

Est.
1841

YORK
ST JOHN
UNIVERSITY

Village, Andrew and Francis, Leslie J. (2022) Factorial structure and validity of the Francis Psychological Type and Emotional Temperament Scales (FPTETS). *Mental Health, Religion & Culture*, 25 (9). pp. 897-909.

Downloaded from: <https://ray.yorks.ac.uk/id/eprint/5794/>

The version presented here may differ from the published version or version of record. If you intend to cite from the work you are advised to consult the publisher's version:
<https://www.tandfonline.com/doi/full/10.1080/13674676.2022.2026311>

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form. Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. [Institutional Repositories Policy Statement](#)

RaY

Research at the University of York St John

For more information please contact RaY at
ray@yorks.ac.uk

Factorial structure and validity of the Francis Psychological Type
and Emotional Temperament Scales (FPTETS)

Andrew Village*

School of Humanities

York St John University, England, UK

Orcid: 0000-0002-2174-8822

Leslie J. Francis

Centre for Educational Development, Appraisal and Research (CEDAR)

University of Warwick, England, UK

Orcid: 0000-0003-2946-9980

Author note:

Andrew Village
York St John University
Lord Mayor's Walk
YORK
YO31 7EX
UK

Tel: +44 (0)1904 876723

Email: a.village@yorksja.ac.uk

Abstract

The aim of this study was to test the factorial structure and validity of the Francis Psychological Type and Emotional Temperament Scales (FPTETS) in a sample 209 men and women enrolled on a university ministry training course. Confirmatory Factor Analysis supported the five-factor structure of scales measuring introversion-extraversion, sensing-intuition, feeling-thinking, judging-perceiving, and emotional calm-volatility. This showed that it is possible to add the latter scales to those in the parent instrument (the Francis Psychological Type Scales) without destroying its factorial structure. Validity of the orientation and emotional temperament scales was tested among 78 of the original sample who also completed the Eysenck Personality Questionnaire Revised shortened version (EPQ-RS). There were significant correlations between extraversion scores on the two instruments and between Eysenck neuroticism and FPTETS volatile scores, suggesting these two components of the FPTETS and the two dimensions of the EPQR-S assess similar components of personality in both instruments.

Keywords: emotional temperament; Francis Psychological Type Scales; neuroticism; personality; psychological type

Introduction

The Francis Psychological Type Scales (FPTS) were developed to operationalize the model of psychological type proposed by Jung (1923) and developed into a four-component model (Myers et al., 1998). They have been widely used over the last 15 years in studies of clergy and congregations. Type models lack a component related to neuroticism, which is present in other models of personality such as Eysenck's three-dimensional model (Eysenck & Eysenck, 1985; Eysenck et al., 1985) or the five-factor model of personality (Costa & McCrae, 1985). To remedy this, emotional temperament scales have been added to the FPTS. This study examines the factor structure of the new instrument to test if adding the scales retains the original four components. It also seeks to validate two components of the new scales against equivalent components in the Eysenck model of personality.

Conceptualisations and operationalisations of psychological type

Jung's theory of psychological type is rooted in three dichotomous preferences that point to underlying psychological functioning. The first of these relates to the preference for external or internal mental processing, expressed as an orientation towards either extraversion (E) or introversion (I). The second relates to the perceiving process (P) whereby information is taken in, expressed as a preference for the functions of either sensing (S) or intuition (N). The third relates to the judging process (J) whereby decisions are made, expressed as a preference for the functions of either feeling (F) or thinking (T). Jung argued that although all orientations and functions were available to everyone, most people exhibited a preference for one or other of the pairs in each dimension, leading to the idea of a typology. This theory implies differentiation among eight function-orientations (see Ross & Francis, 2020), that is each of the four functions (sensing, intuition, thinking, and feeling) operating in each of the two orientations (introversion and extraversion). In order to operationalise this model of psychological type, psychometric instruments have been developed to assess four features of

the theory in order to distinguish not only between the preferred orientation (E or I), the preferred perceiving function (S or N), and the preferred judging function (T or F), but also between the preferred process extraverted in the outside world, either the judging process (J) or the perceiving process (P). Two of the better-known instruments designed to measure these four features of psychological type theory are the Myers-Briggs Type Indicator (MBTI; Myers, McCaulley, Quenck, & Hammer, 1998) and the Keirsey Temperament Sorter (KTS; Keirsey, 1998; Keirsey & Bates, 1978).

