 | 0.839 | 0.076 | -0.571 |
| **Item 12** | 111 | 1.08 | 0.945 | 0.428 | -0.793 |
| **Item 13** | 111 | 1.49 | 0.952 | 0.039 | -0.899 |
| **Item 14** | 111 | 1.23 | 0.943 | 0.174 | -0.943 |
| **Social Dysfunction** | | | | | |
| **Item 15** | 111 | 1.34 | 0.745 | 0.828 | 0.384 |
| **Item 16** | 111 | 1.51 | 0.712 | 1.03 | -0.289 |
| **Item 17** | 111 | 1.53 | 0.761 | 0.397 | -0.382 |
| **Item 18** | 111 | 1.48 | 0.737 | 0.218 | -0.228 |
| **Item 19** | 111 | 1.5 | 0.862 | 0.058 | -0.615 |
| **Item 20** | 111 | 1.3 | 0.734 | 0.734 | 0.482 |
| **Item 21** | 111 | 1.59 | 0.813 | 0.359 | -0.667 |
| **Depression** | | | | | |
| **Item 22** | 111 | 1.15 | 1.08 | 0.394 | -1.167 |
| **Item 23** | 111 | 0.89 | 1.012 | 0.863 | -0.414 |
| **Item 24** | 111 | 0.78 | 0.957 | 0.955 | -0.206 |
| **Item 25** | 111 | 0.92 | 0.983 | 0.633 | -0.822 |
| **Item 26** | 111 | 0.86 | 0.962 | 0.795 | -0.486 |
| **Item 27** | 111 | 0.68 | 0.914 | 1.108 | 0.136 |
| **Item 28** | 111 | 0.96 | 1.061 | 0.631 | -0.973 |

## Table 6 - Correlation Coefficients (Spearman's Rho) between GHQ-28 items, grouped by factor

| GHQ item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **2** | .471** | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **3** | .687** | .546** | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| **4** | .580** | .433** | .609** | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| **5** | .319** | .299** | .469** | .528** | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| **6** | .236* | .245** | .359** | .497** | .815** | 1 | | | | | | | | | | | | | | | | | | | | | | |
| **7** | .226* | .329** | .427** | .440** | .565** | .575** | 1 | | | | | | | | | | | | | | | | | | | | | |
| **8** | .470** | .348** | .524** | .554** | .461** | .475** | .417** | 1 | | | | | | | | | | | | | | | | | | | | |
| **9** | .331** | .199* | .448** | .462** | .575** | .524** | .533** | .755** | 1 | | | | | | | | | | | | | | | | | | | |
| **10** | .409** | .370** | .556** | .554** | .494** | .368** | .472** | .559** | .518** | 1 | | | | | | | | | | | | | | | | | | |
| **11** | .397** | .283** | .522** | .544** | .445** | .411** | .363** | .507** | .485** | .650** | 1 | | | | | | | | | | | | | | | | | |
| **12** | .429** | .388** | .492** | .568** | .634** | .598** | .511** | .575** | .592** | .530** | .564** | 1 | | | | | | | | | | | | | | | | |
| **13** | .464** | .389** | .550** | .556** | .453** | .464** | .449** | .572** | .447** | .589** | .717** | .645** | 1 | | | | | | | | | | | | | | | |
| **14** | .468** | .417** | .650** | .630** | .525** | .468** | .501** | .640** | .614** | .658** | .658** | .763** | .723** | 1 | | | | | | | | | | | | | | |
| **15** | .254** | .240* | .293** | .285** | .302** | .305** | .338** | .347** | .302** | .357** | .357** | .359** | .396** | .401** | 1 | | | | | | | | | | | | | |
| **16** | .353** | .188* | .348** | .459** | .409** | .395** | .409** | .413** | .386** | .437** | .467** | .421** | .534** | .424** | .355** | 1 | | | | | | | | | | | | |
| **17** | .448** | .353** | .494** | .445** | .406** | .408** | .394** | .485** | .383** | .542** | .543** | .491** | .629** | .672** | .504** | .447** | 1 | | | | | | | | | | | |
| **18** | .450** | .290** | .404** | .420** | .404** | .358** | .309** | .385** | .341** | .556** | .503** | .488** | .571** | .550** | .389** | .525** | .655** | 1 | | | | | | | | | | |
| **19** | .367** | .257** | .343** | .324** | .336** | .314** | .318** | .380** | .350** | .465** | .340** | .439** | .509** | .497** | .460** | .523** | .540** | .634** | 1 | | | | | | | | | |
| **20** | .274** | .286** | .312** | .329** | .310** | .296** | .310** | .378** | .313** | .579** | .395** | .311** | .528** | .486** | .332** | .540** | .485** | .652** | .634** | 1 | | | | | | | | |
| **21** | .452** | .389** | .593** | .469** | .384** | .280** | .408** | .368** | .341** | .535** | .417** | .421** | .539** | .511** | .353** | .373** | .482** | .560** | .483** | .574** | 1 | | | | | | | |
| **22** | .433** | .434** | .613** | .512** | .433** | .452** | .477** | .523** | .487** | .553** | .591** | .579** | .585** | .680** | .432** | .312** | .591** | .499** | .469** | .466** | .618** | 1 | | | | | | |
| **23** | .357** | .396** | .579** | .574** | .515** | .490** | .485** | .568** | .538** | .611** | .572** | .646** | .612** | .675** | .438** | .355** | .534** | .481** | .484** | .431** | .586** | .791** | 1 | | | | | |
| **24** | .275** | .307** | .369** | .500** | .382** | .437** | .430** | .399** | .401** | .497** | .596** | .564** | .634** | .542** | .422** | .404** | .531** | .515** | .465** | .444** | .438** | .672** | .809** | 1 | | | | |
| **25** | 0.127 | .215* | .309** | .334** | .315** | .419** | .409** | .416** | .412** | .379** | .428** | .482** | .485** | .477** | .300** | .228* | .435** | .347** | .301** | .308** | .323** | .637** | .726** | .773** | 1 | | | |
| **26** | .351** | .342** | .476** | .624** | .551** | .554** | .559** | .575** | .615** | .560** | .611** | .709** | .589** | .680** | .479** | .552** | .558** | .571** | .540** | .470** | .463** | .644** | .736** | .669** | .618** | 1 | | |
| **27** | .201* | .259** | .308** | .405** | .354** | .467** | .433** | .369** | .371** | .437** | .507** | .449** | .548** | .480** | .392** | .288** | .466** | .494** | .390** | .462** | .436** | .636** | .691** | .863** | .767** | .562** | 1 | |
| **28** | .219* | .311** | .355** | .335** | .407** | .427** | .429** | .457** | .463** | .462** | .509** | .528** | .531** | .510** | .371** | .308** | .392** | .382** | .388** | .338** | .357** | .555** | .718** | .740** | .804** | .650** | .738** | 1 |

**Table 7 – *Descriptive statistics for SDQ***

| | N | Mean | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|
| **Internalising** | | | | | |
| **SDQ_3** | 109 | 0.71 | 0.749 | 0.542 | -1.028 |
| **SDQ_6** | 109 | 0.9 | 0.781 | 0.179 | -1.333 |
| **SDQ_8** | 109 | 1.05 | 0.786 | -0.081 | -1.371 |
| **SDQ_11** | 109 | 0.35 | 0.599 | 1.529 | 1.289 |
| **SDQ_13** | 109 | 0.71 | 0.724 | 0.512 | -0.943 |
| **SDQ_14** | 109 | 0.36 | 0.519 | 1.003 | -0.151 |
| **SDQ_16** | 109 | 1.01 | 0.776 | -0.016 | -1.328 |
| **SDQ_19** | 109 | 0.49 | 0.661 | 1.03 | -0.091 |
| **SDQ_23** | 109 | 0.76 | 0.815 | 0.467 | -1.341 |
| **SDQ_24** | 109 | 0.7 | 0.764 | 0.577 | -1.06 |
| **Externalising** | | | | | |
| **SDQ_2** | 109 | 0.88 | 0.836 | 0.229 | -1.535 |
| **SDQ_5** | 109 | 1 | 0.782 | 0 | -1.355 |
| **SDQ_7** | 109 | 0.65 | 0.629 | 0.429 | -0.648 |
| **SDQ_10** | 109 | 0.78 | 0.798 | 0.419 | -1.305 |
| **SDQ_12** | 109 | 0.32 | 0.637 | 1.801 | 1.895 |
| **SDQ_15** | 109 | 1.08 | 0.771 | -0.143 | -1.297 |
| **SDQ_18** | 109 | 0.91 | 0.834 | 0.175 | -1.543 |
| **SDQ_21** | 109 | 0.9 | 0.637 | 0.087 | -0.52 |
| **SDQ_22** | 109 | 0.55 | 0.687 | 0.862 | -0.446 |
| **SDQ_25** | 109 | 0.93 | 0.729 | 0.114 | -1.093 |
| **Prosocial** | | | | | |
| **SDQ_1** | 109 | 1.48 | 0.661 | -0.894 | -0.309 |
| **SDQ_4** | 109 | 1.45 | 0.659 | -0.797 | -0.436 |
| **SDQ_9** | 109 | 1.7 | 0.518 | -1.465 | 1.248 |
| **SDQ_17** | 109 | 1.72 | 0.488 | -1.497 | 1.28 |
| **SDQ_20** | 109 | 1.41 | 0.656 | -0.675 | -0.56 |

