Personality Traits in HILDA

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Abstract

Wave 5 was the first time in HILDA that respondents were questioned on their personality character traits. The inclusion of personality in HILDA was based on the Five Factor (Big-Five) Personality Inventory, which is a descriptive model of personality identifying five broad dimensions including Emotional stability, Extraversion, Openness to experience, Agreeableness, and Conscientiousness.

This paper will item analyse responses to the 36 personality questions used in Wave 5 to evaluate how well they capture the separate constructs of the Five Factor Personality Inventory, and to assess the reliabilities of each of the scales. In addition, this paper will examine how the HILDA personality scales correlate with other measures available in HILDA, known to be associated with personality.

Using a maximum likelihood factor analysis, the items grouped into seven factors, five of which support the Big-Five structure. Subsequent analysis for a five factor solution suggested that the majority of items performed appropriately. The resulting five scales show an adequate degree of internal consistency, good variance and discriminating properties, and normal distributions. The association of the five scales with other measures known to be associated with personality were found, with few exceptions, to be consistent with the literature.

The conceptual status of the Big-Five has limited the extent to which certain psychometric properties, such as construct and content validity, can be examined. With this in consideration, we interpret our results as offering an adequate, but not complete, support for the HILDA personality traits inventory and subsequent scales. I strongly recommend the use of the original TDA-40 items, as opposed to the current 36 items, in future waves of HILDA.

Personality traits are relatively stable, cross-situational tendencies that refer to the abstract underlying potentials of individuals. The current most popular approach for studying and organising personality traits is the five factor, or the Big-Five model, which suggests that most individual differences in human personality can be classified into the following five broad domains of abstractions: Emotional stability, Extraversion, Openness to experience, Agreeableness, and Conscientiousness.

Wave 5 was the first time in HILDA that respondents were questioned on their personality character traits based on the Big-Five model. This paper will item analyse responses to the 36 personality questions used in Wave 5 to evaluate how well they capture the separate constructs of the Five Factor Personality Inventory and to assess the reliabilities of each of the scales. In addition, this paper will examine how the HILDA personality scales correlate with other measures available in HILDA, known to be associated with personality.

The history of the Big-Five

Personality has been conceptualised from a range of theoretical perspectives. While each of these perspectives has made a unique contribution to our understanding of personality the lack of an overall rationale has made the systematic accumulation and integration of these findings extremely difficult. After decades of research on devising a general taxonomy of personality traits, consensus has now been reached on what has become known as the Big-Five (Goldberg, 1981) personality dimensions. These dimensions do not represent a particular theoretical perspective but rather a common framework for the various and diverse systems of personality description. In fact, the title 'Big-Five' was chosen not to reflect the intrinsic greatness of the five factors but rather to emphasise that each factor is extremely broad with a dimension that encompasses a large number of distinct and more specific personality characteristics.

Initially, the main five factors were guided by the lexical approach[1]. They were derived from analyses of the natural-language terms people use to describe themselves and others (e.g.; Allport & Orbert, 1936). In trying to bring some order to the list of over 18,000 terms, Allport and Orbert (1936) identified four major categories. Norman (1967) subsequently expanded Allport and Orbert's initial classification into seven content categories. While these classifications provided some initial structure a more systematic framework for distinguishing, ordering and naming individual differences in people's behaviour and experience was required (John & Srivastava, 1999). The first such classification was developed by Cattell.

Cattell, using both semantic and empirical procedures, and his reviews of the personalogical literature, reduced an initial list of 4,500 trait terms[2] to 35 bipolar clusters of related terms. Using this small set of variables, and several oblique factor analysis, Cattell identified 12 personality factors, which ultimately became part of his 16 Personality Factors (16PF)[3] questionnaire. Cattell's initial work was followed by a

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[1] Lexical hypothesis posits that most of the socially relevant and salient personality characteristics have become encoded in the natural language (Allport, 1937).

[2] For his research purposes Cattell decided to focus on the ***personality*** trait category of the 18,000 terms, by Allport & Orbert (1936).

[3] The 16PF Fifth Edition also includes five global factors.

number of other researchers who examined the dimensional structure of personality trait ratings. Many of these researchers found the same five factor structure (for more detail on this look to the work of John and Srivastava 1999). This was not surprising given that a number of these studies were influenced by Cattell's selection of variables. To avoid this common bias, Goldberg (1990) constructed a new inventory of trait adjectives. Using Norman's (1967) semantic categories as scales and a variety of factor extraction and rotation methods he consistently replicated the Big-Five factors as his first five factors. Goldberg published several adjective lists scales of which, the most commonly used is the 100-item Trait Descriptive Adjectives (TDA) (Goldberg, 1992) (see Box 1).

While researchers following the lexical tradition were accumulating evidence for the Big-Five, analysis of questionnaire scales, developed by other investigators, had shown only two dimensions to appear consistently. These two dimensions were Extraversion and Neuroticism. This, however, changed in the early 1980s with the work of Costa and McCrae. Their initial work to develop a personality inventory using cluster analysis of the 16PF identified three categories that closely resembled three of the Big-Five factors; these were Neuroticism, Extraversion and Openness (NEO) (Costa & McCrae, 1985). Their subsequent work on recovering the Big-Five factors in various personality questionnaires also found a strong convergence of factor-analytic results from lexical tradition with those from the questionnaire tradition. These findings lead to a notable change in the acceptance of the five factors.

In 1992, Costa and McCrae published the 240-item NEO Personality Inventory, Revised (NEO PI-R), which contained six specific facets under each Big-Five factor. It was developed with samples of middle-aged and older adults, using both factor analytic and multimethod validational procedures and test construction. The NEO-PI-R became one of the most comprehensive and widely used personality inventory instruments in the discipline of psychology. To a large degree this was due to the strong psychometric properties of its scales including substantial internal consistency, temporal stability, and convergent and discriminant validity against spouse and peer ratings (Costa & McCrae, 1992; McCrae & Costa, 1990). One disadvantage of the instrument was its length, with time to complete being forty-five minutes. To provide a shorter measure for various research applications Costa and McCrae developed a 60-item version (NEO-FFI, Costa & McCrae, 1992) (see Box 1) as well as a 12-item instrument.

Conceptual Map of the Big-Five or Measuring the Big-Five

A major problem with the Big-Five traits documented consistently in different studies (using somewhat different sets of variables, procedures and interpretation) is the lack of stringent definition of the five factors and their factor content[4] (for more information on the content of the Big-Five see Box 2). To extract a common definition for each factor, John (1990) used 10 people, as judges, to independently sort 300-items in the Adjective Check List (ACL) into five domains. Inter-judge agreement was substantial, suggesting a consensually shared understanding of the five

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[4] For example, the NEO includes items related to *warmth* in Extraversion whereas the BFI and TDA include them in Agreeableness.

dimensions. John selected the top 112 items with the highest agreement among the judges. When he compared the interpretations of these 112 items with an independent factor solution based on questionnaire data, he found that over 87 per cent of the items had the highest loading on the factor it was expected to, indicating a good convergence between semantic and factor solutions. It also became apparent from John's study that each of the five factors covered a broad range of content. To some extent it is this broadness of the factors that inevitably leads different investigators to focus on different components of the factors when developing shorter instruments measuring the Big-Five traits.

Strengths and Limitations of the Big-Five taxonomy

The major strength of the Big-Five taxonomy is that it can capture, at the broad level, the commonalities among systems of personality traits, and therefore 'can provide an integrative descriptive model for research' (John & Srivastava, 1999, pp. 31). On the other hand, the Big-Five does not provide a *comprehensive theory* of personality; however, this function was never intended. It was developed to account for the structural relations between personality traits to provide an account of personality that is primarily descriptive and which focuses on a structure of variables rather than on types of individuals (Goldberg, 1993). In summary, while the Big-Five is very useful to describe structural relations among personality traits its value to reliably predict specific behaviours is limited.

Mini-markers

To reduce testing time, several shortened versions of the Big-Five scale called mini-markers were developed (see Box 1). A mini-marker requires the researcher to compromise between increasing reliability (by using larger item sets) and reducing subject's testing time (by using smaller sets). Furthermore, as mini-markers include items relatively close to the prototypical cores of the five factors, they tend to leave out variables with questionable factor purity. A benefit of this is a more homogenous scale. The cost, however, is the sacrifice of the breadth of the factor. Tighter scales may lead to lower overall reliability as abbreviating scales may produce "too much" homogeneity, leading to the "attenuation paradox"—a possible decrease in validity as item intercorrelations increase, but not all facets of each domain are represented.

In addition to the scales listed in Box 1 there are other measures which set out to assess the Big-Five factors. While most of these were developed for a specific research application, the plethora of instruments to measure the same thing indicates the lack of a definitive instrument/s.

BOX 1:   MINI-MARKERS

Shorter scales save testing time, reduce subject boredom and fatigue, and subsequently could increase response rate. Further, items are often shorter and can be easier to understand. One the other hand, single trait adjectives can be ambiguous in their meanings.   Some of the well established, but shorter instruments developed for various research applications are:

- ***The Big-Five Inventory (BFI)*** by Benet-Martınez and John (1998)
  Consisting of 44 short phrases, based on trait adjectives found to be prototypical markers of the Big-Five. Estimated to take around 5 minutes to complete. Although the BFI include only 8 to 10 items per scale it has high content coverage and psychometric properties. It has also shown a high convergent validity with other self-report Big-Five scales and with peer ratings (John & Srivastava, 1999).

- ***NEO Five-Factor Inventory (NEO-FFI)*** by Costa and McCrae (1992)
  Consisting of 60 self-report items, it is a shortened version of NEO-PI, containing the best items of that longer inventory as indicated by factor analysis. Estimated to take around 15 minutes to complete. Research using the NEO-FFI has demonstrated strong psychometric properties (John & Srivastava, 1999).

- ***Trait Descriptive Adjectives–100 (TDA-100)*** by Goldberg (1992)
  Consisting of 100 adjectives it requires about 15 minutes of respondents time. Based on Norman's semantic categories list Goldberg (1990) constructed an inventory of trait adjectives for respondents to rate their own personality. He then factor analysed the collected data. Goldberg distilled his findings into several published lists of adjective lists. The list most commonly used is the set of 100 unipolar trait descriptive adjectives.

- ***Trait Descriptive Adjectives–40 (TDA-40)*** by Saucier (1994)
  Using Goldberg's 100-item set and guided by psychometric criteria Saucier (1994) selected those items that showed high factor purity. In addition Saucier was aiming to:
  - increase "user-friendliness" by reducing the number of terms beginning with a prefix un-,
  - decrease the number of root-negation pairs (e.g. kind-unkind), and
  - increase the already high correlation of the scales with scales from the full set of 100 markers.