The MBTI was designed for use with clients by trained practitioners in one-on-one or small group consultations. The MBTI is also used at extended workshops led by trained practitioners, where the aim is to allow participants to explore their personality by using the instrument as a means of developing themselves and others. The emphasis is on improving self-awareness over an extended period, often in the context of helping organisations to function more effectively. Although this model of utilizing psychological type has proved useful to many people over a number of years (Bayne, 2005), it is cumbersome in situations where type preferences need to be assessed more quickly, as in research studies using questionnaires. There have been several attempts to overcome this problem. Keirsey and Bates (Keirsey, 1998; Keirsey & Bates, 1978) developed the Keirsey Temperament Sorter (KTS), as a 70-item, self-completion instrument. They also developed the notion of ‘temperaments’ alongside type, by looking at the characteristics of people with the matched preferences of SJ, SP, NT, and NF. Although the KTS has been used in a range of studies of type and temperament (Jones & Francis, 1999; Village & Francis, 2005; Waskel & Coleman, 1991), the format of this instrument remains more appropriate for individual self-completion than for inclusion in survey-based research. Francis (2005) developed the Francis Psychological Type Scales (FPTS) specifically as an instrument designed for survey-based research in the context of studies within the fields of psychology and religion or empirical

theology. The FPTETS have been widely used for well over a decade in studies of clergy and lay people (for examples, see references in Francis, Laycock, & Brewster, 2017).

Psychological type in relation to other models of personality

One issue that has been raised in relation to psychological type is how the four dimensions relate to trait models of personality currently popular among psychologists. Type models assign individuals to dichotomous categories using the cumulative scores on each dimension obtained from the particular instrument being employed. There is considerable evidence to suggest that type scores correlate with traits in other models (Crump, Furnham, & Moutafi, 2003; Francis & Jones, 2000; Furnham, 1996; MacDonald, Anderson, Tsagarakis, & Holland, 1995; McCrae & Costa, 1989; Tobacyk, Livingston, & Robbins, 2008). In these studies, MBTI scores were usually treated as if they were scores on a trait-based model, and this may sometimes be the best way to use the data from type sorters in research contexts (Village, 2011). The Five Factor Model (FFM) model posits five dimensions: extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness (Costa & McCrae, 1997, 2008; McCrae & Costa, 2008). In a sample of 267 adults in the US that completed both the FFM and MBTI instruments there were significant correlations between the two extraversion scales, between intuition and openness, between feeling and agreeableness, and between judging and conscientiousness (McCrae & Costa, 1989). These associations are in line with theoretical predictions from the two models, and have been demonstrated to varying extents in other studies (Crump et al., 2003; Furnham, 1996; MacDonald et al., 1994; Parker & Stumpf, 1998; Renner et al., 2014; Tobacyk et al., 2008).

The Eysenck Personality Questionnaire (EPQ) was derived from work on abnormal psychology and posits three dimensions: extraversion, neuroticism, and psychoticism (Eysenck & Eysenck, 1985; Eysenck & Eysenck, 1975; Furnham, Eysenck, & Saklofske, 2008). It has been revised (Eysenck, Eysenck, & Barrett, 1985) and abbreviated (Francis,

Brown, & Philipchalk, 1992). In a sample of 377 adult churchgoers there was a good correlation between extraversion as measured by the EPQ and MBTI, and moderate correlation between EPQ psychoticism and judging-perceiving scores in the MBTI (Francis & Jones, 2000). The mapping of these two instruments appears to more complex than for the FFM.

Taken together, the results cited above suggest that psychological type may be a slightly different way of conceptualising dimensions of personality that are shared with trait models. Each has their own origins and assumptions, strengths and weaknesses. The Eysenck model emerged from the field of abnormal psychology and has undergone changes since it was first developed, notably the addition of psychoticism to the original model (Eysenck & Eysenck, 1976; Eysenck et al., 1985). The Eysenck conceptualization views extremes on two of the three dimensions as indicators of pathology, whereas type models stress that preferences reflect different modes of functioning without attaching value or pathology to these preferences. The FFM has both the advantage and disadvantage of being a largely heuristic instrument, developed by the factor analysis of many words associated with personality, but with little underlying theoretical basis for the selection of the five components (De Raad, 2000). It started as a three-dimensional instrument (the NEO) and was later revised by the addition of two dimensions, agreeableness and conscientiousness (Costa & McCrae, 2008). The dimensionality has been tested and found to vary between samples (Bowler, Bowler, & Phillips, 2009; Furnham, 1996), and there is little theoretical guidance for deciding how many factors there should be (Eysenck, 1994; Vassend & Skrandal, 1995). Lloyd (2012) concluded that although there are some weaknesses with type models, the suspicion directed at them from some quarters has little justification, and often amounts to little more than prejudice.