## Table 8 - Correlation Coefficients (Spearman's Rho) between SDQ items, grouped by factor

| SDQ item | 3 | 6 | 8 | 11 | 13 | 14 | 16 | 19 | 23 | 24 | 2 | 5 | 7 | 10 | 12 | 15 | 18 | 21 | 22 | 25 | 1 | 4 | 9 | 17 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3** | 1 | .272** | .454** | 0.163 | .551** | 0.025 | .274** | .399** | .228* | .368** | .276** | .308** | 0.138 | .310** | .371** | .226* | .280** | -0.02 | .268** | 0.128 | -0.042 | -0.047 | -0.05 | -0.023 | -0.045 |
| **6** | | 1 | .224* | .342** | .316** | .238* | 0.176 | .262** | .420** | .268** | .213* | .237* | 0.06 | .331** | .235* | 0.127 | .284** | .193* | .365** | 0.182 | -.212* | -.351** | -0.096 | -0.026 | -0.182 |
| **8** | | | 1 | .225* | .607** | 0.159 | .486** | .359** | .296** | .508** | .338** | .258** | 0.053 | .271** | .399** | 0.072 | 0.143 | -0.064 | .338** | 0.14 | -0.043 | -.199* | -0.072 | -0.076 | -0.08 |
| **11** | | | | 1 | .341** | .461** | .212* | 0.185 | .348** | .193* | 0.145 | 0.056 | .203* | .222* | 0.121 | -0.106 | 0.033 | 0.131 | .253** | 0.161 | -.256** | -.303** | -.249** | -.289** | -.312** |
| **13** | | | | | 1 | .288** | .444** | .489** | .287** | .579** | .232* | .379** | 0.157 | .339** | .505** | 0.152 | .276** | 0.052 | .443** | 0.045 | -0.138 | -.236* | -0.095 | -0.107 | -0.179 |
| **14** | | | | | | 1 | .220* | 0.189* | 0.107 | 0.184 | .214* | 0.033 | 0.096 | 0.169 | 0.125 | -0.033 | -0.013 | 0.149 | .302** | .220* | -.308** | -.448** | -.311** | -.275** | -.213* |
| **16** | | | | | | | 1 | .262** | .199* | .534** | .232* | .199* | 0.008 | .353** | .261** | .261** | 0.138 | -0.013 | .392** | 0.18 | -0.021 | -.284** | -0.095 | -0.126 | -0.115 |
| **19** | | | | | | | | 1 | .392** | .321** | .272** | .291** | 0.138 | .287** | .510** | .384** | .277** | -0.067 | .362** | .234* | -0.113 | -.254** | 0.051 | 0.021 | -0.017 |
| **23** | | | | | | | | | 1 | .410** | .280** | .221* | -0.043 | .202* | .199* | 0.186 | .229* | -0.129 | .236* | 0.099 | -0.031 | -.202* | 0.118 | -0.018 | 0.012 |
| **24** | | | | | | | | | | 1 | .251** | .223* | -0.075 | .309** | .314** | .221* | .188* | -0.076 | .290** | 0.065 | -0.034 | -0.188 | 0.039 | -0.026 | -0.044 |
| **2** | | | | | | | | | | | 1 | .397** | .209* | .537** | .308** | .569** | .384** | .239* | .223* | .357** | -0.16 | -.309** | -0.041 | -0.099 | -0.145 |
| **5** | | | | | | | | | | | | 1 | .357** | .368** | .323** | .387** | .538** | .208* | .450** | .262** | -.272** | -.251** | -0.026 | -0.06 | -.231* |
| **7** | | | | | | | | | | | | | 1 | .225* | .234* | .240* | .457** | .324** | .362** | .346** | -.365** | -.411** | -.230* | -0.068 | -.381** |
| **10** | | | | | | | | | | | | | | 1 | .230* | .519** | .310** | .265** | .322** | .447** | -.213* | -.315** | -0.085 | -0.091 | -.196* |
| **12** | | | | | | | | | | | | | | | 1 | .285** | .309** | 0.105 | .452** | 0.096 | -0.095 | -.218* | 0.011 | -0.124 | -0.025 |
| **15** | | | | | | | | | | | | | | | | 1 | .467** | .265** | .227* | .489** | -0.12 | -.198* | 0.056 | 0.11 | -0.085 |
| **18** | | | | | | | | | | | | | | | | | 1 | 0.187 | .468** | .275** | -.316** | -.224* | 0.039 | -0.063 | -.257** |
| **21** | | | | | | | | | | | | | | | | | | 1 | 0.141 | .550** | -.328** | -.370** | -0.072 | -0.006 | -.345** |
| **22** | | | | | | | | | | | | | | | | | | | 1 | .214* | -.275** | -.430** | -0.135 | -.268** | -.270** |
| **25** | | | | | | | | | | | | | | | | | | | | 1 | -.325** | -.425** | -0.072 | 0.104 | -.309** |
| **1** | | | | | | | | | | | | | | | | | | | | | 1 | .512** | .350** | .352** | .633** |
| **4** | | | | | | | | | | | | | | | | | | | | | | 1 | .194* | .205* | .392** |
| **9** | | | | | | | | | | | | | | | | | | | | | | | 1 | .539** | .488** |
| **17** | | | | | | | | | | | | | | | | | | | | | | | | 1 | .277** |
| **20** | | | | | | | | | | | | | | | | | | | | | | | | | 1 |

**Measurement model**

For the father's psychopathology data, Model 4 (bifactor) fitted the data best, $\chi 2$ (322) = 445.564, $p<0.001$; CFI= 0.984; RMSEA = 0.061; SRMR = 0.052. Table 10 shows that the correlated group factor (Model 2) also had an acceptable fit, $\chi 2$ (344) = 668.239, $p<0.001$; CFI= 0.960; RMSEA = 0.092; SRMR = 0.078. The single factor (Model 3) did not fit the data particularly well, and the Orthogonal group factor (Model 1) had the weakest fit of the data according to al fit indices.

For the children's psychopathology data, the bifactor (Model 5) also showed an acceptable fit and fitted the data best, $\chi 2$ (247) =362.874, $p<0.001$; CFI= 0.911; RMSEA = 0.061; SRMR = 0.052. As Table 11 highlights, the Hierarchical model (Model 3) was not statistically distinguishable from the Oblique Group Factor model (Model 2) upon analyses, $\chi 2$ (272) =523.197, $p<0.001$; CFI= 0.807; RMSEA = 0.092; SRMR = 0.142. The Orthogonal Group Factor (Model 1) and Single Factor (Model 4) had poorer fits to the data.

**Associations between father's and child's psychopathology**

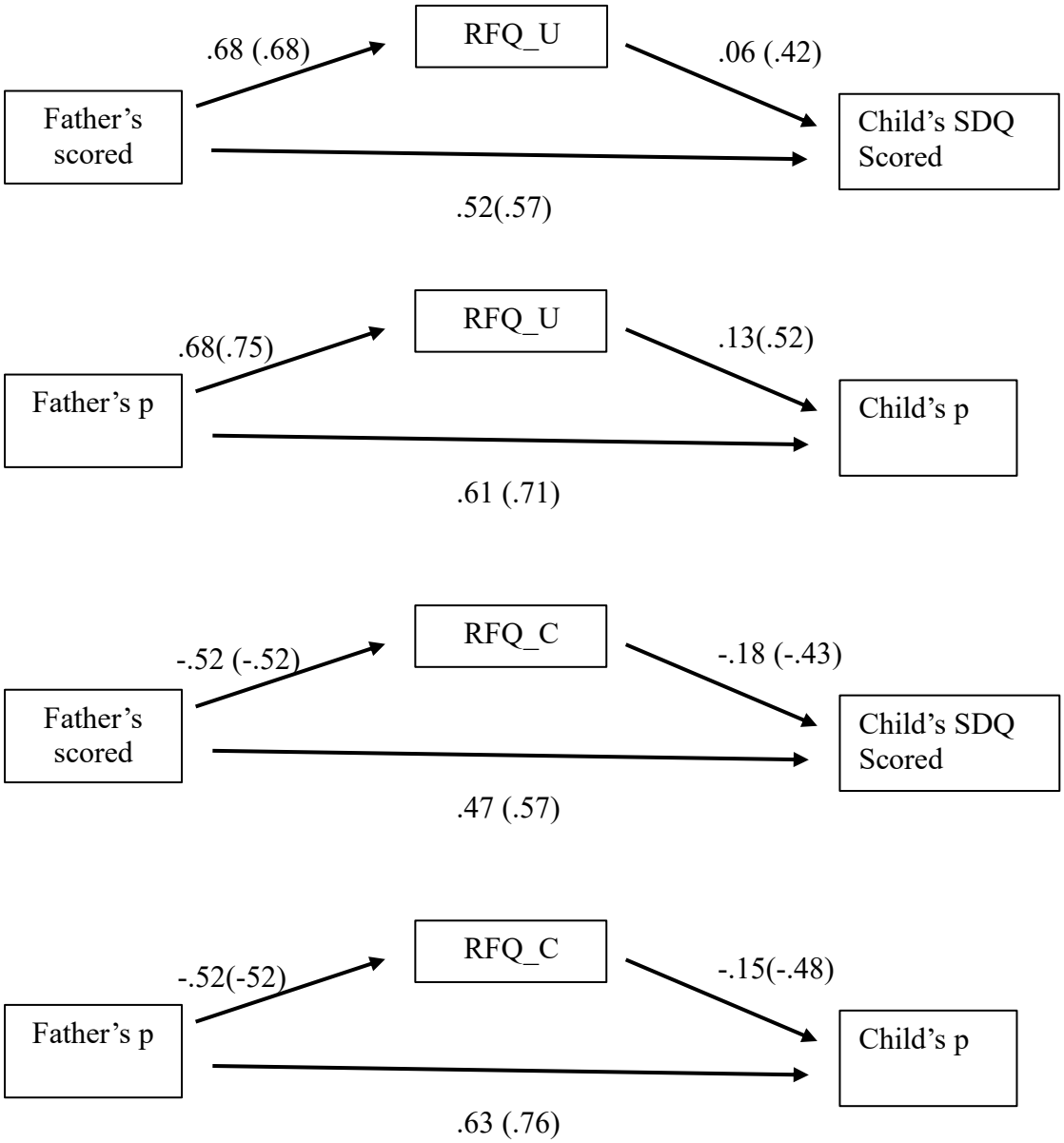
Spearman's Rho coefficients were estimated for the relationships between factor scores, exported from Mplus. These correlation coefficients were also estimated for the relationships using computed scale scores (GHQ and SDQ). There was a strong positive correlation between veteran's p factor and their children's p factor, $r_s= 0.712$, $p<0.001$. There was a moderately strong positive correlation between veterans scored psychopathology and child's scored psychopathology, $r_s= 0.583$, $p<0.001$. There was a strong positive correlation between veteran's p factor and RFQ_U ($r_s= 0.685$, $p<0.001$) and moderately strong relationship between veteran's p factor and RFQ_C ($r_s= -.574$, $p<0.001$). There was a similarly strong correlation when using veterans scored pathology and RFQ_U, ($r_s= 0.654$, $p<0.001$) and veteran's scored pathology and RFQ_C ($r_s= -.557$, $p<0.001$). Based on exported

Factor Scores, Table 9 shows how all specific factors modelled from the veterans' psychopathology data had very small (non-significant) correlation coefficients with the children's p factor scores.

The mediation model was used to test the effect of father's p factor on the child p factor directly and indirectly via reflective functioning (separately using rfq_u and rfq_c). The standardised regression coefficient between the GHQ total scale scores and the SDQ total scale scores was statistically significant, $b = 0.25$, $F$ (1,107) = 50.73, $p<.001$, $R^2 = 0.32$. The regression coefficient between the p factor scores from the GHQ data and the p factor scores from the SDQ data, as yielded from the bifactor analyses in Mplus, was also statistically significant, $b = 0.97$, $F$ (1,107) = 142.3, $p<.001$, $R^2 = 0.57$. The R-square value for the bifactor path analyses suggest that the fathers' p explains 57% of the variance in child psychopathology. This is compared with the R-Square statistic in the non-bifactor path analysis that found fathers total psychopathology accounts for 32% of the variance in the children's psychopathology.