- ***Ten-Item Personality Inventory (TIPI)*** by Gosling et. al. (2003)
  The TIPI contains two items for each Big-Five factor and it takes only a couple of minutes to complete. The scale was constructed to emphasise content validity considerations, and internal consistency estimates are therefore inappropriate. The scales in TIPI show high convergent validity with other widely used Big-Five scales as well as a very good test-retest reliability.

BOX 2:   CONTENT OF THE BIG-FIVE FACTORS

While there is a general consensus on the number of broad factors of personality, there is some disagreement about their precise meaning and content. What follows is a brief description of the traits which most commonly define each factor.

- *Extraversion*
  It is widely agreed that the first dimension of the Big-Five is Eysenck's Extraversion/Intraversion. Extraversion refers to the degree of sociability or withdrawal a person tends to exhibit. Traits frequently associated with this dimension include being sociable, gregarious, assertive, talkative and active.

- *Emotional stability*
  Also frequently referred to by its converse — Neuroticism. Similarly to Extraversion there is a general agreement regarding the content of this factor. Traits commonly associated with this dimension include being anxious, depressed, angry, vulnerable, impulsive, emotional, worried and insecure.

- *Openness to experience*
  Openness refers to the breadth of experience to which a person is amenable and it has been probably the most difficult factor to identify. It has been interpreted frequently as Intellect or Culture. Traits commonly associated with this dimension include being imaginative, complex, creative, cultured, curious, original, broad-minded, intelligent and artistically sensitive.

- *Agreeableness*
  Agreeableness, is also referred to as Likeability, Friendliness or Social Conformity, contrasts a prosocial orientation towards others with antagonism. Traits frequently associated with this dimension include being courteous, flexible, trusting, straightforward, altruistic, good-natured, cooperative, tolerant and tender-minded.

- *Conscientiousness*
  Also referred to as Conformity, Dependability and, because of its relationship with a variety of educational achievement measures, as Will to achieve. There is some disagreement regarding the traits associated with this dimension. While some researchers suggested that it reflects dependability, such as being careful, thorough, responsible, organised and planful; others argued that it also incorporates volitional variables, such as hardworking, achievement oriented and persevering.

Source: Barrick & Mount, 1991; Costa & McCrae, 1992; John & Srivastava, 1999

DEVELOPMENT OF THE HILDA PERSONALITY TRAIT SCALES

Results from Wave 5 dress rehearsal

The Wave 5 dress rehearsal included two alternative instruments, the TIPI and the TDA-40[5] (for more information on TIPI and TDA-40 see Box 1). Results suggested that both measures performed reasonably well; however, the inherently greater reliability of TDA-40 was strongly in its favour.

Principal component analysis extracted two components from the TIPI and thus failed to support the five personality dimensions it was designed to measure. The two components explained 67 per cent of the total variance in the 10-items. Scale reliability analysis has found the two-item TIPI scales particularly problematic[6] (University of Melbourne, 2005).

Results from the TDA-40 extracted eight components, instead of the expected five, and explained just 56 per cent variations in the 40 items. Components one to five, containing 33-items, meshed quite well with the five factor concept. However, the remaining seven items formed an additional three components. There were also a number of items that appeared to load better on a different component than what they set out to measure. The internal reliability of the five scales of TDA-40 ranged between .69 and .79. Furthermore, it was found that exclusion of certain items could further improve inter-item consistency (University of Melbourne, 2005).

Based on these results, the exclusion of some of the poorly performing items was recommended and a new 30-item instrument was proposed. This recommendation was later reviewed resulting in a 36-item instrument (consisting of 30 items from the TDA-40 and an additional six items from various sources).

DATA, MEASURES AND METHODS

Data

The data used in this research came from Wave 5 of HILDA, a longitudinal survey of households focusing on the interactions between the labour market, families and social welfare. Wave 5, conducted between August 2005 and March 2006, involved a sample of 17,469 persons eligible for interview, 12,759 of who were successfully interviewed. However, not all of the successfully interviewed respondents completed and returned the self-completion questionnaire where the personality trait items were listed. Consequently, only 10,512 respondents (or 82.4 per cent of those successfully interviewed) provided valid answers to all personality traits measures. Table 1 provides a summary of the characteristics of the sample of respondents who provided valid answers to all personality trait questions. Comparative data from all successfully interviewed respondents are also provided. This table demonstrates that

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[5] Note that the TDA-40 items tested in the HILDA Dress Rehearsal were not actually taken directly from Saucier (1994). Due to a mistake in the set tested the adjectives Distant, Orderly, Mellow, Enthusiastic, Average and Ordinary took the place of Unsympathetic, Organised, Unenvious, Energetic, Uncreative and Unintellectual.

[6] Note that the internal consistency estimates reported in the report are inappropriate as the scale was constructed to emphasise content validity considerations rather than internal consistency.

the sample of respondents who provided valid answers to the personality items bears a close resemblance to the wider sample of respondents.

Table 1: Selected characteristics of all successfully interviewed respondents and respondents with valid answers to all personality traits items compared (%)

Characteristics	Successfully interviewed respondents	Respondents with valid answers to all personality traits items
No.	12,759	10,512
Sex		
Males	47.26	46.99
Females	52.74	53.01
Age groups (years)		
15–19	9.65	9.20
20–24	8.75	8.41
25–34	16.14	16.26
35–44	19.65	20.54
45–54	17.45	18.13
55–64	12.96	13.43
65–74	8.50	8.33
75+	6.89	5.70
Marital status		
Married	49.35	51.28
De facto	11.94	11.94
Separated	2.92	2.78
Divorced	5.97	5.89
Widowed	5.45	4.60
Single	24.36	23.51
Country of birth		
Australia	78.35	79.58
Overseas—Main English-speaking countries	10.02	10.57
Overseas—Other	11.63	9.86
Education attainment		
Degree or higher	20.05	21.59
Diploma	8.53	9.03
Certificate	21.09	21.18
Year 12	13.63	13.44
Year 11 or below	36.70	34.77
Labour force status		
Employed full-time	43.55	44.30
Employed part-time	21.08	22.01
Unemployed	3.13	2.94
Not in the labour force	32.24	30.75
Occupation*		
Senior officials and managers	9.83	9.63
Professionals	20.30	21.70
Technicians and associate professionals	14.89	15.18
Clerks	12.22	12.52
Service and sales workers	15.82	15.51
Trade workers	13.68	12.81
Elementary occupations	13.25	12.65

Note: * Employed sub-sample only
Source: HILDA wave 5

Measures

The measures of personality traits were listed under the Lifestyle and Living Situation module in Wave 5. Thirty of the 36 adjectives were lifted from the TDA-40 (Saucier,

1994), while the remaining six questions were from other sources. Respondents were asked to identify on a seven-point rating scale how well each of the adjectives describes them, with 1= to, does not describe me at all, to 7= to, describes me very well.

Methods
Various procedures (discussed below) were utilised to assess item reliability, internal consistency, construct validity and external validity.

Normality and discriminating properties of all items
Means and variances for all items were assessed to ensure they discriminated adequately between respondents (floor and ceiling effects).

Construct validity
According to the American Psychological Association (APA), construct validity can be demonstrated only when a theoretical definition of the construct exists as a basis to judge whether the proposed theoretical interpretation is supported by empirical evidence (APA, 1999). However, as several critics have argued the Big-Five does not provide a complete *theory* of personality with an emphasis on inferred dynamic and developmental processes, or a comprehensive explanatory account of personality (Eysenck, 1997; John & Srivastava,1999; McAdams, 1992; Pervin, 1994). This lack of agreed definitions of the five personality traits or established causal links and embedment in proper nomological network had largely limited our attempt to critically evaluate the construct validity of the HILDA personality traits scales. Instead a search for underlying themes was conducted using factor analysis technique. A suitably factor-pure item had to have a highest loading that was at least 1.25 times the loading on any other factor. Items that did not satisfy this criterion were considered to be loading to more than one factor.

Content validity
As stated by the APA content validity requires that a measure contains items that are representative of the construct's theoretical domain and that the measure is free from items measuring extraneous or confounding items (APA, 1999). Again, since to date the theoretical definition of the five personality traits are not developed and agreed on enough, no attempt will be made in this paper to examine the content validity of the personality traits inventory in HILDA. Furthermore, the HILDA personality traits instrument, along with other mini-markers, does not claim an adequate content coverage. Rather, it claims to adequately assess the same construct scales as longer scales do. The extent to which it has succeeded in doing this will be evaluated through its external or predictive validity.

Internally consistency
Most scales are designed with a goal of optimising internal consistency. This paper examined the most widely used index of internal consistency —Cronbach's alpha (for each item Item-total correlation, Squared Multiple R and Alpha if deleted).

Computing scales
Summated scales, as opposed to Factor scores based on item loadings [7], were used to compute scales. As factor scores are more likely to underestimate the contribution of highly specific variables measuring some unique facets of a scale, as these items tend

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[7] Factor score is computed based on the factor loadings of all variables on the factor, whereas the summated scale is calculated by combining the selected variables.

to be overlooked when items are selected solely on their groupings[8]. One major disadvantage of the use of summated scales however, is some loss of discriminant validity, as the dimensions will no longer be orthogonal.

Split-sample estimation
A five-factor Factor analysis and scale estimation was reproduced and compared for two randomly created equal samples from HILDA in order to assess to what extent the results are comparable and generalisable across the population.

Split-half reliability
Reliability of the sum scale via the *Spearman-Brown split-half*[9] and *Guttman split-half*[10] coefficients was established. If the sum scale is perfectly reliable, we would expect that the two halves are perfectly correlated.

External validity and predictive utility
While the Big-Five were first discovered in lexical research and factors were interpreted as dimensions of trait descriptions, as opposed to an underlying theory, subsequent research found external or predictive validity of the Big-Five. For example, evaluation by John and Srivastava (1999) of how well the five personality scales correlate with variables that are known, or thought, to be associated with has found significant correlations in the expected directions for both TDA instruments.

An important objective of this paper is to examine the scales as predictors of socially significant behaviours and quality of life. Usually analysis assessing patterns of external correlates is applied to evaluate the construct validity of an instrument in terms of a nomological network. However, in this paper the analysis will be used only to evaluate whether the pattern of external correlates of the personality trait scales in HILDA matched the patterns of external correlates demonstrated by other established personality scales. From these results we can judge with some confidence if the measures in HILDA assess the same constructs as those assessed by longer, established measures.