The need to add and test a new component to the FPTETS

One aspect of personality that is present in trait models but not in type models relates to emotionality. Both the EPQ and the FFM have dimensions of neuroticism, which describe a trait related to emotionality. The underlying assumption posited by Eysenck was that those who score high on neuroticism have a low activation threshold in those parts of the brain related to the fight-or-flight response (Furnham et al., 2008). This means they tend to respond strongly to stressors, showing frequent signs of negative affect such as anxiety or fear. Other indications of neuroticism include mood swings, feelings of guilt and a tendency towards depression. This aspect of psychological functioning is not represented in classical type models, which tend to focus on the perception and processing of information, rather than on the more affective character of responses to stress. To address this lack, a ten-item scale of emotional temperament has been added to the FPTS to produce the Francis Psychological Type and Emotional Temperament Scales (FPTETS). The intention was to produce an instrument that fitted easily into the style of the FPTS while allowing the measurement of a dimension that was not an integral part of psychological type models.

The aim of this study was to examine the factor structure and validity of the new instrument using data from a sample of trainee ministers. The participants completed questionnaires at the start and finish of their training, the first included the FPTETS and the second included the shorter version of the revised Eysenck Personality Questionnaire (EPQ-RS, Eysenck et al., 1985). This allowed a test of the validity of extraversion and emotionality scores from the FPTETS by comparing them with extraversion and neuroticism scores on the EPQ-RS.

Method

Participants

Students on theology and ministry higher education programmes in the United Kingdom were invited to complete questionnaires at the start and finish of their studies (for more details, see

Village, 2019). The first questionnaire included the FPTETS and was completed by 209 students. This sample was used to test the factor structure of the instrument and comprised 62% women and 38% men; 42% were under 50, 31% were in their 50s, and 27% were 60 or older. The second questionnaire included the EPQ-RS and was completed by 78 students who had previously completed the first questionnaire. This sample was used to test the validity of the FPTETS scales against the EPQ-RS and comprised 66% women and 34% men; 33% were under 50, 36% were in their 50s, and 31% were 60 or older.

Instruments

The Francis Psychological Type and Emotional Temperament Scales (FPTETS) were presented in paper format with items from different dimensions unseparated.ⁱ The 50-item instrument included the four sets of ten forced-choice items from the original FPTES (Francis, 2005) which relate to each of the four components of the psychological type model: orientation (extraversion or introversion), perceiving process (sensing or intuition), judging process (thinking or feeling), and attitude toward the outer world (judging or perceiving). In addition, there were ten forced-choice items that were designed to assess emotional temperament (calm or volatile).

In each scale in the FPTETS, ten characteristics associated with each preference are present in opposite pairs in a forced-choice format (see Table 1 for the pairs): selecting a choice scored 1 for that preference and 0 for the opposite preference. Scores on each scale were complementary (E-I, S-N, T-F, J-P, and C-V), so the analysis used scores for only one item in each dimension to avoid unnecessary redundancy. Items scores for extraversion (E), sensing (S), thinking (T), judging (J) and volatile (V), were used as observed variables and scored zero or one.

The EPQ-RS is a 48-item instrument with forced-choice items assessing extraversion, neuroticism, psychoticism, and a lie scale (Eysenck et al., 1985). The alpha reliabilities for

scales in this sample were similar to those reported elsewhere for extraversion (.88), neuroticism (.85), and the lie scale (.74). Psychoticism typically has a lower reliability, and this was also true in this study (.44).

Data Analyses

The analyses used responses to the E, S, T, J, and V scales, which were the mirror image of responses to the I, N, F, J, and C scales respectively. The data were subject to a confirmatory factor analysis (CFA) using the Factor Analysis procedure in SPSS 25 (Arbuckle, 2017). Our aim was to confirm the loading of items on five factors as predicted by the model, so the programme was constrained to select five factors, making this a confirmatory rather than exploratory process. Principal components analysis (PCA) was used to extract five factors followed by a varimax rotation (ensuring factors were orthogonal to one another).

The responses to all items were dichotomous (1 = selected, 0 = other item in pair selected). Statistical opinion is divided on how far such data can be analysed with the CFA procedures applied to normally distributed data, but most experts advise the use of methods that do not require the assumptions applying in normal PCA (Dolan, 1994; Lorenzo-Seva & Ferrando, 2012; Parry & McArdle, 1991; Rhemtulla, Brosseau-Liard, & Savalei, 2012). For this reason, the categorical PCA procedure in SPSS (CATPCA) was also used to extract factors, and the results are presented alongside those from a standard PCA.