The mediation path analyses on Scored scales (Figure 4) suggest that: RFQ_U accounts for none of the association (p=.553) with SDQ scores once father's scored are controlled for; RFQ_C partially mediates (p=.044) the effect between fathers scored psychopathology and child's scored psychopathology. When examining the path analyses with father's p factor scores and child's p factor scores: the mediating effect of RFQ_U was non-significant (p=.139) and the effect of RFQ_C became marginally non-significant (p=.052).

Figure 4 - Mediation path analyses tested




*Note - Reporting standardised coefficients, with correlation coefficients in parentheses*

**Table 9 – Inter-factor correlation coefficients (Spearman's Rho estimation between factor scores)**

| | GHQ_P | GHQSOM | GHQANXIN | GHQSOCDY | GHQDEP | SDQINT | SDQEXT | SDQPRO | SDQ_P | RFQ_U | RFQ_C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **GHQ_P** | 1 | | | | | | | | | | |
| **GHQSOM** | 0.092 | 1 | | | | | | | | | |
| **GHQANXIN** | 0.093 | .346** | 1 | | | | | | | | |
| **GHQSOCDY** | 0.053 | -.277** | -.376** | 1 | | | | | | | |
| **GHQDEP** | 0.055 | -0.127 | 0.006 | -0.089 | 1 | | | | | | |
| **SDQINT** | 0.053 | -0.096 | -0.008 | -0.023 | 0.127 | 1 | | | | | |
| **SDQEXT** | 0.076 | -0.006 | -.196* | -0.016 | -0.104 | -0.15 | 1 | | | | |
| **SDQPRO** | 0.011 | -0.175 | 0.098 | 0.017 | 0 | -0.162 | -.281** | 1 | | | |
| **SDQ_P** | .747** | 0.021 | 0.022 | 0.061 | 0.028 | 0.185 | 0.072 | 0.024 | 1 | | |
| **RFQ_U** | .686** | -0.006 | 0.134 | 0.081 | -0.05 | -0.061 | -0.064 | 0.175 | .545** | 1 | |
| **RDQ_C** | -.574** | .033 | -.083 | .005 | -.095 | -.058 | .010 | -.139 | -.490** | -.776** | 1 |

Abbreviations: Latent factors: GHQ_P: father's p factor ; GHQSOM: father's somatic symptoms ; GHQANXIN: father's anxiety/insomnia in; GHQSOCDY: father's social dysfunction; GHQDEP: father's depression; SDQINT: children's internalising symptoms; SDQEXT: children's externalising symptoms; SDQPRO: children's prosocial behaviour; SDQ_P: children's p factor; RFQ_U: reflective functioning uncertainty ; RFQ_C: reflective functioning certainty.

**Table 10 - Fit indices for measurement models of veteran psychopathology (GHQ-28) data**

| Model and number of parameters | Chi-sq | Df | CFI | RMSEA (90% CI) | SRMR |
|---|---|---|---|---|---|
| Model 1: Orthogonal group factor | 4606.623 | 350 | 0.471 | 0.331 | 0.415 |
| Model 2: Oblique group factor | 668.239 | 344 | 0.96 | 0.092 | 0.078 |
| Model 3: Single factor | 972.414 | 350 | 0.923 | 0.127 | 0.104 |
| Model 4: Bifactor | 445.564 | 322 | 0.984 | 0.061 | 0.052 |

**Table 11 - Fit indices for measurement models of child psychopathology (SDQ-28) data**

| Model and number of parameters | | Chi-sq | Df | CFI | RMSEA (90% CI) | SRMR |
|---|---|---|---|---|---|---|
| 1. Orthogonal group factor | 75 | 865.195 | 275 | 0.547 | 0.140 | 0.227 |
| 2. Oblique group factor | 78 | 523.197 | 272 | 0.807 | 0.092 | 0.142 |
| 3. Hierarchical | 78 | 523.198 | 272 | 0.807 | 0.092 | 0.142 |
| 4. Single factor | 74 | 1330.283 | 276 | 0.19 | 0.081 | 0.121 |
| 5. Bifactor | 103 | 362.874 | 247 | 0.911 | 0.066 | 0.098 |

## Discussion

The current study investigated veteran mental health and suggests the prevalence of mental distress in this sample of veteran father's and their children is higher than in the general population based on the existing literature. The demography of the sample is briefly discussed in terms of possible vulnerabilities and protective factors in veteran families, as well as potential moderating effects on the intergenerational association of psychopathology suggested by the findings. Upon examining the structure of psychopathology in fathers and their children, the bifactor model was identified as fitting the data best. Using factor analytic methods, the findings suggest that a general dimension of psychopathology (p factor) is a better predictor of intergenerational transmission of mental disorder compared with using the computed scale scores. However, this finding should be treated with caution given the sample size of this study. Furthermore, father's reflective functioning was strongly correlated with their children's psychopathology, however it was a non-significant mediating factor when tested in path analysis.

### Veteran mental health

**As the priority of this study was to examine psychopathology in a veteran sample using factor analytic methods, demographic data was not analysed as part of the methodology. Demographics such as deployment details and age are discussed generally in relation to the overall findings on the psychopathology of this sample and with reference to literature cited in the introduction. These few points of discussion are, however, not drawn from statistical analyses of demographic data, and further research could more formally explore this.**

The GHQ-28 was selected for this study due to its wide use in prevalence studies. When compared to previous prevalence survey findings (NHS Digital, 2017), this study

suggests that the sample of veterans have significantly higher prevalence of psychological distress compared to the general population. This finding is expected based on the demography of the veteran sample and findings from the existing literature on the impact of, for example, military deployment. Veterans in this study had a mean score of 34.67, where participants scoring higher than 24, although not an absolute cut-off, are considered 'psychiatric' (Goldberg et al 1997). Previous research suggests military deployment, with increased risk of experiencing traumatic events, is associated with poorer mental health indicators (Wade et al, 2017). Since, therefore, a high proportion (92.8%) of this study's participants reported that they were operationally deployed, the high prevalence of mental distress amongst the sample is an unsurprising finding. It raises the question of the specific impact of any trauma participants might have experienced, particularly in light of the finding that 57.7% of participants identified themselves as having held a 'combat arms' role, and further 26.1% in a 'combat support role'. Previous research has indicated that combat exposure negatively impacts on mental health outcomes independent of prior mental health difficulties (Rona et al, 2009).

The UK's Ministry of Defence, based on annual population survey data and data patterns, predict that the proportion of working age veterans (16-64) will, by 2028, increase to 44% from what was 37% in 2016 (MOD, 2019). Due possibly, at least in part, to this study's criteria requiring veterans to have a child between the ages of 4-16, the average age of the sample participants was 43.7 years. This study sample, therefore, appears to be younger than the average veteran population, where annual population survey data reports 85% of veterans are over 55 years old (MOD, 2017), but provides a good sample of working-age veterans. Particularly given the projected decrease in average age of veterans in the next 8 years (MOD, 2019), the age-representativeness of this veteran sample may increase in the future and certainly provide a good sample of working-age veterans.

The findings from the SDQ also suggest that the children of veterans experienced higher levels of distress than is to be expected with children and adolescents in the general population (NHS Digotal, 2017). Interestingly, 94.6% of respondents reported that they had a partner, where not being in a relationship has been identified as a factor increasing the likelihood of veterans perceiving their military career having a negative impact on their children (Rowe et al, 2004).

Another consideration is a possible sampling bias whereby the veterans that participated in the research had higher levels of motivation to participate because their experience of mental health difficulties incentivised them to support such research. That the study required participants to self-select and contact the researcher if interested, arguably increases this liklihood.

The veteran population have also been shown to perceive their military career as having had a negative effect on their children (Andres & Moelker, 2010; Rowe et al, 2014), and the findings in this study emphasise the importance of family support for veterans, particularly children of veterans. Further qualitative research could help deepen our understanding of the specific resources and challenges of military life on children to help mitigate any possible negative impact and could shed light on potential mechanisms implicated in intergenerational transmission of psychopathology.

Evidence highlights that roughly 90% of those currently registered as military personnel within the UK Armed Forces are male (Dempsey, 2018). Since this study includes only veteran fathers, a subsection of the veteran population is not represented, and this exclusion should be considered when interpreting these findings. Contrastingly, the findings of this study also reflect on the aspect of paternal mental health and contribute to the

evidence base suggesting the impact of father's psychopathology on the mental health of offspring (Wickersham et al, 2020).

Structure of psychopathology

That the bifactor model fitted the data better than that of a single factor model, supports previous findings that the general dimension of psychopathology is not a unidimensional latent factor but rather within a bifactor model with specified group factors also (Caspi et al, 2014; Martel et al, 2016). Given the GHQ-28 is developed to measure general psychopathology, the finding of a bifactor model fitting this data best is arguably unsurprising. In light of the literature, however, suggesting the many forms of psychopathology comprise significant common and unique features (Lahey et al, 2012), this study's findings points towards the p factor, as the shared variance amongst all items of the father's psychopathology data, as an important general dimension within the structural model of psychopathology.

The analyses of the children's psychopathology data tested the fits of structural models including the correlated two-factor model comprising the specific externalising and internalising factors. These analyses also found the bifactor model as the best fit of the five models tested. The analyses in this study are conducted on data not representing the full range of symptomatology of mental disorder and can therefore draw limited conclusions on the possible structure of psychopathology. This study's findings are at odds with some other studies, using the SDQ, that have concluded the bifactor model is not the best fitting from the findings of their analyses (Ortuno-Sierra et al, 2015; Sharratt et al, 2018). That this study found the bifactor model fitted the child psychopathology data best could correspond with the finding that this sample of children and adolescents had higher levels of psychological distress than expected in the general population which may in turn be the result of a possible

broad impact of being a child of a veteran father experiencing high levels of psychological distress. It is also important to note that the findings on child psychopathology in this study are based on the parent-rated data. Recent findings, for example, have indicated that lower language skills at childhood predicted higher levels of parent-reported symptoms of psychopathology in adolescence, but not so in self-reported symptomatology (Thornton et al, 2020). Using informants that self-report high levels of psychological distress to also provide parent-reported data on their children possibly biases the psychopathology data for children. It is clear that this study's findings should be treated with caution, but it is argued that on balance the 'p-factor' is a worthwhile construct to further investigate in child and developmental psychopathology.