Existing research investigating the external validity and predictive utility of the Big-Five personality traits is scarce and is often limited to reports of correlations as opposed to studies establishing independent and meaningful associations or underlying processes. A notable exception to this is research in the field of juvenile delinquency, school performance and childhood psychopathology. In summary, low Agreeableness and Conscientiousness predicted juvenile delinquency, while high Conscientiousness and Openness to experience predicted improved school performance. Furthermore, low Emotional stability and Conscientiousness was related to internalising disorders (see Robins, John and Caspi, 1994).

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[8] In factor analysis each score can be broken down to into three components: common variance, unique variance, and error variance. Common variance is the amount of variance a particular variable holds in common with other variables. Unique variables, on the other hand are highly specific, as they refer to factors uniquely measured by the variable. Error variance is attributable to error. Factor analysis procedures generally identify sources of common variance at the expense of unique variance and thus important facets may be overlooked.

[9] The Spearman-Brown split-half coefficient predicts what the full-test reliability would be, based on half-test correlations.

10 Guttman split-half reliability coefficient is an adaptation of the Spearman-Brown coefficient, but one which does not require equal variances between the two split forms.

Among the adult population, personality traits were found to relate to important outcomes in training and education; employment and the workplace; mental and physical health and other life outcome variables, such as marriage, leadership, donating to charity and social capital.

In the workplace, Conscientiousness was found to be a general predictor of work performance, while other dimensions tend to relate to more specific aspects of job performance. For example, Extraversion was a valid predictor of success in management and sales positions across most criteria, while Agreeableness and Emotional stability was linked to improved job performance in a team environment (Barrick & Mount, 1991). Openness to experience and Extraversion also predicted training proficiency across a variety of occupations. In addition, Extraversion, Conscientiousness and Emotional stability have shown a positive correlation with income. These findings were also supported by the German Panel pre-test personality study in 2004 (Wooden, 2004).

Also, under investigation in terms of external correlates is the relationship between personality and health. There are a number of different approaches explaining the interaction of personality types and health outcomes. The etiological trait approach assumes that personality is an independent risk factor for disease. This means that various early biological characteristics of the individual are related to both personality and health. The stress-moderator approach emphasises the synergy between particular personality traits and stress experience, while according to the illness-behaviour approach, personality affects the health and illness behaviour of individuals (Krantz & Hedges, 1987). An alternative approach suggests that personality may be related to health behaviour, which in turn may lead to disease (Sanderman & Ranchor, 1997). While these models are relatively complex, the research methods applied to date are often not sophisticated enough to establish the causal relations or mechanisms underlying these models. In terms of research findings, studies to date suggests that adults with high Conscientiousness have better health outcomes and longevity whereas adults low on Agreeableness and Emotional stability have poorer health outcomes and more likely to engage in lifestyle risk activities, such as smoking and alcohol intake (Adams, Cartwright, Ostrove, & Stewart, 1998; Friedman, Hawley, & Tucker, 1994).

A recent study by van Loon, Tijhuis, Surtees and Ormel (2001) found that after controlling for other predictors, female (but not male) smokers had significantly higher scores for Extraversion. This result was comparable with earlier findings. Van Loon and colleagues also found that respondents who never smoked reported the lowest score on Neuroticism, followed by ex-smokers, while current smokers reported the highest score for Neuroticism. Also, increased levels of self-reported hostility (comparable to the reverse of Agreeableness) were found to be a significant predictor for being a smoker or ex-smoker. While the study found no statistically significant differences in personality scores between moderate and heavy drinkers, it found that male non-drinkers reported a significantly lower score for Extraversion than moderate and heavy drinkers. This finding by van Loon and her colleagues was largely comparable with earlier findings by Cook, Young, Taylor and Bedford (1998).

While research to date is more concerned with the link between personality and what is unhealthy, as opposed to what is healthy, most recent research has also found

evidence that suggests traits such as Emotional stability and Conscientiousness promote physical health through the model of self-healing (Friedman, et al., 1994).

Life events and life satisfaction in relation to personality traits is another area of research interest. The positive relationship of Extraversion and Emotional stability with subjective well-being is well established by research (for example; Costa & McCrae, 1980). In addition, Extraversion and Emotional stability were both found to strongly and positively correlate with life satisfaction and positive life events, including subjective and objective life events. In a relatively large sample, Australian longitudinal study, Headey and Wearing (1989) found Extraversion to be strongly related to measures of life satisfaction and positive affect but less related to negative affect. Neuroticism on the other hand was more strongly related to measures of life satisfaction and negative affect than measures of positive affect. Also, Openness to experience has shown a moderate, but statistically significant, correlation with all three dimensions of subjective well-being. Theoretical explanations on the dynamics of personality traits and subjective well-being include; personality models, stipulating that subjective well-being is solely a function of personality; adaptation models, claiming that adaptations to events are so rapid that subjective well-being is not measurably affected; and models that treat events as wholly exogenous. An alternative model, the dynamic equilibrium model by Headey and Wearing (1989) proposes that only events that deviate from the 'normal' equilibrium levels of life events will change levels of subjective well-being.

In terms of objective life events, longitudinal analysis by Magnus, Diener, Fujita and Pavot (1993) found that participants with higher level of Extraversion reported more positive life events, but not fewer negative life events, while participants with a higher Neuroticism score reported more negative life events, but not fewer positive life events. This tends to suggest that people with low Emotional stability may react to a wider variety of events in a negative way. Alternatively, their negative emotions may lead them to adopt more negative events to themselves, especially in interpersonal settings where others may react disapprovingly to their expressions of negative affects (Magnus, et al., 1993).

Development of personality in adulthood
Since the 1980s a number of longitudinal and cross-sectional personality studies have provided evidence for the current consensus that while personality traits show high levels of continuity over the life course of individuals, at the same time they show important and systematic changes connected to particular life experiences and context.

A consistent finding among studies is a decreasing pattern of Extraversion with an increase of age during young adulthood. However, patterns after the age of thirty were not clear or consistent. The partitioning of Extraversion into two components; social dominance[11] and social vitality[12], has lead to a clearer pattern of development, and found an increase in social dominance through midlife, and a decline in social vitality into old age (Costa, Herbst, McCrae, & Siegler, 2000; Roberst, Robins, Trzesniewski & Caspi, 2003).

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[11] Social dominance reflects independence and self-confidence especially in social context.
[12] Social vitality reflects sociability, positive affect, gregariousness, and energy level.

Emotional stability appeared to be relatively stable across the life course. Still, cross-sectional studies have shown a slight decrease of Emotional stability with age. For example, McCrae et al. (1999) reported a negative, although very small, correlation between Neuroticism and age across six cultures, while Goldberg, Sweeney, Merenda and Hughes (1998) found a small positive relationship between age and Emotional stability. Findings from longitudinal studies are generally consistent with cross-sectional studies. They found either a decreasing (Robins et al., 2001) or relatively stable (Roberts & Chapman, 2000) trend in neuroticism during young adulthood. Similarly to young adulthood, during middle-age, neuroticism either decreases (Costa et al., 2000) or remains stable (Costa & McCrae, 1988).

Studies examining changes in Openness to experience show an increase in young adulthood followed by either no relationship or a decrease from middle to old-age. For example, Robins et al. (2001) found an increase of Openness to experience (using the NEO-FFI) in a 4-year longitudinal study of college students. However, beyond college years findings are inconsistent. For instance, in a cross-sectional study, Costa and McCrae (1986) reported a negative relationship between age and Openness to experience using a sample of 35 to 84 year-olds. The cross-cultural study by McCrae et al. (1999) reported similar findings. On the other hand, Stevens and Truss (1985) reported no significant changes in measures of Openness to experience during middle adulthood.

While several studies have found little or no change in Agreeableness across the life course (Costa et al., 2000; Stevens & Truss, 1985), there are also examples of cross-sectional studies reporting an increased level of Agreeableness across adulthood. For example, longitudinal studies focusing on the transition from adolescence to adulthood found an increase in Agreeableness from ages 18 to 21 and an increase in congeniality and generosity from adolescence to young adulthood (Robins et al., 2001). Studies focusing on middle-age reported a higher level of Agreeableness among adults 35 to 85 years than college students (Costa & McCrae, 1986), and increased warmth from ages 40 to 54 (Haan, Millsap & Hartka, 1986).

The increase in Conscientiousness, especially in young adulthood, is probably the most robust pattern in personality development. In a cross-sectional study, McCrae et al. (1999) found an increase of all facets of Conscientiousness with an increase in age. A longitudinal study from adolescence to adulthood by Stein, Newcomb and Bentler (1986) found corresponding results. However, Costa et al. (2000) reported little or no changes in the level of Conscientiousness between the ages 41 to 50. In contrast Helson and Kwan (2000) reported a positive relationship between age and measures of socialisation, self-control and conformance in a sample of 33 to 75 year-olds.

In summary, it appears that people are more socially dominant during young adulthood, and more Conscientious and Agreeable during middle and into old-age. Emotional stability appears to increase across the life course, while Openness to experience tends to remain stable after a small increase during young adulthood.

RESULTS

Normality and discriminating properties of all items

The assumptions of univariate normality were evaluated through histograms and summary descriptive statistics. Of the 36 observed personality trait measures 15 were moderately skewed[13]. An additional four items (sloppy, jealous, cold, and careless) had highly skewed distribution[14]. Having some highly skewed items in personality inventories is expected. Also, all four items performed well in subsequent factor analysis and scale construction procedures, and therefore no transformations to normalise the distribution were necessary. A Kaiser measure of sampling adequacy of 0.891 indicated that the group of items was appropriate for factor analysis.

Construct validity

A maximum likelihood factor analysis with oblimin[15] rotation was performed on the 36 personality trait items. The items grouped into seven factors, using an eigenvalue of 1 (see Tables 2, A1 and A2). Five of the seven factors supported the Big-Five personality traits. Factor 1, capturing Emotional stability accounted for 18.7 per cent of the variance, while Factor 3, reflecting Extraversion accounted for 7.8 per cent of the variance. Factor 4, capturing Conscientiousness accounted for 5.8 per cent of the variance, while Factor 5, capturing Agreeableness accounted for 4.7 per cent of the variance. Factor 6 reflecting Openness to experience accounted for 3.7 per cent of the variance, while Factors 2 and 7 accounted for 12.2 and 3.3 per cent of variance respectively.