Results

Item endorsement

The percentage frequency of endorsing the E, S, T, J, and V responses are shown in table 1. Cronbach's internal consistency reliabilities for the scales (alpha) were E-I: .80, S-N: .66, T-F: .65, J-P: .76, and C-V: .80. For most items there was a fairly even split between the two possible responses. A few items had more consistent uneven splitting, notably 'Keep

things as they are' (i84, sensing) which was much less popular than the intuitive alternative 'Improve things', 'Punctual' (i78, judging) which was much more popular than 'Leisurely', 'Happier with certainty' (i92, judging) which was more popular than 'Happier with uncertainty', and 'Emotional' (i09, volatile), which was more popular than 'Unemotional'. In this sample, some of these items may have carried some value bias, such as the idea that those entering ministry should be agents of change rather than maintainers of the status quo.

- insert table 1 about here -

CFA

The CFA constrained the factors to five, thereby testing whether items loaded on the dimensions expected from the model underlying the FPTETS. Table 2 shows factor loadings for normal PCA with those less than .30 removed to improve readability. Table 3 shows the same results but treating responses as binary categories. The two sets of results were similar, with the same relative factor loadings for items, showing the robustness of normal PCA to violations in the underlying nature of the data. Analysis of items was therefore confined to the PCA results in table 2.

- insert tables 2 and 3 about here -

The factor analyses showed that only four of the 50 items had factor loadings below .30 for their expected scale. There were a few additional items that also loaded more heavily on a different dimension to that expected:

Extraversion: One item, 'Speak before thinking' (i81), loaded poorly on its expected scale and loaded to the same extent on judging.

Sensing: One item, 'Concerned for details' (i54), loaded poorly on its expected scale and loaded most heavily on the volatile scale.

Thinking: One item, 'Truthful' (i06), loaded poorly on its expected scale and loaded most heavily negatively on sensing.

Judging: Two items loaded reasonably well on this scale, but more heavily on other scales: ‘Act on decisions’ (i28) negatively on extraversion, and ‘Like to be in control’ (i37) which was slightly more heavily loaded on thinking.

Emotionality: One item, ‘Emotional’ (i09), loaded poorly on its expected scale and loaded positively with extraversion and negatively with thinking.

These results suggest that there may be scope for adjusting some of these items to ensure a better fit to the underlying dimensionality of the instrument. Despite this, the Cronbach alpha reliabilities of all five scales were reasonable to good: extraversion .80, sensing .65, thinking .65, judging .76, volatile .80.

Validity of the FPTETS Extraversion and Volatile scales

Table 4 shows bivariate correlations between the Eysenck and FPTETS scale scores for 78 participants that fully completed both instruments during the study. As expected, the two largest positive correlations were between the two measures of extraversion ($r = .72$, $df = 77$, $p < .001$) and between the neuroticism and volatile scales ($r = .78$, $df = 77$, $p < .001$). There were also significant negative correlations between the sensing scale scores and the Eysenck psychoticism and extraversion scale scores, suggesting that sensing may be associated with stable introversion.

- insert table 4 about here -

Discussion

The aim of this study was to test the factorial structure of the Francis Psychological Type and Emotional Temperament Scales (FPSETS) and the validity of two components related to extraversion and emotional volatility. This extends work of the factorial structure of the Francis Psychological Type Scales (FPTS) to include an additional factor related to emotional temperament. The structure of the four components of the FPTS were similar to those

identified in previous studies (Francis et al., 2017; Village, 2021). This study has shown that the inclusion of an emotional temperament scale within the framework of the original FPTETS seems to work well and allows the assessment of a construct that is related to neuroticism within the revised Eysenck model. One item in the emotional temperament scale worked poorly, because participants linked ‘emotionality’ with items associated with either extraversion or feeling (the opposite of thinking). This item may need to be revised slightly, perhaps to indicate the sort of ‘over emotionality’ that is associated with emotional instability. The correlation of the two measures of extraversion was as predicted, and in line with other studies that suggest this aspect of personality is similar across several different models (Francis & Jones, 2000; McCrae & Costa, 1989; Tobacyk et al., 2008). Even with the weaker item included, the emotional temperament scale appeared to be a useful and reliable measure of emotional stability versus instability.

The items in the four original dimensions of the FPTETS generally loaded as expected on the correct dimension, confirming previous analyses (Francis et al., 2017; Village, 2021). The items that loaded least well were in some cases those that did the same in previous analyses, suggesting the scales could be improved by removing or adjusting the wording of some items. This is unlikely to make a significant difference to the way individuals score on each dimension, or their final type categories, but better items might help to define the constructs more tightly.

This study of FPTETS suffered from some weaknesses that need to be addressed in future studies. The sample size was relatively small, and the sample was of training ministers. Previous use of the FPTETS has tended to be with clergy and laity, and it would be useful to test the instrument on a wider range of participants. The cross validity with the Eysenck instrument was separated in time by up to three years, to reduce the size of questionnaires.

