

Congruence as a Predictor of Occupational Stress

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Abstract

This study examined the relation among nine measures of Holland's concept of congruence and the relation of these measures and occupational stress. Holland's Self-Directed Search (Holland, 1985b) and the Occupational Stress Inventory (Osipow & Spokane, 1987) were administered to 154 fully-employed adults. Two correlated factors accounted for the pattern of correlations among the congruence measures. The first factor was defined by measures which made use of the hexagonal arrangement of types and the second was based simply on discrepancies between the letters representing the person's type and the job environment. A number of markers for the second factor were related to stress and strain. Iachan's M index (Iachan, 1984;1990) was the best predictor, accounting for seven percent of variance on total stress scores and nine percent of variance on total strain scores. It is suggested that the relation between congruence and stress, like the relation between congruence and job satisfaction (Spokane, 1985), is significant but rather small and dependent on the measure of congruence used.

Congruence as a Predictor of Occupational Stress

The notion of Person-Environment (P-E) fit has recently been revived in the literature. Attempts at operationalising the construct have been made and a number of theories aimed at assessing the match between the person and the work environment have emerged. These include the Theory of Work Adjustment (Dawis & Lofquist, 1964) and Holland's (1985) theory of Personalities and Work Environments. A number of variables have been examined under the umbrella of P-E fit including, tenure, vocational stability, career indecision, and academic performance. A substantial proportion of P-E fit research, however, has focused on its relation with job satisfaction and it is generally accepted that a positive but weak relationship exists between the two constructs (see Spokane, 1985; Assouline & Meir, 1987). There has been little research on the correlation between P-E fit and associated constructs such as occupational stress. This is surprising when one considers that the link between P-E fit and occupational stress was discussed by Tziner and Dawis (1988) and that stress costs organizations millions of dollars each year through lost productivity, absenteeism, accidents, and insurance payouts. The present study was designed to go some way towards meeting this need by investigating the relation between occupational stress and various measures of P-E fit derived from Holland's (1985) theory of career interests.

A large amount of research has been carried out on the causes of stress and certain characteristics of the work environment have been identified as potential stressors. These include organizational structure, work relations, career development opportunities (Parker & De-Cotis, 1983), an absence of positive conditions including autonomy, variety, self-actualization and success (Kanner, Kafry & Pines, 1978), perceived control over the work process (Fisher, 1984), role conflict and ambiguity, underload or overload (Gupta & Beehr, 1979), poor physical working conditions, physical danger (Cooper & Smith, 1985), and erratic work hours (Greenhaus & Parasuraman, 1987). Outside the work environment, factors such as conflicts with family demands (Marshall & Cooper, 1981), financial tensions (Greenhaus & Parasuraman, 1987) and other personal life pressures, may add to stressors already operating in the workplace (Bhagat, McQuaid, Lindholm & Segovis, 1985). Such stressors are found to result in a wide range of physical, psychological and behavioural strain outcomes.

Although accounts of stress that focus on the environment have contributed to our understanding of the phenomenon, as have accounts that focus on the response of the individual (e.g. Beehr & Bhagat, 1985), it is undoubtedly true that stress is better explained by examining the interaction between the individual and the environment. P-E fit theories have an important role to play here. Researchers have used a variety of explanatory constructs to examine the relation between P-E fit and stress/strain. P-E fit theory defines the extent to which a person fits a job in terms of the match between the reinforcers offered by the job (e.g. pay, opportunity to achieve, and social environment) and the motives of the individual (e.g. how much pay, opportunity to achieve, and social interaction the individual desires), and the match between the individual's skills and the demands of the work environment (Dawis & Lofquist, 1984). P-E fit theory predicts that the magnitude of strain experienced by individuals is proportional to the degree of misfit between those individuals and their work

environments (Van Harrison, 1978). According to the Theory of Work Adjustment, a range of stress and strain symptoms can result when mismatches occur on any of these dimensions (Tziner & Dawis, 1988). In a similar vein, French, Rogers and Cobb (1974) stated that strain is one of the consequences of P-E misfit and that the type of strain which develops depends largely on which motives are not satisfied by the work environment, the individual's genetic and social background, the individual's coping and defence predispositions, and the presence of constraints on a particular response in a given situation. As the individual experiences various job-related strains over a period of time, their effects culminate in various types of illness (Van Harrison, 1978). Good P-E fit however, results in feelings of self-worth, self-efficacy, and competency within the employee (White, 1963).