Items selected from the TDA-40 inventory were more likely to load sufficiently on the intended trait factors than items selected from other sources. Items from the TDA-40 that did not load the highest on their intended factor include *Creative* and *Imaginative* which both loaded onto Factor 2, and *Harsh*, loading substantially higher onto Emotional stability than its target factor, Agreeableness. Items from the TDA-40 which loaded onto more than one factor[16] were; *Withdrawn*, loading onto Extraversion and Emotional stability; *Cold,* loading onto Agreeableness and Emotional stability; and *Systematic* loading onto Conscientiousness and 'Openness to experience'.

Of the six items selected from other sources only one item, *Orderly,* loaded sufficiently on its intended factor, Conscientiousness. The item *Selfish* loaded stronger on Emotional stability than on its target factor, Agreeableness. The other four items had their highest loading on Factor 2 (E*nthusiastic* and *Lively)* and Factor 7 (*Calm* and *Traditional* and *Lively*). Results from principal component analysis with varimax rotations (not shown in this paper) produced equivalent results.

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[13] Had a skewness coefficient value between 0.5 and 1 or -0.5 and -1.

[14] Had a skewness coefficient greater than 1 or less than -1.

[15] Oblimin is an oblique axis-rotation technique with no orthogonal assumptions made to the correlation(s) between factors (Gorsuch, 1997). By using this method we wish to come to a more 'natural' solution.

[16] A suitably factor-pure item had to have a highest loading that was at least 1.25 times the loading on any other factor. Items that did not satisfy this criterion were considered to be loading to more than one factor.

The item *Imaginative* had an extremely high (0.88) correlation with Factor 2. It came across as a very strong indicator of a concept not covered in the dimensions of the Big-Five. The two other items that sufficiently loaded onto Factor 2 were *Creative* and *Enthusiastic*. These three items are often descriptors of desirable employment candidates. As noted earlier, some researchers advocated for more than five dimensions to encompass personality. For example, Hogan (1986) proposed six dimensions. The major difference between his classification and the Big-Five structure was the splitting of the Extraversion dimension into Sociability and Ambition. It can be argued that the items falling under Factor 2 to some extent describe various aspects of Hogan's dimension of Ambition.

To investigate whether the items would support the five factor structure a maximum likelihood factor analysis, with five components rotated to a oblimin criterion, was undertaken. Items that did not reach the cut-off factor loading of .45, or did not load more than 1.25 times higher on the expected factor than any other factor, were excluded from the result unless there was a strong theoretical rationale to retain them. This benchmark may seem too relaxed; however, the unique nature of personality traits is the lack of simple hierarchical structure in the real world. Consequently, items set out to measure important aspects of personality are sometimes excluded because of their multiple loadings. To moderate the potential of similar misjudgements in this research the usual benchmark was adjusted.

The rotated five-component solution (see Table 3) sufficiently supported the Big-Five structure. Twenty-eight of the 36 items loaded on their corresponding components with values greater than 0.45, and at least 1.25 times higher than on any other factor. Again, items selected from the TDA-40 inventory were more likely to load sufficiently on the intended five trait factors than items selected from other sources. TDA-40 items that did not load the highest on their intended factor included: *Complex*, which loaded equally onto 'Openness to experience' and its target factor, Emotional stability; *Withdrawn*, which loaded higher on Emotional stability than its target factor, Extraversion; *Harsh*, which loaded higher onto Emotional stability than its target factor, Agreeableness; *Cold*, which loaded higher onto Emotional stability than onto its target factor, Agreeableness; and *Careless*, which loaded equally onto Conscientiousness and its target factor, Emotional stability.

Items from other sources that did not load the highest onto their intended factor included *Selfish*, which loaded higher onto Emotional stability than its target factor, Agreeableness; and *Enthusiastic*, which loaded higher on Openness to experience and Agreeableness and than its target factor, Extraversion. *Calm* and *Traditional*, set to measure Emotional stability and Conscientiousness respectively, did not load high enough on any factors. Results from principal component analysis with varimax rotations (not shown in this paper) produced equivalent results. The resulting five personality scales are listed in Table 4.

PERSONALITY TRAIT ITEMS IN HILDA AND IN THE TDA-40

	Emotional stability	———	Extraversion	Conscientiousness	Agreeableness	Openness to experience	———
TDA-40 items excluded from HILDA	Relaxed Unenvious		Bold Energetic	Organised Practical	Unsympathetic Rude	Uncreative Unintellectual	
Items in HILDA from TDA-40	Envious Fretful Jealous Moody Temperamental Touchy		Bashful Extroverted Quiet Shy Talkative Withdrawn	Careless Disorganised Efficient Inefficient Sloppy Systematic	Cold Cooperative Harsh Kind Sympathetic Warm	Complex Creative Deep Imaginative Intellectual Philosophical	
Items in HILDA from other sources	Calm		Enthusiastic Lively	Orderly Traditional	Selfish		

RESULTS FROM FACTOR ANALYSIS

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Items loading on to the factors	Envious Fretful Harsh Jealous Moody Selfish Temperamental Touchy	Creative Imaginative Enthusiastic	Bashful Extroverted Quiet Shy Talkative	Careless Disorganised Efficient Inefficient Orderly Sloppy	Cooperative Kind Sympathetic Warm	Complex Deep Intellectual Philosophical	Calm Traditional
Cross-loading items	Cold Withdrawn Lively		Withdrawn Lively	 Systematic	Cold	 Systematic	 Lively

Source: HILDA wave 5; TDA-40 by Saucier, 1994

Table 3: Factor matrix from five factor analysis (oblimin rotation) of HILDA personality traits items

Items	Emotional stability	Openness to experience	Extraversion	Conscien-tiousness	Agreeableness
Emotional stability					
Moody	.697				
Temperamental	.683				
Jealous	.614				
Fretful	.575				
Envious	.573				
Touchy	.598				
Openness to experience					
Imaginative		.715			
Creative		.613			
Intellectual		.561			
Philosophical		.511			
Deep	.311	.455			
Complex	.465	.441			
Extraversion					
Quiet			.742		
Shy	.316		.679		
Talkative			-.646		
Extroverted			-.461		
Bashful	.382	.337	.477		
Lively		.344	-.473		.368
Conscientiousness					
Orderly				.723	
Disorganised	.353			-.696	
Efficient				.684	.380
Sloppy	.416			-.597	
Inefficient	.386			-.576	
Systematic				.515	
Agreeableness					
Warm		.314			.748
Kind					.729
Sympathetic					.665
Cooperative				.313	.608
Not included					
Selfish	.567				-.348
Harsh	.583				-.360
Cold	.512				-.398
Enthusiastic		.515	-.335		.474
Withdrawn	.531		.494		
Careless	.440			-.442	
Calm	-.273				.322
Traditional				.231	.249

Note: Only loadings >0.3 or above .8% of the loading on the highest factor reported.
               Kaiser-Meyer-Olkin measure of Sampling Adequacy=0.891
Source: HILDA wave 5

According to the criteria, one of the items that were deemed to be excluded from the results is *Complex*. *Complex* had a loading of 0.44 to its target factor, Openness to experience, as well as a loading of 0.47 to Emotional stability. However, this trait is frequently listed in the literature as a dimension of Openness to experience (Barrick & Mount, 1991; Costa & McCrae, 1992; John & Srivastava, 1999) and therefore it was retained for that scale. Given the high intercorrelation between the five personality traits and the lack of stringent definitions of the five factors and their content, cross-loadings of traits onto more than one personality trait, such as this, is not unusual.

Nevertheless, future research should explore how this item together with other poor performing items would perform with a different sample or under different techniques, such as confirmatory factor analysis.

Our results are indicative of several items loading to more than one personality trait. Subsequent bivariate correlation analysis between the five scales found a low to moderate correlation between Conscientiousness and Emotional stability (*r=.30*), Conscientiousness and Agreeableness (*r=.30*), and Agreeableness and Openness to experience (*r=.27*).

This intercorrelation between the five personality trait scales is consistent with previous studies, which found the five factors are not independent from each other, and often there is a negative correlation between Extraversion and Emotional Stability (Goldberg, 1993; and Norman, 1963). In fact, partly because the five traits have consistently been found to be intercorrelated, some researchers proposed a broad level of personality description. For example, Digman (1997) demonstrated the emergence of two higher-order factors—*Socialisation*, a factor incorporating Emotional stability, Agreeableness and Conscientiousness; and *Personal growth*, a factor incorporating Extraversion and Openness. Similarly DeYoung, Peterson, and Higgins (2002) found the same two broader personality factors, incorporating the same scales. Although, in this study it was named—*Stability*, stable organisation of psychosocial function relying largely on externally determined strategies; and *Plasticity*, the process of exploring and incorporating novel information into that organisation.

A second-order factor analysis of the HILDA five personality scales did not replicate the same higher order factor solution reported by Digman (1997) and DeYoung et al. (2002). In fact, out results failed to identity possible solutions to adequately reproduce the five scales using fewer constructs.

Internal consistency

Table 4 provides information on the reliability of the five resulting personality trait scales in HILDA. All five scales show an adequate degree of internal consistency with alpha scores ranging between 0.74 for Extraversion and 0.81 for Emotional stability. The item-total correlations listed in the table reveal that all scales are strongly unidimensional. All items, with the exception of *Systematic* (*r=.40*) and *Bashful* (*r=.36*), had a reliability coefficient above .40.

Split-half reliability
Split-half reliability analysis results are shown in Table 5. If a sum scale is perfectly reliable, we would expect the two halves to perfectly correlate. The correlations between forms for the five personality scales ranged from .42 for Extraversion to .68 for Emotional stability. The Guttman split-half technique procedure resulted in average reliability coefficients from .59 for Extraversion to .81 for Emotional stability. These results indicate that some scales, particularly Extraversion, have a relatively low internal consistency. Further analysis found that the removal of the item *Bashful* from the Extraversion scale would improve its internal reliability. Similarly, the removal of the item *Complex* would improve the internal reliability of the Openness to experience scale (see the last rows in Table 5).