Although these aspects of personality are, by definition, thought to be stable over time in adults, it would be better where possible to deliver the two instruments simultaneously.

Ethical Approval

Approval for the project was given by the Faculty Research Committee at York St John University, reference ET/17/06/10/AV.

All participants were required to give their informed consent before participating in the project and completing questionnaires.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Arbuckle, J. L. (2017). *IBM SPSS Amos 25 user's guide*. Chicago, IL: IBM Corporation.
- Bayne, R. (2005). *Ideas and evidence: Critical reflections on MBTI theory and practice*. Gainesville, FL: Center for Applications of Psychological Type Inc.
- Bowler, M. C., Bowler, J. L., & Phillips, B. C. (2009). The Big-5±2? The impact of cognitive complexity on the factor structure of the five-factor model. *Personality and Individual Differences, 47*(8), 979-984. doi: 10.1016/j.paid.2009.08.002
- Costa, P. T., & McCrae, R. R. (1997). Stability and change in personality assessment: The Revised NEO Personality Inventory in the Year 2000. *Journal of Personality Assessment, 68*(1), 86 -94. doi: 10.1207/s15327752jpa6801_7
- Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory*. Psychological Assessment Resources. [https://doi.org/https://doi.org/10.1037/t07564-000](https://doi.org/10.1037/t07564-000)
- Costa, P. T., & McCrae, R. R. (2008). The revised NEO Personality Inventory (NEO-PI-R). In G. J. Boyle, G. Matthews & D. H. Saklofske (Eds.), *Personality theory and assessment* (Vol. 2 Personality measurement and testing) (pp. 179-198). London: Sage. doi.org/10.4135/9781849200479.n9
- Crump, J., Furnham, A., & Moutafi, J. (2003). The relationship between the revised NEO-personality inventory and the Myers-Briggs type indicator. *Social Behavior and Personality, 31*(6), 577-584. doi: 10.2224/sbp.2003.31.6.577
- De Raad, B. (2000). *The Big Five personality factors: The psycholexical approach to personality*. Ashland, OH: Hogrefe & Huber Publishers.
- Dolan, C. V. (1994). Factor analysis of variables with 2, 3, 5 and 7 response categories: A comparison of categorical variable estimators using simulated data. *British Journal of Mathematical and Statistical Psychology, 47*(2), 309-326. doi: 10.1111/j.2044-8317.1994.tb01039.x

- Eysenck, H. J. (1994). The Big Five or giant three: Criteria for a paradigm *The developing structure of temperament and personality from infancy to adulthood*. (pp. 37-51). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Eysenck, H. J., & Eysenck, M. W. (1985). *Personality and individual differences: A natural science approach*. New York: Plenum Press. doi.org/10.1007/978-1-4613-2413-3
- Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire (adult and junior)*. London: Hodder & Stoughton.
doi.org/10.1037/t05462-000
- Eysenck, H. J., & Eysenck, S. B. G. (1976). *Psychoticism as a dimension of personality*. London: Hodder and Stoughton.
- Eysenck, S. B. G., Eysenck, H. J., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and Individual Differences*, 6(1), 21-29. doi: 10.1016/0191-8869(85)90026-1
- Francis, L. J. (2005). *Faith and psychology: Personality, religion and the individual*. London: Darton, Longman & Todd.
- Francis, L. J., Brown, L. B., & Philipchalk, R. (1992). The development of an abbreviated form of the revised Eysenck personality questionnaire (EPQR-A): Its use among students in England, Canada, the U.S.A. and Australia. *Personality and Individual Differences*, 13(4), 443-449. doi: 10.1016/0191-8869(92)90073-X
- Francis, L. J., & Jones, S. H. (2000). The relationship between the Myers-Briggs Type Indicator and the Eysenck Personality Questionnaire among adult churchgoers. *Pastoral Psychology*, 48(5), 377-386. doi: 10.1023/A:1022036504232
- Francis, L. J., Laycock, P., & Brewster, C. (2017). Exploring the factor structure of the Francis Psychological Type Scales among a sample of Anglican clergy in England.

Mental Health, Religion & Culture, 20(9), 930-941. doi:

10.1080/13674676.2017.1375469

Furnham, A. (1996). The big five versus the big four: The relationship between the Myers-Briggs Type Indicator (MBTI) and NEO-PI five factor model of personality.

Personality and Individual Differences, 21(2), 303-307. doi: 10.1016/0191-

8869(96)00033-5

Furnham, A., Eysenck, S. B. G., & Saklofske, D. H. (2008). The Eysenck personality measures: Fifty years of scale development. In G. J. Boyle, G. Matthews & D. H.