If, as this study tentatively suggests, the p factor is present in both children and adults it supports the view that the p-factor is a consistent and enduring finding when assessing the structure of psychopathology (Pettersson et al, 2018). Parallels have been made between this finding of the p-factor within the structural model of psychopathology and that of the g factor in intelligence considered to constitute a broad dimension of mental capacity (Capsi et al, 2014). Similarly to how the g factor of intelligence is conceptualised as influencing ones performance in cognitive ability tests and reflecting shared variance amongst different cognitive tasks, it is argued that the p factor also constitutes an underlying influence on different forms of mental disorder and the hypothesised propensity for an individual to "develop any and all forms of common psychopathologies" (Caspi et al, 2014, p.131). Key to the bifactor model, is the inclusion of the spectral factors alongside the p factor as determined from both child and father psychopathology data. Although not specifically examined in this study, this poses interesting questions about the meaning of these spectral level factors when the p factor has been accounted for.

Intergenerational transmission of psychopathology

The correlation found in this study between veteran's psychopathology and children's psychopathology may be a more general finding adding support to the evidence-base of intergenerational transmission of mental disorder (Leis et al, 2010; Reck et al, 2016). A recent systematic review concluded that paternal psychopathology was significantly associated with adolescent depression and anxiety and highlighted the need for further research to investigate the relationship between paternal mental disorder other than depression, and the psychopathology of their children (Wickersham et al, 2020). In light of this literature, the current study bolsters the findings on the relationship between father's and child's psychopathology.

The findings in this study indicate a relationship between fathers' psychopathology and that of their children, but also suggest that intergenerational transmission is related to the general dimension of psychopathology. It indicates that any mental health disorder a father might experience is not transmitted as a specific mental health disorder but perhaps through a general vulnerability to psychopathology as accounted for by the p factor. Previous findings have suggested there are general risk factors for the intergenerational transmission of mental disorder (Goodman et al, 2011) and this study implicates the p factor as a possible general risk factor. The finding of the p factor, as the hypothesised general dimension of psychopathology capturing one's tendency towards any and all forms of mental disorder (Caspi et al, 2014), might, by accounting for them in the measurement, help resolve clinical issues such as comorbidity, and unclear boundaries between disorders and between psychopathology and 'normality' (Kotov et al, 2017). Furthermore, the association between father's p and children's p suggested in this study, also sheds light on the question of what broad risk factors are present in the intergenerational vulnerability to psychopathology. It raises the question of how the

spectral group factors fit in to the picture of intergenerational risk, given there were no significant associations identified in this study's analyses.

It is extremely likely that there are a range of risk factors for psychopathology that combine in complex ways, and the p factor could be considered a tool for capturing these broad influences (Constantinou & Fonagy, 2019). It may be important to develop reliable measures to efficiently identify and quantify the p factor, in young people particularly. This would be particularly important as it would align with the vision for mental health services to focus on early intervention and preventative treatment of children and young people (12-25 years old) who, evidence shows, have disproportionally the highest prevalence of mental disorder of all ages (McGorry, Bates & Birchwood, 2013).

In light of the findings of the present study, the potential development and use of a tool designed to measure p factor in young people could help improve early intervention and help the reduce subsequent costs of more reactive interventions. Utilising such a measure at an early stage (e.g. within early school settings) before young people are potentially known to mental health services might help identify those with general vulnerability to mental disorder. Furthermore, if future longitudinal research helped confirm and elucidate the direction of association between father's psychopathology and children's psychopathology it is conceivable that assessment of parental p factor could additionally help identify that veteran's with high p factor are predicted to have children with high levels of general psychopathology. There is a necessity for further development and research of transdiagnostic approaches as effective and proactive treatment of psychopathology (Dagleish et al, 2020) and specifically in developing such approaches to target the general factor of psychopathology (Forbes, Rapee & Krueger, 2019).

This study additionally tested whether reflective capacity, as measured by the reflective functioning questionnaire (RFQ-8), accounted for the shared variance between father's psychopathology and child psychopathology. Although reflective functioning was associated with child psychopathology, the findings of the path analyses indicate that reflective functioning did not account for shared variance between father's and children's psychopathology. A possible reason for this finding of non-significance, particularly given the significant correlation between reflective functioning and child psychopathology, is that reflective functioning has a moderating effect in the relationship between father's and children's psychopathology. Previous findings have suggested a moderating effect of maternal reflective functioning on the relationship between childhood abuse and child psychopathology (Ensink et al, 2017). It is, of course, most probable that the process of transmission between paternal and child psychopathology is a complex one involving interacting variables, and research should continue to explore the possible mediating variables to help elucidate the mechanism(s) accounting for intergenerational transmission of psychopathology.

Limitations

Although some limitations of this study have been noted already, it is important to emphasise that the analyses used in this study and the conclusions made from the results are particularly limited by the sample size of this study. As stated in the methods, a pragmatic decision was made that the statistical simulation analyses required to perform a power calculation were outside the scope of this DClinPsy project. A decision was made to proceed with planned analyses on the sample of 111 veterans since that this sample of veterans constitutes a hard-to-reach group making it a worthwhile endeavour. Whilst the conclusion of this study are made cautiously, it is important to acknowledge that the small sample size and

the omission of a power calculation affects the accuracy of the factor-analytic findings, and subsequent replicability of this study's results.

By using confirmatory bifactor analysis, the current study employs analytic methods that have been critiqued in previous literature by highlighting potential problems with such approaches. It is argued that such analytic studies involve use of global fit statistics that typically 'overfit' and hence favour bifactor models (Bonifay & Cai, 2017). The use of these global fit statistics, it is stated, enable the flexibility of a bifactor model to absorb as much item variance as possible within the general or group factors to inflate the result of fit (Bornovalova et al, 2020). Although this is a contention debated within psychopathology research, it is important to acknowledge that employing rigorous research designs such as longitudinal and multi-informant designs (Bornovalova et al, 2020) can help to appropriately and reliably investigate psychopathology and better understand constructs such as the p factor. Literature employing these methods are also critiqued as neglecting inconsistencies found across studies that determine the p-factor as representing highly contrasting symptomatology (Bonifay & Cai, 2017). This is also a debated critique but certainly implies the need to clarify and acknowledge the use of psychopathology indicators in the analyses of p factor studies to help improve the scientific/conceptual endeavour to understand the nature of this hypothesised general dimension of psychopathology. The use of factor analytic methods in this study do, however, point towards the importance of a general dimension of psychopathology and help to consider its value as a possible predictor of intergenerational transmission of psychopathology.

A separate limitation relates to how this study involved the same informant completing both self-report data on veteran psychopathology and parent-report data on child psychopathology potentially biasing the degree of similarity/relationship between father and child psychopathology. These are limitations common to research on parent-child

psychopathology (Michelini et al, 2019), but future research building on these findings could seek to use child self-report data on psychopathology to mitigate this potential bias and could utilise data from additional informants.

Another limitation of this study relates to its cross-sectional research design. If the findings suggesting a relationship between father's p and child p could be determined in a longitudinal design this would establish a clearer indication of intergenerational transmission of psychopathology by determining the reliability of this relationship over time. The importance of this study, however, has been in further identifying the presence of the p factor in children as an indicator of general vulnerability to psychopathology.

## Conclusion

This study investigated veteran mental health and the relationship between father's and children's mental disorder by examining the structure of psychopathology from data on veterans and their children. As expected from existing literature, the findings for both fathers' psychopathology and their children, suggest the bifactor model as the best fitting model. This bifactor model consists of spectral group factors and, importantly, a general dimension of psychopathology that has previously been termed the p factor. The study also highlighted the relationship between fathers' p factor and children's p factor. The findings suggest that the risk of intergenerational transmission of psychopathology is captured in the p factor. Although there was a significant correlation between father's reflective functioning and their children's psychopathology, the study found that reflective functioning did not account for the shared variance between fathers' psychopathology and their children's. Further research is required to elucidate the value of the p factor as a marker for intergenerational vulnerability to mental disorder and to help identify possible mechanisms, and their interaction, through which intergenerational transmission of psychopathology may occur. Furthermore, further

investigation is required to identify the meaning and impact of spectral factors of psychopathology, as within the bifactor models for fathers and children, on the development and intergenerational transmission of psychopathology.

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# Part 3: Critical Appraisal

## Introduction

This critical appraisal initially reflects on the background to the research in this thesis considering the topic of veteran mental health, conceptualisation and dimensionality of psychopathology, and intergenerational vulnerability to mental health difficulties. It then discusses some of the methodological choices made during this project. These illustrate the challenge of seeking to conceptually answer the research questions whilst pragmatically achieving the aims within the context of a DClinPsy programme.

## Themes from the research

### *Veteran mental health*

Based on responses to national population surveys, 2.5 million UK Armed Forces veterans were estimated to reside in the UK in 2016, making up 5% of household residents (MOD, 2017). A strong evidence-base also suggests prevalence rates of mental health difficulties in the veteran population are comparable to the rates within the general population (Iversen & Greenberg, 2009; Woodhead et al, 2011; Hunt et al, 2014). The data from the UK population survey data suggest there were no differences between veterans' and non-veterans' general physical and mental health. However, the data did show that working age (16-64) veterans who have previously smoked were significantly more likely to report mental illness and/or depression (MOD, 2017). This highlights the complexity in acknowledging relevant sample characteristics when identifying a population and seeking to draw conclusions from subsequent findings.

Although not specifically addressed in my research questions, studying mental health in the context of veteran families has been an excellent opportunity, particularly as part of a

broader research team/project with opportunity to consider the findings as they apply to the veteran population. For example, the findings of the research raise a question about what particular risks and protective factors military life might have on the mental health of the veterans from this sample and the mental health of their children. Rather than exploring specific aspects of veteran family experiences, this empirical study investigated more broadly the structure of psychopathology and identified the general factor of psychopathology as a key component from the data on both veterans and their children.

Liaising with a range of veteran organisations led to anecdotal conversations about a variety of reasons veterans might be very keen or very reluctant to engage in an e-survey about veteran mental health. It was noted by one particular smaller organisation that many of the veterans in their network had been clear they do not feel comfortable disclosing information over the computer/internet but would have completed it with 'paper and pen'. It perhaps highlighted the common challenge of tackling stigma but also the trust participants are required to have when completing an e-survey on potentially sensitive information. On the other hand, numerous veterans and participants spoke about being pleased that such research was being conducted, and conveyed enthusiasm about wanting to support such endeavours that help inform effective support and resources for military and veteran families. These challenges are considered further in the section on data collection below.

*Dimensional models of mental ill-health*

The rates of mental health difficulties reported in children is increasing, amplifying the invitation to investigate the aetiology of mental health problems and to focus on prevention and early intervention (Bor, Dean, Najman & Hayatbakhsh, 2014). Increasing findings are posing a significant challenge to the traditional view that mental health problems are distinct, categorical disorders (Castellanos-Ryan et al, 2016). Dimensional models of

mental health are indicated by findings of high comorbidity between disorders and exist on a continuum (Caspi et al, 2014).