Table 4 Reliability testing of the Big-Five personality traits scales

Scales and scale items	Standardised alpha	Standardised item-total correlation	Standardised alpha with deleted item
Emotional stability	**0.805**		
Moody		0.624	0.760
Temperamental		0.599	0.766
Jealous		0.580	0.770
Touchy		0.549	0.777
Envious		0.520	0.784
Fretful		0.501	0.788
Openness to experience	**0.738**		
Imaginative		0.532	0.684
Intellectual		0.484	0.698
Philosophical		0.482	0.699
Deep		0.471	0.702
Creative		0.459	0.706
Complex		0.416	0.718
Extraversion	**0.741**		
Quite (reversed)		0.581	0.674
Shy (reversed)		0.565	0.679
Talkative		0.547	0.684
Extroverted		0.410	0.723
Lively		0.406	0.724
Bashful (reversed)		0.364	0.735
Conscientiousness	**0.791**		
Orderly		0.628	0.738
Disorganised (reversed)		0.605	0.744
Efficient		0.594	0.747
Sloppy (reversed)		0.520	0.765
Inefficient (reversed)		0.516	0.765
Systematic		0.398	0.793
Agreeableness	**0.785**		
Kind		0.651	0.701
Warm		0.629	0.713
Sympathetic		0.562	0.747
Cooperative		0.526	0.765

Source: HILDA wave 5

Table 5 Split-half reliability testing of the BIG-Five personality traits scales

Scales	Unequal-length Spearman-Brown coefficient	Guttman Split-half coefficient	Correlation between forms
Emotional stability	.814	.813	.686
Agreeableness	.772	.767	.629
Openness to experience	.687	.687	.523
Conscientiousness	.668	.668	.502
Extraversion	.594	.592	.423
Openness to experience with item-Complex deleted	.766	.740	.613
Extraversion with item-Bashful deleted	.631	.645	.468

Source: HILDA wave 5

Table 6 Validation of factor analysis by split-sample estimation, factor loadings (oblimin rotation) and item-total correlation of HILDA personality traits items

Scales and scale items	Emotional stability	Openness to experience	Extraversion	Conscien-tiousness	Agreeableness	Standardised item-total correlation
SAMPLE ONE						
Emotional stability						
Moody	0.715					0.617
Temperamental	0.701					0.607
Jealous	0.631					0.581
Touchy	0.630					0.552
Envious	0.588					0.537
Fretful	0.588					0.498
Openness to experience						
Imaginative		0.690				0.525
Creative		0.573				0.445
Intellectual		0.608				0.491
Philosophical		0.556				0.468
Deep	0.321	0.505				0.469
Complex	0.472	0.515				0.408
Extraversion						
Quiet			-0.722		(rev)	0.593
Shy	0.302		-0.671		(rev)	0.575
Talkative			0.592			0.544
Extroverted		0.302	0.418			0.422
Bashful	0.357		-0.496		(rev)	0.363
Lively			0.312			0.419
Conscientiousness						
Orderly				0.724		0.625
Disorganised	0.339			-0.720	(rev)	0.602
Efficient				0.677	-0.333	0.598
Sloppy	0.396			-0.616	(rev)	0.524
Inefficient	0.375			-0.583	(rev)	0.516
Systematic				0.522		0.402
Agreeableness						
Warm		0.309			0.735	0.631
Kind					0.728	0.664
Sympathetic					0.695	0.569
Cooperative					0.597	0.526
Not included						
Selfish	0.550				0.358	
Harsh	0.580				0.383	
Cold	0.492				0.428	
Enthusiastic		0.472			-0.419	
Withdrawn	0.531		-0.433			
Careless	0.423			-0.453		
Calm	-0.257	0.246			-0.236	
Traditional			-0.239			

Note: Only loadings >0.3 or above .8% of the loading on the highest factor reported.
         Kaiser-Meyer-Olkin measure of Sampling Adequacy=0.881
Source: HILDA wave 5

Table 6 Validation of factor analysis by split-sample estimation, factor loadings (oblimin rotation) and item-total correlation of HILDA personality traits items (cont.)

Scales and scale items	Emotional stability	Openness to experience	Extraversion	Conscien- tiousness	Agreeableness	Standardised item-total correlation
S A M P L E T W O						
Emotional stability						
Moody	0.670					0.631
Temperamental	0.657					0.590
Jealous	0.586					0.578
Touchy	0.564					0.546
Envious	0.551					0.502
Fretful	0.558					0.504
Openness to experience						
Imaginative		0.740				0.539
Creative		0.646				0.472
Intellectual		0.485				0.477
Philosophical		0.459				0.496
Deep	0.324	0.398				0.472
Complex	0.466	0.375				0.424
Extraversion						
Quiet			-0.766		(rev)	0.569
Shy	0.322		-0.648		(rev)	0.555
Talkative			0.607			0.550
Extroverted			0.422			0.397
Bashful	0.401		-0.413		(rev)	0.364
Lively			0.357			0.393
Conscientiousness						
Orderly				-0.712		0.632
Disorganised	0.362			0.667	(rev)	0.607
Efficient				-0.667	0.324	0.590
Sloppy	0.429			0.567	(rev)	0.516
Inefficient	0.388			0.557	(rev)	0.518
Systematic				-0.504		0.394
Agreeableness						
Warm					0.698	0.627
Kind					0.688	0.639
Sympathetic					0.647	0.554
Cooperative					0.543	0.526
Not included						
Selfish	0.574				-0.339	
Harsh	0.583				-0.366	
Cold	0.521				-0.359	
Enthusiastic		0.477			0.359	
Withdrawn	0.532		-0.425			
Careless	0.452			0.424		
Calm	-0.269				0.263	
Traditional			-0.224	-0.217		

Note: Only loadings >0.3 or above .8% of the loading on the highest factor reported.
Kaiser-Meyer-Olkin measure of Sampling Adequacy=0.876
Source: HILDA wave 5

Table 7   Split sample estimation of the Five Personality Trait scales in HILDA wave 5

Scales	SAMPLE ONE			SAMPLE TWO		
	Standardised alpha	Mean	Standard deviation	Standardised alpha	Mean	Standard deviation
Emotional stability	0.807	5.180	1.097	0.802	5.165	1.088
Agreeableness	0.789	5.371	0.942	0.781	5.372	0.936
Openness to experience	0.733	4.223	1.078	0.743	4.211	1.090
Conscientiousness	0.792	5.076	1.056	0.790	5.090	1.023
Extraversion	0.747	4.453	1.073	0.735	4.416	1.068

Source: HILDA wave 5

Split-sample estimation

A re-estimation of factor models of two equal randomly selected samples found that both were highly comparable in terms of loadings and internal consistency (Table 6). Our descriptive analysis of the split samples (Table 7) did not find a notable, or statistically significant, difference. These results indicate that these scales are comparable and generalisable across the Australian population. Furthermore, descriptive statistics presented in Table 8 show good variance and discriminating properties as well as a normal distribution for all five scales.

Table 8   Descriptive statistics for personality trait scales in HILDA wave 5

Scales	Mean	Standard deviation	Skewness	Kurtosis
Emotional stability	5.17	1.09	-0.42	-0.14
Agreeableness	5.37	0.95	-0.67	0.95
Openness to experience	4.22	1.06	-0.14	0.02
Conscientiousness	5.08	1.04	-0.37	-0.06
Extraversion	4.43	1.07	-0.05	-0.23

Source: HILDA wave 5

Table 9 summarises the internal reliabilities (alpha scores) for the HILDA personality traits scales, with a comparison to those reported by other international studies using various instruments to measure the Big-Five personality traits. The NEO-PI-R had the highest level of internal consistency with a mean alpha score of 0.89. The alpha coefficients of the Big-Five scales in HILDA were comparable, with some variations between scales, with those for the TDA-40 (Saucier, 1994), but were consistently lower, typically by .05 to .09, than those for the TDA-100 (Goldberg, 1992). This is not surprising, as moving from a large set of items to a shorter set usually leads to a decrease in internal reliabilities. On the other hand, alpha scores for the HILDA personality scales were also consistently lower, particularly for the measure of Extraversion, than those for the BFI which contains 44 items only.

Table 9   Internal consistency (alpha scores) of the HILDA Big-Five personality traits scales as compared with other instruments

Instrument	Emotional stability	Extraversion	Openness to experience	Agreeableness	Conscientiousness	Average of alpha scores
HILDA Big-Five	0.81	0.74	0.74	0.79	0.79	0.77
TDA-40 (U.S. sample)	0.75	0.83	0.74	0.75	0.81	0.78
TDA-100 (U.S. sample)	0.83	0.90	0.82	0.84	0.88	0.85
BFI-44 (U.S. sample)	0.84	0.88	0.81	0.79	0.82	0.83
NEO-PI-R (240 items) (U.S. normative sample)	0.92	0.89	0.87	0.86	0.90	0.89
NEO-FFI (60 items) (U.S. normative sample)	0.86	0.77	0.73	0.68	0.81	0.77

Source: HILDA wave 5, Saucier, 1994; Goldberg, 1992; John O.P., et al., 1991; Costa and McCrae, 1992

External validity and predictive utility

Gender

Previous research shows consistent differences between genders in the Big-Five scores with women scoring higher in the Agreeableness and lower in the Emotional stability domain. The underlying causes for these differences are inconclusive. In this research women reported a higher score on all measures, except Openness to experience, which was significantly lower for women (see Table 10). While all differences were statistically significant (partly because of the relatively large sample size of HILDA), the difference was most evident on the Agreeableness scale (see Figure 1), with females reporting a substantially higher level of Agreeableness across all ages. However, it appears that gender differences may reduce somewhat after the age of 55. The direction of this difference was consistent with other studies. The next large difference appeared on the Extraversion and Conscientiousness scales. The difference on the Emotional stability scale was in the opposite direction than expected; however, while statistically significant, it was relatively small (just over 7 per cent of one standard deviation). One possible reason for this different outcome is the age composition of the HILDA sample. Studies of adolescents found higher levels of neuroticism among girls than boys (Margalit & Eysenck, 1990). However, studies of personality development during middle adulthood found an increased emotional coping skill with age (Helson & Kwan, 2000).

Age

Previous research examining the link between age and personality traits found that a person's rating on the five factors may change with age. In this research, Conscientiousness and Emotional stability has shown a general and consistent increase in the higher age categories (see Table 10 and Figure 1). The differences between age categories have reached a statistical significance, except for Conscientiousness for which the difference between the age categories among respondents over 55 was minimal. While the highest increase in Conscientiousness seem to happen among respondents under the age of 35 the highest increase in Emotional stability appears to happen over the age of 50.

The mean level of Agreeableness was the highest among respondents in the younger age categories. The difference between the age categories among respondents over 35

was negligible and did not reach statistical significance. This pattern is consistent with the literature.

In terms of Openness to experience, there was a general decline with age as predicted by the literature. The steepest decline seemed to occur among respondents over the age of 55. Extraversion decreased with age, particularly among respondents under the age 30 (see Figure 1). In summary, with a few minor exceptions, the links between age and personality traits was found to be consistent with the literature.