Saklofske (Eds.), *Personality theory and assessment* (Vol. 2 Personality measurement and testing) (pp. 199-218). London: Sage. doi.org/10.4135/9781849200479.n10

Jones, S. H., & Francis, L. J. (1999). Personality type and attitude toward Christianity among student churchgoers. *Journal of Beliefs & Values*, 20(1), 105-109.

doi.org/10.1080/1361767990200110

Jung, C. G. (1923). *Psychological types*. London: Routledge.

Keirsey, D. (1998). *Please understand me II: Temperament, character and intelligence*. Del Mar, CA: Prometheus Nemesis.

Keirsey, D., & Bates, M. (1978). *Please understand me* (3rd ed.). Del Mar, CA: Prometheus Nemesis.

Lloyd, J. B. (2012). The Myers-Briggs Type Indicator® and mainstream psychology:

Analysis and evaluation of an unresolved hostility. *Journal of Beliefs & Values*, 33(1), 23-34. doi: 10.1080/13617672.2012.650028

Lorenzo-Seva, U., & Ferrando, P. J. (2012). TETRA-COM: A comprehensive SPSS program for estimating the tetrachoric correlation. *Behavior Research Methods*, 44(4), 1191-

1196. doi: 10.3758/s13428-012-0200-6

- MacDonald, D., Anderson, P., Tsagarakis, C., & Holland, C. (1994). Examination of the relationship between the Myers-Briggs Type Indicator and the NEO Personality Inventory. *Psychological Reports, 74*, 339-344. doi.org/10.2466/pr0.1994.74.1.339
- MacDonald, D. A., Anderson, P. E., Tsagarakis, C. I., & Holland, C. J. (1995). Correlations between the Myers-Briggs Type Indicator and the NEO Personality Inventory Facets. *Psychological Reports 76*(2), 449-450. doi: 10.2466/pr0.1995.76.2.449
- McCrae, R. R., & Costa, P. T. (1989). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the Five-Factor Model of personality. *Journal of Personality, 57*(1), 17-40. doi: 10.1111/j.1467-6494.1989.tb00759.x
- McCrae, R. R., & Costa, P. T. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of personality* (3rd ed.) (pp. 159-181). London: Guilford Press.
- Myers, I. B., McCaulley, M. H., Quenk, N. L., & Hammer, A. L. (1998). *MBTI manual: A guide to the development and use of the Myers-Briggs Type Indicator* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Myers, I. B., & Myers, P. B. (1980). *Gifts differing*. Palo Alto, CA: Consulting Psychologists Press.
- Parker, W. D., & Stumpf, H. (1998). A validation of the five-factor model of personality in academically talented youth across observers and instruments. *Personality and Individual Differences, 25*, 1005-1028. doi.org/10.1016/S0191-8869(98)00016-6
- Parry, C. D. H., & McArdle, J. J. (1991). An applied comparison of methods for least-squares factor analysis of dichotomous variables. *Applied Psychological Measurement, 15*(1), 35-46. doi.org/10.1177/014662169101500105

- Renner, W., Alexandrovicz, R., Menschik-Bendele, J., & Deakin, P. (2014). Does the Myers-Briggs Type Indicator measure anything beyond the NEO Five Factor Inventory? *Journal of Psychological Type, 74*(1), 1-10.
- Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods, 17*(3), 354-373. doi: 10.1037/a0029315
- Tobacyk, J. J., Livingston, M. M., & Robbins, J. E. (2008). Relationships between Myers-Briggs Type Indicator measure of psychological type and NEO measure of Big Five personality factors in Polish university students: A preliminary cross-cultural comparison. *Psychological Reports, 103*(2), 588-590. doi: 10.2466/PR0.103.6.588-590
- Vassend, O., & Skrondal, A. (1995). Factor analytic studies of the neo personality inventory and the five-factor model: The problem of high structural complexity and conceptual indeterminacy. *Personality and Individual Differences, 19*(2), 135-147.
doi.org/10.1016/0191-8869(95)00041-4
- Village, A. (2011). Introduction to special section: Psychological type and Christian ministry. *Research in the Social Scientific Study of Religion, 22*, 157-164.
doi.org/10.1163/ej.9789004207271.i-360.28
- Village, A. (2019). Does higher education change the faith of Anglicans and Methodists preparing for church ministries through a course validated by a UK university? *Practical Theology, 12*(4), 389-401. doi: 10.1080/1756073X.2019.1635310
- Village, A. (2021). Testing the factor structure of the Francis Psychological Type Scales (FPTS): A replication among Church of England clergy and laity. *Mental Health Religion & Culture, 24*(4), 336-346. doi: 10.1080/13674676.2020.1780575