Undertaking factor-analytic research for this thesis, and using psychopathology data, has deepened my appreciation for the importance of this field of research seeking to understand mental health and conceptualise psychopathology. It has been particularly interesting undertaking research alongside clinical placements prompting thoughts about how this conceptualisation of psychopathology relates to clinical work and the experience of working in services (such as CMHT and CAMHS) with, for example, high levels of both concurrent comorbidity and developmental sequential comorbidity (Hankin et al, 2016). The increasing evidence-base supporting dimensional models helps make sense of these clinical observations and challenges the view of psychopathology as a range of distinct syndromes with specific aetiologies. As highlighted in the empirical paper, the psychiatric nosological systems currently used are possibly founded upon and maintain inaccurate conceptualisations of psychopathology. This therefore also potentially stifles our understanding of the development of mental illness.

Reading the literature has provided a strong rationale for examining the dimensionality of psychopathology such as typically unclear boundaries between disorders, arbitrary cut-offs between psychopathology and normality, comorbidity, diagnostic instability, and heterogeneity within diagnostic categories (Kotov et al, 2017). These are aspects and challenges recognisable from experiences within clinical training and suggest this to be an important and impactful area of psychological research. Due to the magnitude of recent empirical findings, from research using factor analytic methods indicating underlying latent dimensions of psychopathology, it has been an excellent opportunity to embark on a research study testing dimensional models on psychopathology data. Adding to an area of

research that has the potential to reconceptualise psychopathology in a way that might enable better identification of specific aetiologies and treatment mechanisms and transform the way services are able to reliably meet the needs of those suffering mental health problems. I am aware that this thesis has only engaged with a small section of this complex area of research which is large and typically highly theoretical and conceptual. However, the promising developments recently made to reconceptualise psychopathology (Kotov et al, 2017) highlight how important this area is and that to study and add to it has been extremely worthwhile.

**The systemic review**

Having identified that my empirical paper would involve testing the statistical fit of the general dimension of psychopathology (the p-factor), I began scoping the literature on this to help inform plans for the systematic review. In addition to identifying empirical support of the bifactor structure of psychopathology, it highlighted numerous possible ways, although very tentatively, to conceptualise the nature of this proposed general vulnerability to psychopathology.

Links have been made to negative emotionality (Caspi et al, 2014) and poor constraint and impulsivity (Caspi et al, 2014; Castellanos-Ryan et al, 2016). Emerging evidence also associates the p factor with response inhibition as a specific impairment of executive control (Castellanos-Ryan et al, 2016), conceptually similar to impulsivity. Neural substrates of executive function, emotional regulation and self-control were also identified as possible corollaries to the p factor (Beauchaine et al, 2017), along with low agreeableness and low conscientiousness (Caspi et al, 2014; Castellanos-Ryan et al, 2016). It has also been postulated that the p factor is linked to impairments in mechanisms underlying resilience potentially resulting from a lack of flexibility in social communicative processes (Fonagy et

al, 2017). This has been a new and complex area of research to explore, with the literature drawing on many technical aspects of a wide range of psychological theory of developmental psychopathology.

Discussion with my supervisors greatly helped me to familiarise myself with broader themes and concepts within the p-factor literature and helped determine the feasibility of focussing on the prognostic value of the p factor for my review question. The increasing evidence of associations between the p factor and future adverse outcomes, a key observation from the analyses of Caspi et al (2014), highlights prognostic value in the p factor independent of its conceptual meaning. Investigating this aspect in the systematic review enabled a clearer insight into the breadth and depth of associations the p factor has with subsequent outcomes. This highlighted that whilst the p factor remains a very promising statistical representation of the shared variance among symptoms of psychopathology, it is not to be conflated with the hypothesised construct of a general dimension of psychopathology. It has been important for me to actively make this distinction when making conclusions and drawing interpretations from the systematic review and empirical results: the criticism that the p factor might constitute a statistical artefact (Bornovalova et al, 2020) helped me to draw perspective when trying to discuss the findings, and my supervisors greatly helped me to do this particularly during my writing up.

Embarking on this review seeking to understand and report on the literature required care to distinguish between the statistical p factor and the conceptual hypothesis of general psychopathology. It had been helpful to recognise that there are numerous risk factors for psychopathology that interact in complex ways, but that the p factor provides a tool for capturing these broad influences and exploring their possible treatment targets (Constantinou & Fonagy, 2019).

To answer the review question ‘what is the prognostic value of the p factor?’, a key item of the inclusion criteria was for papers using longitudinal study design to help indicate potential associations between the p factor and subsequent outcomes. As a result, and due to the constraints of the project, it was determined that included studies were non-interventional to avoid the attribution of outcomes to study interventions. Although briefly noted in the discussion of the systematic review, a limitation in this set of criteria is that it was unable to control for or mitigate the effects of potential treatments/interventions that participants might have received independently of their study cohorts. This highlights the challenge of developing a review methodology to answer a specific question, and the importance of acknowledging such limitations. There was a significant subset of studies that specifically tested the homotypic or heterotypic stability of the p factor. This group of studies therefore provide an impression of the continuity of disorders over time as identified by the p factor. It was decided, however, that these would also be excluded as they did not identify external outcomes that could be associated to the p factor.

**The empirical paper**

In order to efficiently reach the large and widely spread population of veterans, it was determined that an electronic survey would prove the best means of data-collection for this research study. As noted in the methodology of the empirical paper, it was identified that, due to its wide use in prevalence studies, the GHQ-28 and SDQ provide data on psychopathology symptomology that could be compared to the general population. Since the conditions of use for the GHQ-28 require that the electronic data is stored on a password-protected platform, the study utilised UCL’s Patient Outcome Database (POD) used by the Anna Freud Centre. Understandably, it was a important aim to develop the survey so as to reduce non-completers amongst participants.

As the e-survey was part of a broader research project, there were a combination of five validated measures and a bespoke demographic questionnaire in addition to the initial short screening questions. This ultimately meant there was a total of 99 questions included within the e-survey. It is important to reflect on the representativeness of the research sample to help consider limitations of the results. Whilst careful consideration was made to enable sufficient and relevant data for the research questions of two DClinPsy projects, this was alongside the other aim to increase response rates to improve representativeness.

For this study, non-response bias is impacted by two factors: the extent to which respondents and non-respondents differ in terms of the symptoms of psychopathology of them and their children, as well as the number of responses in the survey (Bethlehem, 1988). With the first of those factors in mind, it is interesting to note that some anecdotal feedback from participating veterans indicated they were very pleased that they could participate in the context of their experiences of mental health and family life as a veteran. It is conceivable that eligible veterans were more likely to participate in the survey having had more experiences of mental health difficulties personally or within their family. However, the experience of stigma around mental health may therefore also be relevant to the motivation veterans have or do not have to participate in such research. Based on this hypothesis that veterans might have been more motivated to participate if they had experiences of mental health difficulties personally or within their family, it is interesting to reflect on the importance of individuals capacity and inclination to acknowledge experiences of mental health as possibly increasing or reducing likelihood of participation. There is perhaps a group of our target population that may, regardless of whether they have experience of significant levels of psychopathology, feel unable to report or discuss such topics for reasons of stigma. It's also possible those eligible veterans that did not participate may not hold the view that

participating in the study could have a positive impact on their veteran community in any way, reducing the incentive many other veterans anecdotally reported as key.

The number of survey responses as a factor of non-response bias (Bethlehem, 1988), was an important driver of the careful selection of measures included in the survey. This also drove the rigorous approach of contacting and partnering with multiple veteran organisations to help distribute the study invitation to increase numbers of participants. In addition to the persistent contacting of relevant organisations for recruitment, it was also valuable experience regularly liaising with the key collaborator (King Edward VIIs Hospital) and the wider researcher team. Particularly as aspects of research experience not often part of DClinPsy research projects. After a few months of recruitment, as part of our approach to increase representativeness of the veteran sample, funding was given to help incentivise participation. This was something that came about a timely stage in the recruitment process and as a result of in-depth reporting to the wider research team on the number of organisations that had been contacted, the breakdown of veterans that were eligible, had indicated interest, and had participated.

It was unfortunate that, following the updated recruitment approach of the small financial incentivisation, we had suspected 'fraudsters' reporting to be eligible participants. Research that utilises e-surveys are increasingly more common and this risk of participants either participating illegitimately due to ineligibility or participating as an (eligible) individual multiple times, increases with this mode of electronic research (Teitcher et al, 2015). This raised the issue of validity of e-survey participants and the risk of exploitation, particularly since all contact is remotely conducted via the internet. It highlighted the importance of considering how financial incentivisation impacts on research, seeking to a greater sample size whilst not having the processes to totally avoid potential fraudulent responses that would be invalid. These suspected fraudulent enquiries all came within a short

period of time characteristic of the many valid enquiries received shortly after a new advert was posted by one of the military organisations or social media posts. They were however peculiarly worded and all suspiciously similar in wording, form and structure, alerting us to check them more carefully and respond appropriately, as mentioned above. Only three of the 'participants' were sent details of the survey and went on to participate, and so these three were omitted from the final data set for analyses.

It was extremely rewarding to be involved in a study requiring extensive liaising with veteran organisations as well as working with a wider research team helping to develop my project management skills. For example, there were discussions about the veteran population and the various terms that 'veterans' might more accurately identify with such as 'Armed Force Leavers', 'Ex-Military', 'Service Leavers'. It was also helpful to consider alternative incentivisation strategies such as using 'snowballing methodology' by emailing all participants to consider inviting other eligible individuals to participate.

Reflecting on the recruitment approach, it is interesting to note that although many military charities indicated willingness to support the research by distributing the advert to veterans, there were a few organisations that demonstrated significant interest and support. There are many factors that might have led certain organisations to be more willing and able to support. Firstly, it was the case that a number of organisations were not exclusively for veterans and perhaps had a higher number of ineligible individuals by virtue of their status as actively serving in the military. As a subset of the general population, the veteran population has been shown to have a lot of similarities as well as a few differences to the general population (MOD, 2017). For example, there were no differences between the self-reported general health of veterans and non-veterans, whilst veterans were found to be older than non-veterans according annual population surveys (MOD, 2017). Based on these annual population surveys, it is estimated that 60% of veterans are aged 65 and over, and 47%

estimated to be 75 and over. Although it was not possible to source any reliable data on the number of veterans that had children between the ages of 4-17 years old, the average age of the veteran population suggests this subgroup of the veteran population could be considerably smaller than the 2.4 million UK armed forces veterans. Given this, it is difficult to know how many eligible veterans from the various networks and recruitment sources might have seen the invitation to participate and not opted-in to participate. One of the organisations that provided a vital large network of veterans had a widely read digital newsletter for their members and required a separate ethics application form to be approved by their Ethics Committee. This proved an extremely valuable network through which to distribute the study invitation, and perhaps highlights the value of more personal telephone conversations and liaising to gain better support from such key organisations. On the other hand, these such organisations might have been the ones that were more amenable to the invitation to speak on the telephone due to their interest in supporting the research.