Marital status

Emotional stability was found to be lowest among single respondents and highest among widowed respondents (Table 10). To some extent, this relationship may be related to age of respondents. Other analysis, not shown in here, has also found that female, but not male, married respondents reported higher scores on Emotional stability than separated respondents. This finding is consistent with previous findings on Emotional stability correlating with the propensity to marriage and divorce (Cramer, 1993).

Extraversion was found to be the lowest among widowed women. No significant difference was observed in the male group[17]. Openness to experience was lowest among widowed and married respondents. Among widows, this relationship may partly be age related. Agreeableness was lowest among single respondents, while Conscientiousness was lowest among single and de facto respondents. Again, this relationship may partly be related to the younger age of these respondents.

Country of birth

Our analysis found that Openness to experience was highest among respondents born in non-English speaking countries, and lowest among Australian born respondents (see Table 10). Conscientiousness was lowest among Australian born respondents and highest among respondents born in other English speaking countries. Respondents born in other English speaking countries also reported the highest level of Emotional stability, followed by respondents born in Australia. Agreeableness only reached a statistically significant difference between respondents born Australia and those borne in other English speaking countries, who reported the highest level. No significant group differences were found for Extraversion.

Educational attainment

Respondents with a diploma or higher educational attainment reported significantly higher levels of Openness to experience, Emotional stability, Conscientiousness and Agreeableness than respondents with Year 12 or below. This result supports existing findings on the relationship between Conscientiousness and educational grades and achievements (for example; Hogan, & Ones, 1997); and Openness to experience and tertiary education (for example; Jang, Livesley & Vemon, 1996). No significant group differences were found for Extraversion (see Table 10).

Labour force status

Respondents not in the labour force reported the lowest level of Openness to experience (this may be age related) followed by part-time and full-time workers.

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[17] Results from analysis of personality traits by sex and marital status are not presented in this paper.

The highest level on this scale was reported by unemployed respondents. Unemployed respondents also reported the lowest level of Emotional stability followed by full-time and part-time workers (see Table 10). This supports existing research which found Emotional stability to be negatively related with unemployment (Headey & Wearing, 1989; Magnus et al., 1993).

The highest level of Emotional stability was reported by respondents not in the labour force. However, this relationship may partly be related the relatively older age of these respondents. Unemployed respondents reported a lower level of Conscientiousness than respondents from other groups. Part-time workers and those not in the labour force reported a significantly higher level of Agreeableness than full-time workers. Respondents not in the labour force reported a significantly lower level of Extraversion compared to other respondents. Analysis not shown here has also found that self-employed workers reported a significantly higher level of Emotional stability than employees.

Occupation (employed sub-sample only)
Our results tend to show that there are differential relations between the personality dimensions and occupations. Openness to experience was highest among professionals compared to respondents from other occupational groups. Further, senior officials and managers as well technicians and associated professionals reported a significantly higher level of Openness to experience than those in the other groups (except professionals). Service and sales workers also reported a higher level of Openness to experience than clerks, trade workers and those with elementary occupations (see Table 10). Of the five personality traits, Openness to experience has shown the highest correlation ($r=.18$) with job status (see Table 11).

Self reported Emotional stability was significantly higher among professionals, senior officials and managers and technicians and associated professionals than among other groups. Similarly, Conscientiousness was significantly higher among higher level occupational groups (see Table 10). Both Conscientiousness and Emotional stability has shown a low degree, but statistically significant correlation ($r=.13$, and $r=.10$, respectively) with job status (see Table 11).

Occupational groups with a significantly lower level of Agreeableness included elementary occupations and trades as well as senior officials and managers. Trade workers and those with elementary occupations also reported the lowest level of Extraversion (see Table 11).

Area
Analysis of self reported traits by remoteness of respondent's residence found that respondents from Major Cities reported a higher level of Openness to experience than respondents from regional and remote areas. Extraversion was significantly higher among respondents in Major Cities than those in Outer Regional areas.

Income
A bivariate correlation analysis between personality trait measures and individual income estimates from HILDA has found a very low, but statistically significant, positive correlation between Conscientiousness and income ($r=.10$). This positive

relationship is consistent with earlier findings. The correlation between income and other personality traits were negligible.

Table 10   Mean values of the Big-Five personality traits in HILDA by selected sample characteristics

	Emotional stability	Extraversion	Openness to experience	Agreeableness	Conscientiousness
Sex					
Males	5.11	4.30	4.25	5.13	4.97
Females	5.19	4.52	4.16	5.57	5.16
Significant differences	*p<.0001*	*p<.0001*	*p<.0001*	*p<.0001*	*p<.0001*
Age group (years)					
1. 15-19	4.81	4.70	4.33	5.09	4.49
2. 20-24	4.82	4.51	4.43	5.27	4.77
3. 25-34	4.92	4.43	4.29	5.32	4.95
4. 35-44	5.00	4.42	4.26	5.36	5.07
5. 45-54	5.17	4.37	4.22	5.41	5.17
6. 55-64	5.46	4.34	4.16	5.45	5.28
7. 65-74	5.56	4.33	3.98	5.42	5.35
8. 75+	5.80	4.21	3.70	5.42	5.35
Significant differences*	1<4,5,6,7,8 2<4,5,6,7,8 3<4,5,6,7,8 4<5,6,7,8 5<6,7,8 6<8	1>2,3,4,5,6, 7,8 2>4,5,6,7,8 3>7,8 4,5,6,>8	1,2,3,4,5>6 1,2,3,4,5>7 1,2,3,4,5>8 6>7,8 7>8	1<2,3,4,5,6,7,8 2<5,6 3,4<6	1<2,3,4,5,6,7,8 2<3,4,5,6,7,8 3<4,5,6,7,8 4<5,6,7,8 5<6,7,8
Marital status					
1. Married	5.24	4.40	4.11	5.39	5.20
2. De facto	4.97	4.45	4.36	5.35	5.01
3. Separated	5.12	4.40	4.37	5.55	5.20
4. Divorced	5.35	4.40	4.42	5.51	5.15
5. Widowed	5.83	4.30	3.74	5.49	5.26
6. Single	4.85	4.44	4.37	5.21	4.72
Significant differences*	6< 1,3,4,5 2<1,4,5 3<1,4,5 1<5 4<5	5<1,2,6 1<6	5<1,2,3,4,6 1<2,3,4	6<1,2,3,4,5 4>1,2	6<1,2,3,4,5 2<1,3,4,5
Country of birth					
1. Australia	5.16	4.41	4.17	5.35	5.03
2. Overseas - Main English-speaking countries	5.34	4.41	4.23	5.41	5.24
3. Overseas - Other	4.93	4.42	4.36	5.36	5.11
Significant differences*	3<1,2 1<2	*not sig.*	1,2<3	1<2	1<2,3

Note: * Significant differences are tested with Tukey's method (p<.05; Agresti & Finlay, 1997)
Source: HILDA wave 5

Table 10 Mean values of the Big-Five personality traits in HILDA by selected sample characteristics (cont.)

	Emotional stability	Extraversion	Openness to experience	Agreeableness	Conscientiousness
Education attainment					
1. Degree or higher	5.21	4.44	4.64	5.44	5.23
2. Diploma	5.24	4.42	4.38	5.45	5.20
3. Certificate	5.12	4.38	4.14	5.27	5.07
4. Year 12	5.03	4.41	4.35	5.37	4.98
5. Year 11 or below	5.16	4.41	3.92	5.33	4.98
Significant differences*	4<1,2,5 3<1,2 5<2	not sig.	5<1,2,3,4 3<1,2,4 2,4<1	3,5<1 3,5<2	5<1,2,3 4<1,2 3<1,2
Labour force status					
1. Employed full-time	5.07	4.40	4.28	5.29	5.07
2. Employed part-time	5.08	4.56	4.23	5.43	5.03
3. Unemployed	4.89	4.44	4.43	5.31	4.75
4. Not in the labour force	5.31	4.33	4.07	5.39	5.11
Significant differences*	3<1,2,4 1,2<4	4<1,2 1<2	4<1,2,3 1,2<3	1<2,4	3<1,2,4
Occupation**					
1. Senior officials and managers	5.22	4.57	4.40	5.28	5.26
2. Professionals	5.23	4.45	4.59	5.44	5.19
3. Technicians and associate professionals	5.12	4.51	4.31	5.43	5.20
4. Clerks	5.01	4.45	4.15	5.53	5.12
5. Service and sales workers	4.93	4.55	4.24	5.42	4.92
6. Trade workers	5.06	4.37	4.10	5.08	4.89
7. Elementary occupations	4.98	4.31	4.02	5.13	4.84
Significant differences*	5<1,2,3 7<1,2,3 4<1,2 6<2	6<1,2,3,4, 7<1,3,5	2>1,3,4,5,6, 7 1>4,6,7 3>4,6,7 5>4,6,7	6<2,3,4,5 7<2,3,4,5 1<2,3,4,5	6<1,2,3,4 7<1,2,3,4 5<1,2,3,4
Remoteness					
1. Major City	5.12	4.42	4.27	5.36	5.06
2. Inner Regional	5.22	4.41	4.11	5.36	5.10
3. Outer Regional	5.18	4.33	4.04	5.33	5.03
4. Remote	5.37	4.37	3.91	5.31	4.98
Significant differences*	not sig.	1>3	1>2,3,4	not sig.	not sig.

Note: * Significant differences are tested with Tukey's method (p<.05; Agresti & Finlay, 1997)
         ** Employed sub-sample only
Source: HILDA wave 5

Table 10 Mean values of the Big-Five personality traits in HILDA by selected sample characteristics (cont.)