Village, A., & Francis, L. J. (2005). The relationship of psychological type preferences to biblical interpretation. *Journal of Empirical Theology*, *18*(1), 74-89. doi:

10.1163/1570925054048929

Waskel, S. A., & Coleman, J. (1991). Correlations of the temperament types, intensity of crisis at midlife with scores on a death scale. *Psychological Reports*, *68*, 1187-1190.

doi.org/10.2466/pr0.1991.68.3c.1187

Table 1

Endorsement of items

Extraversion $\alpha = .80$		%	Introversion $\alpha = .80$		%
i01	Active	49	i02	Reflective	51
i12	Sociable	46	i11	Private	54
i21	Having many friends	21	i22	A few deep friendships	79
i32	Like parties	52	i31	Dislike Parties	48
i41	Energised by others	59	i42	Drained by too many people	41
i48	Happier working in groups	44	i47	Happier working alone	56
i52	Socially involved	63	i51	Socially detached	37
i61	Talkative	54	i62	Reserved	46
i72	An extravert	42	i71	An introvert	58
i81	Speak before thinking	33	i82	Think before speaking	68
Sensing $\alpha = .68$		%	Intuition $\alpha = .68$		%
i03	Interested in facts	61	i04	Interested in theories	39
i14	Practical	58	i13	Inspirational	42
i23	The concrete	67	i24	The abstract	33
i34	Prefer to make	59	i33	Prefer to design	41
i43	Conventional	51	i44	Inventive	49
i54	Concerned about details	18	i53	Concerned for meaning	82
i63	Sensible	55	i64	Imaginative	45
i73	Present realities	52	i74	Future possibilities	48
i84	Keep things as they are	8	i83	Improve things	92
i94	Down to earth	85	i93	Up in the air	15
Thinking $\alpha = .65$		%	Feeling $\alpha = .65$		%
i06	Justice	63	i05	Harmony	38
i15	Analytic	35	i16	Sympathetic	65
i26	Thinking	44	i25	Feeling	56
i35	Firm	41	i36	Gentle	59
i45	Critical	32	i46	Affirming	68
i55	Logical	44	i56	Humane	57
i66	Truthful	44	i65	Tactful	56
i76	Sceptical	25	i75	Trusting	75
i85	Seek for truth	64	i86	Seek for peace	36
i96	Fair-minded	29	i95	Warm-hearted	71

Judging $\alpha = .76$			Perceiving $\alpha = .76$		
		%			%
i07	Happy with routine	70	i08	Unhappy with routine	30
i17	Structured	59	i18	Open-ended	41
i28	To act on decisions	66	i27	To act on impulse	34
i37	Like to be in control	51	i38	Like to be adaptable	49
i57	Orderly	44	i58	Easy going	56
i68	Organised	62	i67	Spontaneous	39
i78	Punctual	80	i77	Leisurely	20
i88	Like detailed planning	73	i87	Dislike detailed planning	27
i92	Happier with certainty	85	i91	Happier with uncertainty	15
i99	Systematic	71	i100	Casual	30
Volatile $\alpha = .80$			Calm $\alpha = .80$		
		%			%
i09	Emotional	80	i10	Unemotional	20
i20	Discontented	14	i19	Contented	86
i30	Feel insecure	22	i29	Feel secure	78
i40	Have mood swings	36	i39	Stay stable	64
i49	Get angry quickly	27	i50	Remain placid	73
i59	Feel guilty about things	79	i60	Feel guilt free	21
i70	Anxious about things	42	i69	At ease	58
i80	Panic easily	25	i79	Stay calm	75
i89	Frequently get irritated	43	i90	Rarely get irritated	57
i98	Easily bothered by things	48	i97	Unbothered by things	52

Note: Items were paired choices. Figures are percentage selecting each item in a pair

$N = 209$; $\alpha =$ Cronbach's alpha.

Table 2

Confirmatory factor analysis for trainee ministers: normal PCA

		Factor				
		1	2	3	4	5
Extraversion						
i01	Active	.54				
i12	Sociable	.74				
i21	Having many friends	.30				
i32	Like parties	.52				
i41	Energised by others	.60				
i48	Happier working in groups	.46				
i52	Socially involved	.65				
i61	Talkative	.75				
i72	An extravert	.76				
i81	Speak before thinking	.29			-.29	
Sensing						
i03	Interested in facts		.45			
i14	Practical		.62			
i23	The concrete		.63			
i34	Prefer to make		.37			
i43	Conventional		.49			
i54	Concerned about details		.22			.45
i63	Sensible		.58			
i73	Present realities		.43			
i84	Keep things as they are		.20			
i94	Down to earth		.44			
Thinking						
i06	Justice			.34		
i15	Analytic			.66		
i26	Thinking			.31		
i35	Firm			.68		
i45	Critical			.45		.35
i55	Logical			.57		
i66	Truthful		-.37	.28		
i76	Sceptical			.28		
i85	Seek for truth			.48		
i96	Fair-minded			.32		