**Final reflections**

Finishing the thesis during the global health pandemic has also brought with it pressures and challenges that have been helpful to reflect on. Thankfully sufficient data had been collected by the time of the national 'lockdown' measures, and the use of our electronic survey could also continue as part of the broader research project. On the other hand, the process of conducting the analyses and writing up the dissertation proved difficult with the distraction of the unfolding concerns around the corona virus, as well as the conditions of working from home on both clinical placement and on allocated days for this research. Personally, it had been important for me to discuss with my research supervisor a timeframe for writing up my thesis, with tentative deadlines for the various components of the dissertation. Alongside that more structured approach, it has been vital to practice good self-

care such as being kind to myself during stressful moments, and not neglecting the importance of doing the healthy things I enjoy such as spending time with family (virtually, where required) and keeping active outdoors.

The process of undertaking this DClinPsy research has been very challenging and hugely rewarding. I have greatly appreciated the experience of engaging in research that adds to the growing area examining dimensional models of psychopathology. Particularly as it strikes me as being able to shed light on some of the clinical issues previously outlined such as unclear boundaries between disorders and between psychopathology and 'normality', as well as the problem of understanding comorbidity within the traditional nosological system of diagnoses (Kotov et al, 2017).

Overall, working with veterans and veteran charities has been an excellent experience and increased my enthusiasm for being a part of a research project aiming to better inform the services and support to veteran families.

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## Appendices

### Appendix 1: Symptomatology data used to model psychopathology

| Study ID | Level of data modelled | Treated as | Data collected | Grouping of symptoms [a] | Method of data collection |
|---|---|---|---|---|---|
| LAHEY2012 | Diagnosis | Categorical | Cross-sectional | EXT: ASPD; TOB; ALC; CAN; DRUG<br>INT I: MDD; DYS; GAD<br>INT II: SAD; PHOB; PAN | Structured interview |
| CASPI2014 | Disorder/ symptom counts | Categorical | Repeated measures | EXT: ALC; CAN; DRUG; TOB; CD<br>INT: MDD; GAD; FEAR<br>[b]p: OCD; BD; SCHIZ | Structured interview |
| LAHEY2015 | Symptom dimension | Continuous | Cross-sectional | EXT: cd; opp; imp; att<br>INT: dep; gad; sad; sch; pan/som; sep | Self-report and parent-report scales |
| HOERTEL 2015 | Diagnosis | Categorical | Cross-sectional | EXT: ALC; DRUG; TOB; GAMB; ASPD<br>INT 1: MDD; DYS; GAD<br>INT II: PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | Structured interview |
| PATALAY 2015 | Symptom (item data) | Categorical | Cross-sectional | Item-level data by factor: EXT; INT | Self-report scales |
| HOERTEL 2018 | Diagnosis | Categorical | Cross-sectional | EXT: ALC; DRUG; TOB; GAMB; ASPD<br>INT 1: MDD; DYS; GAD<br>INT II: PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | Structured interview |

| Study ID | Level of data modelled | Treated as | Data collected | Grouping of symptoms [+] | Method of data collection |
|---|---|---|---|---|---|
| PASCAL 2018 | Diagnosis | Categorical | Cross-sectional | EXT: ALC; DRUG; TOB; GAMB; ASPD<br>INT 1: MDD; DYS; GAD; PAN<br>INT II: SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | Structured interview |
| PETTERSSON2018 | Symptom (item level) | Categorical | Cross-sectional | Item-level data by factor: INAT; IMP; CON; EMO | Parent report scale |

| | | | | | |
|---|---|---|---|---|---|
| BLANCO 2019 | Diagnosis | Categorical | Cross-sectional | EXT: ALC; DRUG; TOB; GAMB; ASPD<br>INT: MDD; DYS; GAD; PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | Structured interview |
| DEUTZ2019 | Symptom dimensions (subscale score) | Continuous | Repeated measures | Symptom dimensions (subscale score) by factor:<br>INT: a/dep; w/dep; som<br>EXT: agg; rule | Self-report and parent-report scales |
| LACEUELLE 2019 | Symptom dimensions (subscale score) | Continuous | Repeated measures | EXT: agg; att; asoc<br>INT: a/dep; w/dep; gad; sad; sep; pan/som<br>[b]p: td; ocd; psy | Self-report and parent-report scales |
| SALLIS2019 | Symptom (item data) | Continuous | Cross-sectional / Repeated measures | Symptom dimensions (subscale score) by factor:<br>EXT: adhd; cd; odd; con; imp; peer<br>INT: dep; gad; sep; sad; emo/p | Self/parent/teacher/observer report scales |
| SNYDER 2019 | Symptom dimensions (subscale score) | Continous | Cross-sectional | INT: dep; anx-p; sad; sep<br>EXT: opp; cd; agg;<br>[b]p: imp | Self-report and parent-report scales |

Key: [a] denotes the symptoms or diagnoses loaded on to the p-factor exclusively in the best-fitting model; [b] indicates the best-fitting group structure when modelling psychopathology

Abbreviations: Latent factors (upper-case lettering and underlined): AGO/P: agoraphobia with panic; CON: conduct problems; DEP: depression; EMO: emotionality-anxiety; EXT: externalising; IMP: hyperactivity-impulsivity; INAT: inattention; INT: internalising; p: p-factor; Diagnoses (upper-case lettering): ALC: alcohol dependence; ASPD: antisocial personality disorder; APD: avoidant personality disorder; BD: bipolar disorder or mania; CAN cannabis addiction; CD: conduct disorder; DPD: dependent personality disorder; DRUG: drug addiction (hard drugs); DYS: dysthymia; FEAR: fear; GAD: generalised anxiety disorder; GAMB: gambling addiction; HPD: histrionic personality disorder; MDD: major depression; OCD: obsessive compulsive disorder; OCPD: obsessive compulsive personality disorder; PAN: panic disorder; PHOB: specific phobia; PPD: paranoid personality disorder; SAD: social anxiety disorder; SCPD: schizoid personality disorder; SCHIZ: schizophrenia; TOB: tobacco addiction. Symptoms (lower-case lettering): a/dep: anxious depression; adhd: attention deficit hyperactivity disorder; agg: aggression; anx-p: physical anxiety; asoc: antisocial behaviour/delinquency; att: attentional difficulties; cd: conduct disorder; con: conduct problems; dep: depressive symptoms; emo/p: emotional problems; gad: general anxiety symptoms; imp: hyperactivity/impulsivity; ocd: obsessive compulsive disorder; odd: oppositional defiant disorder; opp: oppositional defiant; pan/som: panic and somatic symptoms; peer: peer relationship problems; psy: psychotic experiences; rule: rule-breaking; som: somatic symptoms; sad: social anxiety; sch: school phobia; sep: separation anxiety; td: thought disorder; w/dep: withdrawn depression

**Appendix 2: overview of studies using the NESARC cohort sample**

| | LAHEY2012 | HOERTEL2015 | HOERTEL 2018 | PASCAL 2018 | BLANCO2019 |
|---|---|---|---|---|---|
| **Sample size** | 2 time points<br>T1: n = 35,336<br>T2: n = 29,958 | 2 time points<br>n = 34,653 (T1 and T2) participants with missing data at T2 were excluded | 2 time points<br>n = 34,653 (T1 and T2) participants with missing data at T2 were excluded | 2 time points<br>n = 34,653 (T1 and T2) participants with missing data at T2 were excluded | T2: n= 34,653 |
| **Mean age (sd) in years** | Not reported<br>T1: range 18-65 | Mean not reported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 | Mean not reported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 | Mean not reported. Range:<br>T1: 18 to <90<br>T2: 20 to <90 | Not reported, 18+ |
| **Level of data modelled** | Diagnosis | Diagnosis | Diagnosis | Diagnosis | Diagnosis |
| **Treated as** | Categorical | Categorical | Categorical | Categorical | Categorical |
| **Data collected** | Cross-sectional | Cross-sectional | Cross-sectional | Cross-sectional | Cross-sectional |
| **Grouping of symptoms** | **EXT:** ASPD; TOB; ALC; CAN; ODRU<br>**INT I:** MDD; DYS; GAD<br>**INT II:** SAD; PHOB; PAN | **EXT:** ALC; DRUG; TOB; GAMB; ASPD<br>**INT 1:** MDD; DYS; GAD<br>**INT II:** PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | **EXT:** ALC; DRUG; TOB; GAMB; ASPD<br>**INT 1:** MDD; DYS; GAD<br>**INT II:** PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | **EXT:** ALC; DRUG; TOB; GAMB; ASPD<br>**INT 1:** MDD; DYS; GAD; PAN<br>**INT II:** SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD | **EXT:** ALC; DRUG; TOB; GAMB; ASPD<br>**INT:** MDD; DYS; GAD; PAN; SAD; PHOB; BD; APD; DPD; OCPD; PPD; SCPD; HPD |
| **Method of data collection** | Structured interview | Structured interview | Structured interview | Structured interview | Structured interview |

## Appendix A

**My contribution to this joint research project was:**

- Completing half the sections of the ethics form's for UCL's REC and liaising with Emma Jones and my supervisors to submit and revise this.
- Liaising and meeting with the developer of the POD platform and Emma Jones to develop the electronic survey.
- Leading on liaising with half of the military and veteran organisations via email and telephone to discuss the research and request support via dissemination of the research advert.
- Developing a research advert (Appendix C) to disseminate through recruitment network
- Identifying Twitter material to post and posting through the @UCLVeteran2019 handle to increase awareness of the research.
- Leading on liaising with Help for Hero's to get research advert added to the Band of Brothers newsletter on two separate occasions, including tweaking the research advert for the second inclusion in the newsletter.
- Working through the paper files ~200 pain-clinic patients (2018-2019) at the King Edward VII's hospital identifying roughly 80 of those that agreed to be contacted to participate in research. Drafting an email and sending to each of these veterans.
- Led on drafting and saving the emails ready to be sent to all participants with the attached information sheet and POD log-in instructions and credentials.
- Led on setting up the unique log-in POD details for participants
- Independently extracted the data from POD, cleaned and analysed this as part of my research study.
- Independently wrote-up my thesis.