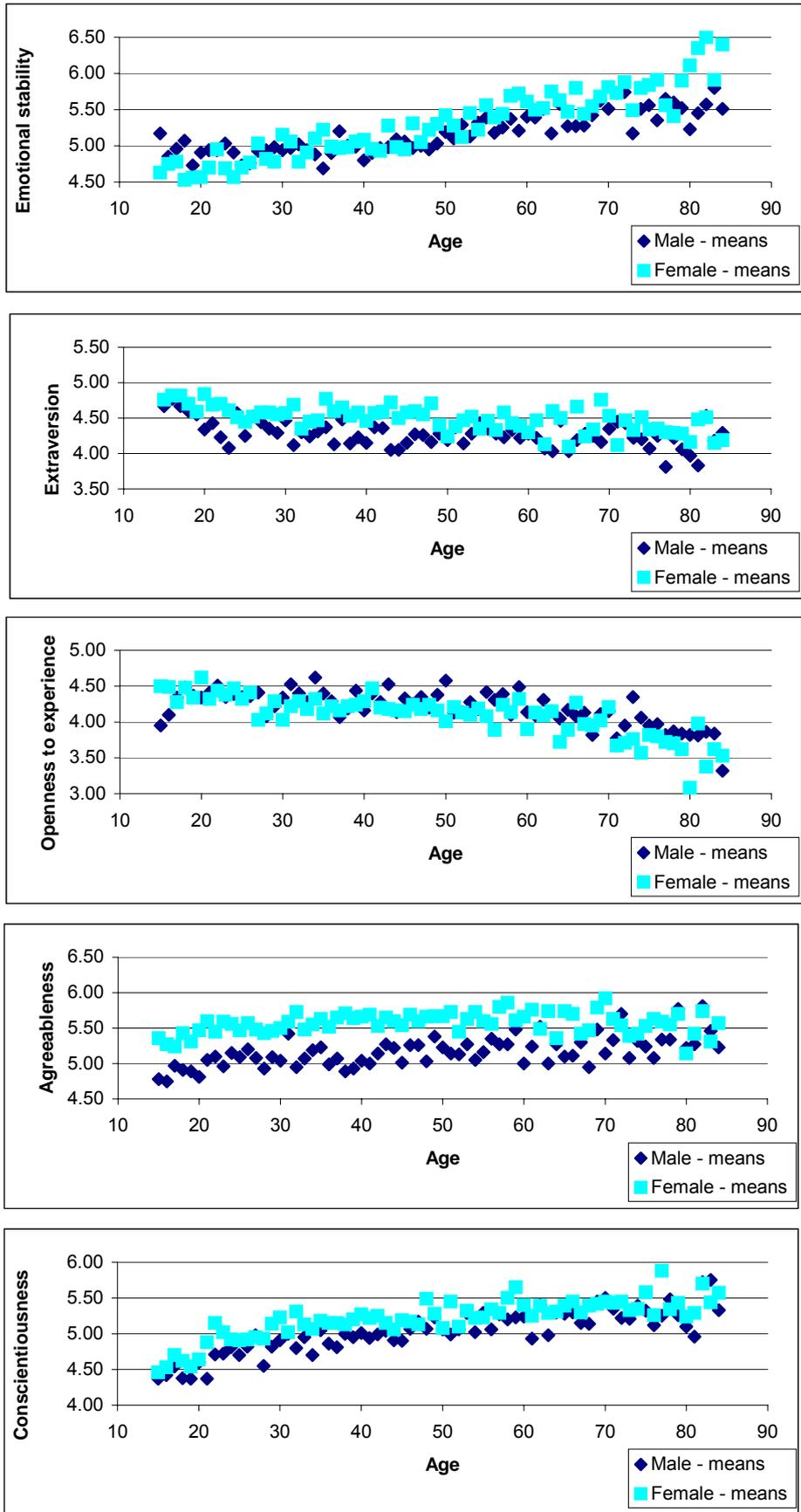|	Emotional stability	Extraversion	Openness to experience	Agreeableness	Conscientiousness
Smoking					
1. Never smoked	5.23	4.39	4.20	5.39	5.11
2. Ex-smoker	5.16	4.39	4.19	5.33	5.15
3. Current smokers	4.94	4.48	4.24	5.30	4.86
Significant differences*	3<1,2 2<1	1,2<3	1<3	1>2,3	1,2>3
Alcohol intake					
1. Never drunk	5.17	4.32	4.06	5.31	4.98
2. No longer drink	5.14	4.35	4.22	5.31	5.06
3. Current drinker – low frequency and low quantity**	5.19	4.40	4.25	5.43	5.10
4. Current drinker – high frequency or high quantity***	5.01	4.51	4.19	5.20	4.94
Significant differences*	4<1,2,3	1,2,3<4 1<3	1<2,3,4 4<3	4<1,2,3 1,2<3	4,1<3

Note: *** Drinks alcohol more than 4 days a week, or more than 4 standard drinks on a day
          **   Drinks alcohol less than 5 days a week and less than 5 standard drinks on a day
          *   Significant differences are tested with Tukey's method (p<.05; Agresti & Finlay, 1997)
Source: HILDA wave 5

Life satisfaction and satisfaction with family relationships

In addition to the life satisfaction measure, the current study also included a measure of satisfaction with family relationships. This measure was calculated for each respondent as the average score across all relationship types which applied to the respondent[18]. Correspondingly, a person would receive a high score for this measure regardless how many relationship types they have, as long as they felt satisfied with those relationships. Of the five personality traits, Emotional stability had the strongest correlation with both life satisfaction (r=.25) and satisfaction with family relationships (r=.23) (see Table 11). This result is consistent with earlier findings by Headey and Wearing (1989), that reported a strong positive association between Extraversion and measures of life satisfaction and positive affect. The current study; however, only found a relatively small correlation between Extraversion and life satisfaction (r=.14), and the correlation between Extraversion and satisfaction with family relationships was negligible. Conscientiousness and Agreeableness also showed a low, but statistically significant, positive correlation with life satisfaction (r=.17 for both) and satisfaction with family relationships (r=.16, and r=.18, respectively).

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[18] The construction equally weighted each type of relationships to which the individual responded. In practice, some relationship types are likely to be more important than others. However, the relative importance of particular relationship types will differ across individuals and life stages, and in the absence of alternative weights, the equal weighting approach was considered reasonable.

Figure 1   Mean scores on HILDA personality traits by age by sex

Source: HILDA wave 5

Table 11   Association between Big-Five variables in HILDA and self reported physical and mental health measures (SF-36)

	Emotional stability	Extraversion	Openness to experience	Agreeableness	Conscientiousness
SF-36 measures					
Physical summary measure	0.161**	0.104**	0.000	0.060**	0.109**
Physical function	-0.014**	0.073**	0.085**	-0.006	0.006
Role physical	0.050**	0.033**	-0.009	0.014	0.033*
Bodily pain	0.069**	0.066**	-0.004	-0.008	0.024
General health	0.193**	0.169**	0.025**	0.098**	0.157**
Mental summary measure	0.318**	0.132**	-0.074**	0.077**	0.155**
Vitality	0.244**	0.188**	-0.001	0.087**	0.154**
Social function	0.226**	0.100**	-0.048**	0.041**	0.121**
Role emotional	0.166**	0.047**	-0.067*	0.021*	0.095**
Mental health	0.423**	0.209**	-0.054**	0.126**	0.209**
Satisfaction					
Life satisfaction	0.245**	0.144**	-0.052**	0.155**	0.167**
Satisfaction with family relationships	0.230**	0.058**	-0.095**	0.176**	0.167**
Income					
Financial year disposable income individual estimate ($) Positive values	0.035**	-0.004	0.052**	-0.035**	0.099**
Job status					
ANU4 occupational status scale of main job***	0.103**	0.022	0.176**	0.076**	0.131**

Note: *** Employed sub-sample only
          ** Significant at the 0.01 level
          * Significant at the 0.05 level
Source: HILDA wave 5

Physical and mental health

Associations between personality traits and measures of self-reported physical and mental health using the SF-36 instrument[19] are presented in Table 11. Of the five personality traits, Emotional stability showed the strongest correlation with mental as well as physical health measures. The highest correlation was observed between Emotional stability and Mental health (*r*=.42), followed by the correlation between Emotional stability and the Mental summary measure (*r*=.32). Emotional stability has also shown a low degree, but statistically significant, correlation with Vitality (*r*=.24), Social function (*r*=.23), and General health (*r*=.19). These relationships were in line with results from previous studies. For example, forward selection regression[20]

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[19] For more information on SF-36 see Ware, 2000.
[20] In forward selection regression the equation starts out empty and predictor variables are added one at a time provided they meet the statistical criteria for entry.

analysis by Holden, Wasylkiw, Starzyk, Book & Edwards (2006) to predict health measures[21] using a pool of potential predictors including the NEO-FFI scales and their new four cluster scales[22] found a comparable, but somewhat stronger correlation of Energetic coping (computed of items measuring Emotional stability and some of the items measuring Extraversion) with Mental health, Vitality, Social function, Role emotional, and General health.

The relationship of Conscientiousness with general health and mental health also ran in the predicted direction, but the magnitude of the estimated correlation was smaller than those found by Holden and his colleagues (2006) with General health, Vitality and Role emotional. In the current study, Conscientiousness has shown a low but statistically significant, correlation with Mental health ($r=.21$), General health ($r=.16$) and Vitality ($r=.15$).

Extraversion also showed a low but statistically significant, positive correlation with Mental health ($r=.21$), and Vitality ($r=.19$). The correlation between Agreeableness and measures of physical and mental health were negligible. While results from the Holden et al. (2006) and current study cannot be compared directly their results of a low degree positive correlation of Sociability (computed of items measuring Agreeableness and some of the items measuring Extraversion) with Mental health, Vitality, Role emotional, and Social functioning are consistent with the findings of this study. The correlation of Openness to experience with various physical and mental measures was relatively weak in both studies.

Smoking and alcohol intake
There is evidence to suggest that adults with low scores on the traits Conscientiousness, Agreeableness and Emotional stability are more likely to engage in lifestyle risk activities, such as smoking and alcohol intake (Adams et al., 1998; Friedman, Hawley, & Tucker, 1994). Results from the current study are in line with these earlier findings. Current smokers scored lower on Conscientiousness, Agreeableness and Emotional stability, and higher on Extraversion and Openness to experience than ex-smokers or respondents who never smoked (see Table 10). While the differences were statistically significant on all five traits, the magnitude of the difference was largest for Emotional stability, followed by Conscientiousness. Similarly to what was reported by van Loon et al. (2001), the current research found that respondents who never smoked reported the highest score on Emotional stability, followed by ex-smokers, while current smokers reported the lowest score.

In terms of alcohol intake, non-drinkers scored lower on Extraversion than moderate drinkers. Respondents with high frequency or high quantity alcohol consumption scored the highest on Extraversion (see Table 10). Van Loon and her colleagues found a similar association between Extraversion and alcohol intake, but only among males. Not surprisingly, respondents who have never drunk alcohol scored the lowest on Openness to experience. High frequency or high quantity drinkers also scored lower on this scale than moderate drinkers. Agreeableness, Conscientiousness and Emotional stability was highest among moderate drinkers and lowest among

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[21] Using the RAND-36 Health Status Inventory
[22] Conscientiousness, Openness, Sociability, and Energetic coping. Sociability included most items measuring Agreeableness and some of the items measuring Extraversion. Energetic coping included most items measuring Emotional stability and some of the items measuring Extraversion.

respondents reporting high frequency or high quantity alcohol intake. In terms of the magnitude of differences between respondents reporting moderate versus high frequency or high quantity drinking, the largest difference was observed for the level of Agreeableness reported by respondents, followed by Emotional stability and Conscientiousness.