Judging				
i07	Happy with routine			.50
i17	Structured			.61
i28	To act on decisions	-.39		.35
i37	Like to be in control		.42	.41
i57	Orderly			.66
i68	Organised			.68
i78	Punctual			.40
i88	Like detailed planning			.53
i92	Happier with certainty		.35	.38
i99	Systematic		.33	.56
Volatile				
i09	Emotional	.44	-.38	.25
i20	Discontented			.54
i30	Feel insecure			.63
i40	Have mood swings			.75
i49	Get angry quickly			.55
i59	Feel guilty about things			.31
i70	Anxious about things			.70
i80	Panic easily			.68
i89	Frequently get irritated			.63
i98	Easily bothered by things			.58

Note: PCA extraction constrained to five factors, with varimax rotation. Numbers in bold indicated highest loading for each item. Loading of less than .30 are omitted for readability, apart from those expected within a particular scale.

Table 3

Confirmatory factor analysis for trainee ministers: Categorical PCA

		Factor				
		1	2	3	4	5
Extraversion						
i01	Active	.54				
i12	Sociable	.74				
i21	Having many friends	.29				
i32	Like parties	.53				
i41	Energised by others	.60				
i48	Happier working in groups	.47				
i52	Socially involved	.65				
i61	Talkative	.75				
i72	An extravert	.76				
i81	Speak before thinking	.25			-.29	.29
Sensing						
i03	Interested in facts		.44			
i14	Practical		.64			
i23	The concrete		.64			
i34	Prefer to make		.40			
i43	Conventional		.48			
i54	Concerned about details		.25			.44
i63	Sensible		.60			
i73	Present realities		.42			
i84	Keep things as they are		.20			
i94	Down to earth		.48			
Thinking						
i06	Justice			.35		
i15	Analytic			.66		
i26	Thinking			.32		
i35	Firm			.67		
i45	Critical			.45		.34
i55	Logical			.57		
i66	Truthful		-.32	.28		
i76	Sceptical			.26		
i85	Seek for truth			.48		
i96	Fair-minded			.34		

Judging				
i07	Happy with routine			.51
i17	Structured			.59
i28	To act on decisions	-.35		.38
i37	Like to be in control		.42	.41
i57	Orderly			.65
i68	Organised			.69
i78	Punctual			.43
i88	Like detailed planning			.53
i92	Happier with certainty	.32		.38
i99	Systematic		.34	.56
Volatile				
i09	Emotional	.42	-.37	.24
i20	Discontented			.53
i30	Feel insecure			.64
i40	Have mood swings			.75
i49	Get angry quickly			.54
i59	Feel guilty about things			.32
i70	Anxious about things			.70
i80	Panic easily			.68
i89	Frequently get irritated			.62
i98	Easily bothered by things			.58

Note: Categorical PCA extraction constrained to five factors, with varimax rotation

Numbers in bold indicated highest loading for each item. Loading of less than .30 are omitted for readability, apart from those expected within a particular scale.

Table 4

Correlation matrix for components of the Francis Psychological Type and Emotional Temperament Scales (FPTETS) and the Eysenck Personality Questionnaire Revised Shorter version (EPQ-RS)

	E-Psy	E-Neu	E-Lie	E-Ext	F-Vol	F-Jud	F-Thk	F-Sen	F-Ext
FPTETS - Extraversion	.22	-.17	.03	.72***	-.06	-.24*	-.14	-.26*	
FPTETS - Sensing	-.37***	.13	-.02	-.47***	.05	.29*	-.01		
FPTETS - Thinking	.13	-.08	-.08	-.08	-.06	.27*			
FPTETS - Judging	-.16	.22	-.11	-.25*	.25*				
FPTETS - Volatile	-.05	.79***	.23*	-.12					
EPQ-RS - Extraversion	.34**	-.20	.00						
EPQ-RS - Lie	.09	.24*							
EPQ-RS - Neuroticism	-.19								
EPQ-RS - Psychoticism									

Note: $N = 78$; * $p < .05$; ** $p < .01$; *** $p < .001$

ⁱIn the dataset, variables were grouped into the relevant dimensions of the model (E, S T, J or V) but retained the item number from their order in the questionnaire. Tables report the item number and a short text response.