**Contribution of Emma Jones (DClinPsy Trainee) to the project was:**

- Completing half the sections of the ethics form's for UCL's REC and liaising with myself and my supervisors to submit and revise this.
- Liaising and meeting with the developer of the POD platform and myself to develop the electronic survey.
- Leading on liaising with half of the military and veteran organisations via email and telephone to discuss the research and request support via dissemination of the research advert.
- Identifying veteran organisations to follow on twitter
- Identifying veteran participants that scored highly on the IESR measure and independently contacting and interviewing those that agreed to gain qualitative data for her study.
- Led on responding to enquiries from veterans using the PALS UCL joint email account for the study.
- Led on enquiring with veteran employers such as corporate banks, and military regiments to target their veteran contacts.
- Independently extracted the data from POD, cleaned and analysed this as part of her research study.
- Independently wrote-up her thesis.

**Appendix B**

| |
|---|
| ABF The Soldier's Charity |
| Armed Forces & Veterans Breakfast Clubs |
| Barclays Bank Military Network |
| Blesma |
| Change Step |
| Combat Stress |
| Give us Time |
| Norfolk Armed Forces Covenant Board |
| Oxford City Veterans Group |
| Pathfinder |
| Phoenix Heroes |
| Poppy Scotland |
| Princess of Wales Royal Regiment |
| PTSD Resolution |
| Ripple Pond |
| Royal Air Force Benevolent Fund |
| Royal Caledonian Education Trust: Scotland's Armed Forces |
| Royal Navy & Royal Marines Charity |
| SSAFA |
| Supporters of Combat Stress |
| Surrey Health Veterans & Families - Listening Project |
| The Grow Organisation |
| The Poppy Factory |
| The Royal British Legion |
| The Warrior Programme |
| Veterans Next Step |
| Veterans outreach support |
| Veterans Support Asociation |
| Veterans with Dogs |
| Veterans' Peer Mentoring Scheme |
| Woody's Lodge |

*Appendix C*


UCL
KING EDWARD VII's HOSPITAL
Centre For Veterans' Health
Anna Freud
National Centre for
Children and Families
We want to understand more about the important father-child relationship, so we can develop more effective ways to help veterans who are struggling with their mental health while also trying to raise their children.
The research is being carried out by The Centre for Veterans' Health at King Edward Vii's Hospital in London, University College London and the Anna Freud National Centre for Children and Families.
We are looking for veterans
(Ex-Military/Service Leavers/Armed Forces Leavers)
who have one or more child between the ages of 4 and 17 years
to fill in some questionnaires online that will take around 20 minutes to complete.
You or your child(ren) do not need to have any mental health difficulties to take part in the research. And only you are required to complete the questionnaires.
Once you've completed the questionnaires,
you'll receive a guaranteed £5 amazon gift voucher and enter a lottery to win up to £50 more
If you're interested and would like more information, please email the researchers, Benjamin Shanmugam or Emma Jones, at
veteranresearch@ucl.ac.uk
or Dr. Louise Morgan, Lead Researcher at the Centre for Veterans' Health, at louisemorgan@kingedwardvii.co.uk
Thank you!

**Appendix D**

## PARTICIPANT INFORMATION SHEET

**Project Title:** Understanding Mental Health in Military Families

This study has been approved by the UCL Research Ethics Committee (Project ID): 15069/001

**What is the participant information sheet?**

This information tells you more about the study. Before you decide whether you would like to take part, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and do not hesitate to get in contact if there is anything that is not clear, or if you would like more information.

**What is the purpose of the study?**

We want to better understand the mental health of veteran families. In particular, we are interested in whether there is a relationship between the mental health of veteran fathers and their children. We hope this will influence how support is offered to veteran families.

**Why have I been chosen?**

We are not approaching any veterans directly to ask them to take part in the study. Veterans who get in touch with us to say they are interested in participating (self-select) and who meet the study inclusion criteria can take part.

You can take part if you meet both criteria:

1. You are a male veteran*
2. There is **at least one child** in your household aged between 4-17 years

*This research will define 'veteran' as anyone who has served for at least one day in Her Majesty's Armed Forces, and now no longer serves (i.e. is now a civilian)

**What would I need to do?**

Once we have your consent, you will be sent an email invitation asking you to complete a series of questionnaires, on behalf of yourself and your child. These questionnaires will be completed online and should take between 10-15 minutes. You can fill in these questionnaires at a place that is convenient for you, using any device that has access to the internet (e.g. computer or smartphone).

**Do I have to take part?**

Your participation in the study is entirely voluntary and confidential. If you choose to take part you will be asked to sign a consent form. You can withdraw at any time during the process without giving a reason and there is no penalty for withdrawing.

**What are the possible benefits of taking part?**

It is hoped that this piece of work will help generate valuable information about mental health in military families. More specifically, participants will be contributing to the generation of knowledge from which veteran families can benefit and we hope that this can lead to better support being offered by clinical services in the future.

**Are there any other incentives to taking part?**

We know that many individuals participate for the above reasons but, as a small token of our appreciation for your time, all participants that complete the survey will be sent *a guaranteed £5 Amazon voucher* by email. In addition, you will be *entered into a prize draw to win* further Amazon vouchers. There will be:

- 2x £50
- 3x £20
- 4x £10.

If you withdraw from the study you will still be eligible to be entered into the draw. You will be informed if you have won a prize via your email address.

**Will my taking part in this study be kept confidential?**

If you participate in the study, your data will be anonymous:

- The only 'personal' data (i.e. data that could be used to identify you) you will be asked for is your email address. This is so we can create an account on our secure data collection platform.
- You will then be assigned an ID number. Once the ID number has been emailed to you, your email address will be stored separately in an encrypted file so that we can contact you about the lottery of gift vouchers. Once the research is complete, your contact email will then be permanently deleted. Your subsequent responses to the questionnaire will be linked to this anonymised ID number only.
- Your participation will not be identifiable within reports or publications.

If you participate in the study, your data will be kept confidential:

- All data will be collected and stored in accordance with the Data Protection Act 1998 and General Data Protection Regulation (2018).
- Only the researchers involved in this study will have access to your anonymised questionnaire answers. These will not be shared with any third parties.
- Your data will be stored in the UCL 'Data Safe Haven', a secure storage facility.
- Your personal data will not be stored for any longer than is necessary for the purposes of this study, after which the research team will delete it.

**Limits to confidentiality**

Confidentiality will be maintained, unless participants disclose something which leads the research team to be concerned about risk of harm to themselves or others. In this situation, the Principal Researcher has a duty of care to inform relevant agencies. If this is necessary, the Principal Researcher will always seek to discuss this with the participant first.

**What will happen to the results of the research?**

The results of this study will be fed back to the Medical Advisory Committee of COBSEO (the Confederation of British Service Charities), which works to further understand the needs of veterans and inform the care that is offered to them. The research will also be submitted as part of our Clinical Psychology doctorate theses and may be submitted for publication in peer-reviewed journals. No participants will be identified in any publication.

**Data Protection Privacy Notice**

The controller for this project will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk

This 'local' privacy notice sets out the information that applies to this particular study. Further information on how UCL uses participant information can be found in our 'general' privacy notice:

For participants in health and care research studies, click here

The information that is required to be provided to participants under data protection legislation (GDPR and DPA 2018) is provided across both the 'local' and 'general' privacy notices.

The categories of personal data used will be as follows: Email address
The lawful basis that would be used to process your *personal data* will be performance of a task in the public interest.
The lawful basis used to process *special category personal data* will be for scientific and historical research or statistical purposes.
*Your personal data will be processed so long as it is required for the research project*. For the duration of the project, we will pseudonymise the personal data you provide. We will endeavour to minimise the processing of personal data wherever possible.
At the end of the project (expected to be July 2020), data will be fully anonymised. Anonymised data will be retained for up to 7 years after the project is complete, as it may be used as a comparator for future studies (e.g. to determine whether mental health in veteran families improves).

If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk.

**Contact for further information or assistance**

You will have received a copy of the Participant Information Sheet for your records electronically.

If you have any further questions or would like assistance at any point during the study, please contact Benjamin Shanmugam or Emma Jones (Trainee Clinical Psychologists) at UCL on veteranresearch@ucl.ac.uk. In the case of a complaint, please contact Dr Laura Gibbon on l.gibbon@ucl.ac.uk
**Name of the principal researcher:** Professor Peter Fonagy, p.fonagy@ucl.ac.uk

**Thank you for taking the time to read this information sheet and for considering to take part in this research.**

*Appendix E*

| ID: | Date of Administration: | Time point: B ; 6 ; 12 ; 18 ; 24 ; 30 ; 36 |
|---|---|---|

# THE GENERAL HEALTH QUESTIONNAIRE

## GHQ 28

### David Goldberg

**Please read this carefully.**

**We should like to know if you have had any medical complaints and how your health has been in general,** *over the past few weeks.* **Please answer ALL the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.**

**It is important that you try to answer ALL the questions.**

**Thank you very much for your co-operation.**

**Have you recently**

| | | | | |
|---|---|---|---|---|
| **A1 – been feeling perfectly well and in good health?** | Better than usual | Same as usual | Worse than usual | Much worse than usual |
| **A2 – been feeling in need of a good tonic?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **A3 – been feeling run down and out of sorts?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **A4 – felt that you are ill?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **A5 – been getting any pains in your head?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **A6 – been getting a feeling of tightness or pressure in your head?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **A7 – been having hot or cold spells?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B1 – lost much sleep over worry?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B2 – had difficulty in staying asleep once you are off?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B3 – felt constantly under strain?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B4 – been getting edgy and bad-tempered?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B5 – been getting scared or panicky for no good reason?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B6 – found everything getting on top of you?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **B7 – been feeling nervous and strung-up all the time?** | Not at all | No more than usual | Rather more than usual | Much more than usual |

**Please turn over**

**Have you recently**

| | | | | |
|---|---|---|---|---|
| **C1 – been managing to keep yourself busy and occupied?** | More so than usual | Same as usual | Rather less than usual | Much less than usual |
| **C2 – been taking longer over the things you do?** | Quicker than usual | Same as usual | Longer than usual | Much longer than usual |
| **C3 – felt on the whole you were doing things well?** | Better than usual | About the same | Less well than usual | Much less well |
| **C4 – been satisfied with the way you've carried out your task?** | More satisfied | About same as usual | Less satisfied than usual | Much less satisfied |
| **C5 – felt that you are playing a useful part in things?** | More so than usual | Same as usual | Less useful than usual | Much less useful |
| **C6 – felt capable of making decisions about things?** | More so than usual | Same as usual | Less so than usual | Much less capable |
| **C7 – been able to enjoy your normal day-to-day activities?** | More so than usual | Same as usual | Less so than usual | Much less than usual |
| **D1 – been thinking of yourself as a worthless person?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **D2 – felt that life is entirely hopeless?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **D3 – felt that life isn't worth living?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **D4 – thought of the possibility that you might make away with yourself?** | Definitely not | I don't think so | Has crossed my mind | Definitely have |
| **D5 – found at times you couldn't do anything because your nerves were too bad?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **D6 – found yourself wishing you were dead and away from it all?** | Not at all | No more than usual | Rather more than usual | Much more than usual |
| **D7 – found that the idea of taking your own life kept coming into your mind?** | Definitely not | I don't think so | Has crossed my mind | Definitely has |

**A** ☐ **B** ☐ **C** ☐ **D** ☐ **TOTAL** ☐



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*Appendix F*

**The Reflective Functioning Questionnaire**

**Please work through the next 8 statements. For each statement, choose a number between 1 and 7 to say how much you disagree or agree with the statement, and write it beside the statement. Do not think too much about it – your initial responses are usually the best. Thank you.**

**Use the following scale from 1 to 7:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

1. __ People's thoughts are a mystery to me **(original item 1)**

2. __ I don't always know why I do what I do **(original item 17)**

3. __ When I get angry I say things without really knowing why I am saying them **(original item 22)**

4. __ When I get angry I say things that I later regret **(original item 29)**

5. __ If I feel insecure I can behave in ways that put others' backs up **(original item 35)**

6. __ Sometimes I do things without really knowing why **(original item 36)**

7. __ I always know what I feel **(original item 8)**

8. __ Strong feelings often cloud my thinking **(original item 27)**

*Appendix G*

## Strengths and Difficulties Questionnaire

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behaviour over the last six months or this school year.