DISCUSSION

The Big-Five taxonomy

The Big-Five concept is a broad level abstraction of personality. In recent years attempts have been made to present the Big-Five concept as an acceptable descriptive paradigm but, as argued by Eysenck, 'a purely descriptive paradigm is a scientific impossibility' (Eysenck, 1997, pp.1225). The fundamental weakness of the Big-Five model as a scientific model of personality is the absence of causal relations and nomological networks to support the factors emerging from factor analysis. It is therefore not surprising that while there is an emerging consensus on the Big-Five factor structure, it is by no means a universal agreement and the number of factors and the nature and content of those factors are still subject to some debate. In summary, the Big-Five concept provides an integrative descriptive concept for personality research, and while some researchers claims that it may hold more meaning and use, these claims are yet to be explicated theoretically.

Psychometric properties of the HILDA personality trait scales

The conceptual status of the Big-Five has limited the extent to which this paper could evaluate the psychometric properties of the personality scales in HILDA Wave 5. Most importantly, content validity analysis was not performed, while construct validity was limited to searching for underlying themes using factor analysis. In terms of external or predictive validity, the analysis in this paper was limited to bivariate correlations as opposed to testing for causal processes.

We interpret our results as offering an adequate but not perfect support for the HILDA personality traits inventory and subsequent scales. Our initial exploratory factor analysis showed that eight of 36 items did not load highest on their corresponding components. Subsequent factor analysis with five components suggested that the majority of items performed appropriately, however, the six items selected from elsewhere did not perform as well as items lifted directly from the TDA-40. The items selected for the Big-Five scales in this research have corresponded with the items selected by the University of Melbourne to construct the five personality scales included in HILDA Wave 5.

All five scales have reached adequate levels for those criteria evaluated in this paper; normality, construct validity, internal consistency, and external correlates. In terms of internal consistency, the personality trait scales within HILDA are somewhat inferior to larger Big-Five instruments. While all five scales have reached adequate to good levels of alpha scores, results from subsequent split-half reliability analysis found that some of the scales, particularly Extraversion, have relatively low levels of internal consistency.

Results from split sample analysis did not find a notable or statistically significant difference—indicating that the scales are stable within the HILDA sample. Further, descriptive statistics found good variance and discriminating properties, as well as a normal distribution, for all five scales. In terms of overall reliability, Emotional stability and Agreeableness performed the best across the criteria and Extraversion performed the least well.

The relationships of personality trait scales with other measures known to be associated with personality were found, with a few exceptions, to be consistent with the literature. In relation to gender, the direction of differences was consistent with other studies, with the exception of Emotional stability. There was a small difference on the Emotional stability scale which ran in the opposite direction than expected. This may be due to the age composition of the HILDA sample which is more representative of the total population than those of the other studies which often rely on college/university samples.

In terms of age, marital status, educational attainment, occupation and income, results from this study using the HILDA personality scales were consistent with previous findings using other established personality scales. The strong positive correlation of Emotional stability with mental health, and to some extent with measures of physical health, was consistent with earlier findings. The relationship of Conscientiousness with general health and mental health, and Extraversion with mental health and vitality, also ran in the predicted direction. Furthermore, the relatively weak relationships of Agreeableness and Openness to experience with mental and physical health measures were in line with earlier findings.

Also resembling previous research, the current study found that adults with low scores on Conscientiousness, Agreeableness and Emotional stability were more likely to engage in lifestyle risk activities, such as smoking and alcohol intake. With the exception of Extraversion, the relationship between personality traits and life satisfaction was found to be consistent with earlier findings. However, in this study the link between Extraversion and life satisfaction and satisfaction with family relationships was negligible. This may due, to some extent, to the relatively low performance of the Extraversion scale.

Based on these results we can be relatively confident that the personality trait items used in HILDA have adequately captured the separate constructs of the Big-Five model. We are also confident that the resulting scales measuring the Big-Five personality traits, with the exception of Extraversion, have good reliability properties. Furthermore, results from our assessment of patterns of external correlates tend to indicate that the Big-Five scales in HILDA assess the same constructs as those assessed by other established measures.

Measuring personality traits in future HILDA waves

In summary, the HILDA personality trait inventory offers a brief and adequate assessment of personality traits, although, it would benefit from modification to improve its validity and reliability. It should be noted that the full set of the TDA-40

items has not been tested in the HILDA Dress Rehearsal[23], and therefore their suitability for use in HILDA has not been assessed. However, it is apparent from our analysis that the 30 items that were used directly from the TDA-40 performed considerably better than those from other sources. Therefore, we recommend use of all 40 items of the TDA-40 (taken directly from Saucier, 1994), rather than the current 36 items, in future waves of HILDA. Switching to this established inventory will also improve the comparability of personality assessment from HILDA with other Australian and international studies using this same instrument.

Limitations to this research and future research

Limitations to this research should be noted. Specifically, the research was constrained by the content validity of the 36 items used in the HILDA survey for representing an appropriate construction of personality descriptors.

Additional testing with a different population could further establish the generalisability of the test across the Australian population. Future research strengthening the evaluation of the psychometric properties of the personality trait scales in HILDA could include confirmatory factor analysis and community sample studies comparing results with other five factor personality trait instruments. In addition, studies exploring the relationship and the underlying causal processes between personality traits and health outcomes and/or lifestyle risk activities could broaden the application and utilisation of personality inventories.

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[23] The TDA-40 items tested in the HILDA Dress Rehearsal were not actually taken directly from Saucier (1994). Due to a mistake in the set tested the adjectives Distant, Orderly, Mellow, Enthusiastic, Average and Ordinary took the place of Unsympathetic, Organised, Unenvious, Energetic, Uncreative and Unintellectual.

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APPENDIX

Table A1: Results for the extraction of factors (oblimin rotation) of HILDA personality traits items

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.730	18.696	18.696	6.065	16.848	16.848	4.780
2	4.381	12.170	30.866	3.882	10.782	27.630	2.807
3	2.805	7.792	38.658	2.299	6.385	34.015	2.709
4	2.110	5.861	44.519	1.604	4.454	38.470	3.816
5	1.692	4.701	49.220	1.204	3.345	41.814	3.584
6	1.327	3.685	52.905	.838	2.327	44.142	2.819
7	1.204	3.344	56.249	.714	1.983	46.124	1.668
8	.939	2.608	58.857				
9	.856	2.378	61.235				
10	.837	2.324	63.558				
11	.760	2.111	65.669				
12	.753	2.091	67.760				
13	.688	1.912	69.672				
14	.642	1.783	71.455				
15	.621	1.725	73.180				
16	.611	1.699	74.878				
17	.573	1.592	76.471				
18	.564	1.566	78.037				
19	.560	1.555	79.592				
20	.542	1.505	81.097				
21	.534	1.483	82.580				
22	.517	1.436	84.016				
23	.507	1.409	85.426				
24	.499	1.387	86.813				
25	.476	1.323	88.136				
26	.453	1.257	89.393				
27	.445	1.237	90.630				
28	.434	1.205	91.834				
29	.427	1.187	93.021				
30	.398	1.105	94.126				
31	.396	1.100	95.226				
32	.373	1.035	96.261				
33	.365	1.014	97.275				
34	.358	.995	98.271				
35	.338	.939	99.210				
36	.285	.790	100.000				

Note: Extraction Method: Maximum Likelihood.
When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.
Source: HILDA wave 5

Table A2: Factor matrix from factor analysis (oblimin rotation)

	Factor 1 Emotional stability	Factor 2 ———	Factor 3 Extraversion	Factor 4 Conscien-tiousness	Factor 5 Agreeablen-ess	Factor 6 Openness to experience	Factor 7 ———
Talkative	.063	.237	**-.652**	.009	.245	.044	.084
Sympathetic	-.090	.234	-.118	.178	**.685**	.160	.142
Orderly	-.088	.079	-.031	**.686**	.256	.137	.266
Envious	**.584**	-.045	.043	-.213	-.138	.155	.062
Deep	.266	.238	.037	-.036	.161	**.605**	.059
Withdrawn	**.510**	-.088	**.462**	-.242	-.222	**.334**	.021
Harsh	**.555**	-.056	.008	-.201	**-.429**	.284	.110
Systematic	.049	.083	.049	**.454**	.078	**.394**	**.309**
Moody	**.717**	-.050	.113	-.253	-.221	.257	-.064
Philosophical	.071	.283	.041	.017	.117	**.648**	.166
Bashful	**.365**	-.026	**.451**	-.193	-.014	.253	.181
Kind	-.102	.299	-.044	.215	**.719**	.114	.247
Inefficient	**.361**	-.097	.131	**-.608**	-.143	.123	-.026
Touchy	**.616**	-.006	.096	-.207	-.083	.221	.009
Creative	.024	**.739**	-.092	.040	.193	.263	.073
Quiet	.082	-.038	**.740**	-.015	.029	.122	.179
Cooperative	-.212	**.305**	.016	.283	**.577**	.093	**.352**
Sloppy	**.380**	-.060	.085	**-.648**	-.226	.165	.078
Jealous	**.627**	-.041	.055	-.270	-.171	.158	.064
Intellectual	.007	**.390**	-.123	.109	.154	**.528**	.226
Extroverted	.105	.242	**-.506**	-.063	.063	.295	.188
Cold	**.475**	-.136	.211	-.258	**-.477**	.231	.146
Disorganised	.317	-.008	.050	**-.740**	-.135	.169	.028
Temperamental	**.687**	-.044	.069	**-.338**	-.242	.251	.001
Complex	**.417**	.177	.088	-.205	-.114	**.591**	.039
Shy	**.311**	-.064	**.664**	-.187	-.013	.182	.181
Warm	-.110	**.362**	-.139	.179	**.721**	.137	.327
Efficient	-.113	.278	-.079	**.644**	.324	.155	**.421**
Fretful	**.584**	-.010	.220	-.240	-.076	.240	.035
Imaginative	.019	**.876**	-.122	.027	.207	**.338**	.161
Enthusiastic	-.126	**.576**	-.346	.239	**.411**	.165	**.438**
Selfish	**.531**	-.065	.047	**-.338**	**-.415**	.279	.098
Careless	**.402**	-.058	.053	**-.500**	-.277	.193	.126
Calm	**-.315**	.210	.031	.148	.271	.089	**.430**
Traditional	-.056	.068	.086	.192	.193	.030	**.366**
Lively	-.086	**.393**	**-.494**	.139	**.314**	.056	**.408**

Source: HILDA wave 5