These versions of P-E fit theory posit rather elaborate, multidimensional frameworks which define the points of contact between the individual and the job. Holland (1985a) used a much simpler framework which emphasised the role of interests, competencies, and self-estimates of skills in assessing the match between person and job referred to as 'congruence'. The essence of Holland's structural model of career preference is the hexagonal arrangement of six basic personality types - Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) - and the claim that work environments can be described in terms of the degree to which they favour particular personality types. Thus, a person who is predominantly realistic, and to a lesser extent conventional and investigative, may be described as RCI. Other things being equal, that person will be happiest in a job that satisfies the combination of interests associated with the RCI person. Holland's conception of P-E fit, although narrower than that described in the Theory of Work Adjustment, leads to the same predictions concerning relations between fit and work outcomes. Holland (1985) emphasises the importance of P-E congruence as a determinant of worker satisfaction, performance, and persistence in a particular occupation. Congruence leads to feelings of satisfaction and well-being, incongruence has the opposite effect. Following the line of argument that P-E fit should also be related to measures of occupational stress (Tziner & Dawis, 1988), Fogarty and Sutherland (1991), in an unreported exploratory study, examined the relation between scores on Osipow and Spokane's (1987) Occupational Stress Inventory (OSI) and both the Iachan M congruence index (Iachan, 1984; 1990) and the Zener-Schnuelle congruence index (Zener & Schnuelle, 1976) and obtained correlations of -0.43 and -0.53 between congruence and total stress scores and -0.36 and -0.44 between congruence and total strain scores, respectively. This outcome was encouraging but two considerations led to the present attempt to replicate these findings. Firstly, they were based on a small number of subjects (N=33) and, secondly, some recent studies have shown that the results of studies employing measures of congruence can depend on the choice of index used.

The notion of congruence has been researched extensively over the years (see Spokane, 1985) using a variety of congruence measures. Some studies have compared two or three fit indices (e.g. Iachan, 1984; Kwak & Pulvino, 1982; Gottfredson & Holland, 1990), and some researchers have found relations between congruence and other variables to change considerably when different measures are used (e.g. Melamed & Meir, 1981). Camp and Chartrand (1992) recently compared thirteen congruence measures and investigated their relation to a number of variables including academic achievement, academic adjustment, aptitude, career indecision, commitment and satisfaction with major. Surprisingly, no correlations were found

between congruence and satisfaction, commitment, or academic adjustment; all of which should have been related to congruence according to Holland (1985). Camp and Chartrand recommended measures which consider both the circumplex and circular order of types assumptions inherent in Holland's hexagon. Only the Kwak-Pulvino and Hexagon Congruence Indices met these criteria and neither index correlated with measures of satisfaction with choice of major. Camp and Chartrand (1992) noted several inadequacies with these indices, and concluded that a satisfactory measure of congruence was yet to be developed. More recently, Brown and Gore (in press) compared ten measures of congruence in terms of their underlying distribution characteristics and their capacity to discriminate among persons with varying degrees of congruence. The Kwak-Pulvino (K-P) measure and their own C index were the only measures that met the requirements of the congruence construct as defined by Holland (1985). They recommended that only these two measures be used in future research.

These studies indicate that the selection of a congruence index is an important consideration when examining the relation between congruence and stress. Some measures make use of the hexagonal arrangement of types, others are based on the extent of mismatch between the summary letters for the person and environment types. The indices are not interchangeable. In view of these findings, the present study - which sought to replicate the Fogarty and Sutherland (1991) study with a larger and more varied sample - was extended to include a variety of congruence measures. It was expected that because congruence is an important aspect of P-E fit which is itself inversely related to stress (Tziner & Dawis, 1988), the various measures of congruence used in the present study would be negatively correlated with measures of occupational stress. The relation was expected to emerge more clearly among the measures of congruence which made use of the hexagonal model.

Method

Subjects

A total of 154 full-time working adults participated in the study, 79 males with a mean age of 35.8 years ($SD = 8.23$), and 75 females, with a mean age of 34.4 years ($SD = 9.9$). Overall, subjects ranged in age from 18 to 58 years, with a mean age of 35 years. All subjects were in full-time professional employment and had been employed in their current job for at least six months. Of the entire sample, 14 each were employed in Realistic, Investigative and Conventional occupations, 7 in Artistic occupations, 80 in Social occupations and 25 in Enterprising occupations. Ninety-four respondents were married, and 60 were unmarried at the time of testing. One respondent had completed primary education, 27 had completed Secondary School to Year 10 level, 17 had completed Senior or Higher School Certificate, 90 had completed Secondary School plus Non-college training, 14 had completed college with a bachelor's degree, and five had completed postgraduate studies.