Child's Name ..... Male/Female

Date of Birth.....

| | Not True | Somewhat True | Certainly True |
|---|---|---|---|
| Considerate of other people's feelings | ☐ | ☐ | ☐ |
| Restless, overactive, cannot stay still for long | ☐ | ☐ | ☐ |
| Often complains of headaches, stomach-aches or sickness | ☐ | ☐ | ☐ |
| Shares readily with other children (treats, toys, pencils etc.) | ☐ | ☐ | ☐ |
| Often has temper tantrums or hot tempers | ☐ | ☐ | ☐ |
| Rather solitary, tends to play alone | ☐ | ☐ | ☐ |
| Generally obedient, usually does what adults request | ☐ | ☐ | ☐ |
| Many worries, often seems worried | ☐ | ☐ | ☐ |
| Helpful if someone is hurt, upset or feeling ill | ☐ | ☐ | ☐ |
| Constantly fidgeting or squirming | ☐ | ☐ | ☐ |
| Has at least one good friend | ☐ | ☐ | ☐ |
| Often fights with other children or bullies them | ☐ | ☐ | ☐ |
| Often unhappy, down-hearted or tearful | ☐ | ☐ | ☐ |
| Generally liked by other children | ☐ | ☐ | ☐ |
| Easily distracted, concentration wanders | ☐ | ☐ | ☐ |
| Nervous or clingy in new situations, easily loses confidence | ☐ | ☐ | ☐ |
| Kind to younger children | ☐ | ☐ | ☐ |
| Often lies or cheats | ☐ | ☐ | ☐ |
| Picked on or bullied by other children | ☐ | ☐ | ☐ |
| Often volunteers to help others (parents, teachers, other children) | ☐ | ☐ | ☐ |
| Thinks things out before acting | ☐ | ☐ | ☐ |
| Steals from home, school or elsewhere | ☐ | ☐ | ☐ |
| Gets on better with adults than with other children | ☐ | ☐ | ☐ |
| Many fears, easily scared | ☐ | ☐ | ☐ |
| Sees tasks through to the end, good attention span | ☐ | ☐ | ☐ |

Signature ..... Date .....

Parent/Teacher/Other (please specify:)

**Thank you very much for your help**



*Appendix H*

**UCL RESEARCH ETHICS COMMITTEE**
**OFFICE FOR THE VICE PROVOST RESEARCH**

29th March 2019

Professor Peter Fonagy
Department of Clinical, Educational and Health Psychology
UCL

Dear Professor Fonagy

**Notification of Ethics Approval with Provisos**
**Project ID/Title: 15069/001: Understanding mental health in the context of military families**

Further to your satisfactory to the Committee's comments, I am pleased to confirm in my capacity as Joint Chair of the UCL Research Ethics Committee (REC) that your study has been ethically approved by the UCL REC until **1st June 2020.**

Ethical approval is subject to the following conditions:

**Notification of Amendments to the Research**
You must seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an 'Amendment Approval Request Form'
http://ethics.grad.ucl.ac.uk/responsibilities.php

**Adverse Event Reporting – Serious and Non-Serious**
It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

**Final Report**
At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research i.e. issues obtaining consent, participants withdrawing from the research, confidentiality, protection of participants from physical and mental harm etc.

Office of the Vice Provost Research, 2 Taviton Street
University College London
Tel: +44 (0)20 7679 8717
Email: ethics@ucl.ac.uk
http://ethics.grad.ucl.ac.uk/

In addition, please:

- ensure that you follow all relevant guidance as laid out in UCL's Code of Conduct for Research: http://www.ucl.ac.uk/srs/governance-and-committees/resgov/code-of-conduct-research
- note that you are required to adhere to all research data/records management and storage procedures agreed as part of your application. This will be expected even after completion of the study.

With best wishes for the research.

Yours sincerely

[redacted]

**Professor Michael Heinrich**
**Joint Chair, UCL Research Ethics Committee**

Cc: Emma Jones & Ben Shanmugam

*Appendix I*

**From:** Allie Bennington <allie.bennington@helpforheroes.org.uk>
**Subject: RE: Research advert request - Band of Brothers newsletter and website**
**Date:** 1 November 2019 at 08:34:42 GMT
**To:** "Shanmugam, Benjamin" <benjamin.shanmugam.17@ucl.ac.uk>
**Cc:** PALS.Veteran Research <veteranresearch@ucl.ac.uk>

Dear Ben – apologies for the delay. I'm absolutely delighted to let you know that the H4H Research Approvals Committee meeting sat earlier in the month and approved your research. I shall brief our Heads of Service about your research at our next joint meeting (next week) and will send all the details through to our Head of Fellowship and Head of Welfare asking each to actively encourage staff to engage with beneficiaries who fit your eligibility criteria to get involved in your research.

Therefore, I have your Appendix 8 (email advert) and Appendix 12, the alternative research summary doc. Do you also have a colourful poster or advert I can also use please? Something that will attract our beneficiaries to read your advert and inspire them to contact you that I can put up on noticeboards in our Recovery Centres

One further activity I am working on is setting up a bespoke page on our website to highlight all the research that we actively support so that beneficiaries can gain further info and contact researchers directly. This has been scoped, but not yet agreed and so is a little way off just yet sadly.

I trust this meets with your requirements and I look forward to hearing from you soon.

Kind regards,

**Allie**

**Dr Allie Bennington | Head of Evaluation and Assurance | Help for Heroes**
01980 844**344**| **allie.bennington@helpforheroes.org.uk**
Tedworth House |Tidworth | Wiltshire | SP9 7AJ |

*Appendix J*

**CONSENT FORM**

Please complete this form after you have read the Information Sheet.

**Project Title:** Understanding Mental Health in Military Families

**Name of Researchers:**

Emma Jones and Benjamin Shanmugam

**Name of Principal Researchers:**

Professor Peter Fonagy - Anna *Freud* National *Centre* for Children and Families
Dr Louise Morgan - The Centre for Veterans' Health at King Edward VII's Hospital
Dr Laura Gibbon – University College London – Research Department of Clinical, Educational and Health Psychology

This study has been approved by the UCL Research Ethics Committee (Project ID): 15069/001

**Thank you for your interest in taking part in this research. Before you agree to take part, please read through and complete this form to acknowledge that you understand your involvement in this study and that you consent to participating.**

I confirm that I understand that by ticking each box below I am consenting to this element of the study. I understand that it will be assumed that unticked/initialled boxes means that I DO NOT consent to that part of the study. I understand that by not giving consent for any one element that I may be deemed ineligible for the study.

| | | |
|---|---|---|
| 1. | I have read and understood the written information above and the Information Sheet, and I understand what the study involves. I have also had an opportunity to consider the information and what will be expected of me. | ☐ |
| 2. | I have been given the opportunity to ask questions about the project and my participation. | ☐ |
| 3. | I voluntarily agree to take part in this project. | ☐ |
| 4. | I understand that I can withdraw from this project at any time, without having to give a reason, and that I will not be penalised for withdrawing or questioned further on why I have withdrawn. | ☐ |
| 5. | I understand that my data gathered in this study will be stored anonymously and securely. It will not be possible to identify me in any publications. | ☐ |
| 6 | I understand that all information provided will be treated as strictly confidential and that all efforts will be made to ensure that I cannot be identified. | |
| 7. | I understand that the data will NOT be made available to any commercial organisations but is solely the responsibility of the researchers undertaking this study. | ☐ |
| 8. | I understand that the direct/indirect benefits of participating | ☐ |
| 9. | I understand that if I choose to withdraw, this will not affect my compensation for taking part in the study. | ☐ |
| 10. | I understand that only the Researchers involved in this study will have access to this data. | ☐ |
| 11. | I agree that my anoymised research data may be used for future research | ☐ |

| | | |
|---|---|---|
| 12. | I am aware of who I should contact if I wish to lodge a complaint. | ☐ |
| 13. | I agree to sign and date this informed consent form. | ☐ |

**Participant:**

_____ ☐

_____

Name of Participant Please tick this box if you consent to taking part

Date

_____

Email Address ☐ UCL researchers may use my details to invite me to take part in related follow-up studies.

**Thank you for your help.**

*Appendix K*

## PARTICIPANT DEBRIEF SHEET

**Understanding Mental Health in Military Families**

Thank you for taking part in our study, we appreciate that you gave up your time to take part and hope that you found it interesting.

**Summary of the Research Project**

The aim of this study is to better understand the mental health of veteran families. In particular, we are interested in whether there is a relationship between the mental health of veteran fathers and their children. We hope this will influence how support is offered to veteran families.

**What to do if you feel concerned about your participation in the study**

If you are concerned after taking part in the study it may be useful to talk to a family member, a friend or your GP.

In addition to this support there is also free and confidential advice provided by the veteran charity Combat Stress which can be found on their website: https://www.combatstress.org.uk/ or by calling their 24-hour mental health helpline on 0800 138 1619 or by texting 07537 404719 or emailing helpline@combatstress.org.uk

An alternative free and confidential mental health helpline is provided by the charity the Samaritans who can be contacted by calling their 24-hour helpline on 116 123.

If you feel at immediate risk, or if you have any concerns or further questions regarding this research, then please do not hesitate to contact project supervisor Dr Laura Gibbon on l.gibbon@ucl.ac.uk

**Thank you for taking the time to read this debrief sheet**