Instruments

The Self-Directed Search (SDS). The Australian Edition of Holland's (1985) Self-Directed Search (SDS) was used to assess personality type. The SDS yields a three-part personality code on the basis of self-reports of preferred activities, preferred occupations, individual competencies, and self-estimates of abilities. To establish a measure of the work environment, the Australian edition of Holland's (1985)

Occupations Finder was used to define each job in terms of a three-part code. This has been found to be a reliable environmental measure (Mount and Muchinsky, 1978).

The Occupational Stress Inventory (OSI). All sections of the Occupational Stress Inventory (OSI; Osipow and Spokane, 1987) were administered to assess occupational stress. The Occupational Roles Questionnaire (ORQ), which covers the first dimension, contains six subscales:

1. Role Overload: measures the extent to which one's workload is thought to exceed one's ability, training, or resources.
2. Role Insufficiency: measures the extent to which there is a match between personal and job demands, and the extent to which an individual's desire for success, career progression, and recognition are met.
3. Role Ambiguity: measures the extent to which individuals know what they are expected to do, how they are to spend their time, and how to be successful in their job.
4. Role Boundary: measures the extent to which individuals feel they have a stake in the success of their organization, and the extent to which they feel proud of what they do.
5. Responsibility: measures the extent to which an individual's job requires them to take responsibility for activities and performance of other employees.
6. Physical Environment: measures the extent to which the individual is exposed to uncomfortable or dangerous levels of noise, wetness, heat, cold, light, poisonous substances and unpleasant odours.

The strain experienced as a result of these factors is measured by the Personal Strain Questionnaire (PSQ), which consists of four subscales:

1. Vocational Strain: measures the extent to which the individual experiences strains such as boredom, dread, lack of interest, poor concentration, and increased frequency of accidents at work.
2. Psychological Strain: measures the extent to which the individual experiences strains including anxiety, depression, irritability and unhappiness in everyday life.
3. Interpersonal Strain: measures the extent to which the individual engages in, and experiences troublesome interpersonal relationships.
4. Physical Strain: measures the extent to which the individual experiences a number of physical complaints including aches and pains, erratic eating habits, lethargy, unplanned weight gain or loss, and increased use of alcohol and /or drugs.

Strain is said to be moderated by the presence of a number of coping resources measured by the Personal Resources Questionnaire (PRQ), which contains four subscales:

1. Recreation: measures the extent to which the individual engages in regular recreational activities.
2. Self-Care: measures the extent to which the individual engages in appropriate eating, sleeping, relaxation and exercise activities.
3. Social Support: measures the extent to which the individual has people who are close to him/her, and who can be called on to provide support.
4. Rational / Cognitive: measures the extent to which the individual possess the ability to organise time effectively, set priorities, and systematically solve problems.

Congruence Measures

Nine congruence measures were used. See Camp and Chartrand (1992) and Brown and Gore (in press) for more complete descriptions of these measures.

1. Dichotomous first-letter agreement (Holland, 1963). Congruence scores of 0 or 1 were assigned on the basis of comparisons of the first letter of the participants' code and their work code. If the letters matched, a score of 1 was assigned. If not, a score of 0 was assigned. We refer to this as the Holland Dichotomous index.
2. First-letter agreement based on the hexagon (Holland, 1973). Congruence scores of 1 to 4 were assigned, with higher scores representing increasing levels of congruence. For example, a Realistic person working in a Realistic environment was assigned a congruence score of 4, while a Realistic person working in a Social environment was assigned a score of 1. We refer to this as the Holland Hexagon index.
3. Z-S Index (Zener & Schnuelle, 1976). Congruence scores of 0 to 6 were assigned, with higher scores again representing increasing levels of congruence. Scores were assigned on the basis of seven questions aimed at assessing the similarity of person and environment codes.
- 4 and 5. K-P Index (Kwak & Pulvino, 1982). Congruence scores ranging from -1 to 1 were assigned with higher scores representing increasing levels of congruence. The calculation of this index utilises the correlation between types in Holland's (1973) hexagonal model. The following formula is used:

$$X = 7^{1/2} (W1 AD + W2 BE + W3 CF)$$
 where X is the determined congruence score; W1, W2, and W3 are weightings of 4, 2, and 1 respectively; and AD, BE, and CF represent the correlation between Holland's (1973) types on the hexagonal model. This study used both Holland's (1973) correlations (p's) (Referred to as K-P1) and those calculated on the basis of this sample (r's) (Referred to as K-P2).
6. The M Index (Iachan, 1984 & 1990). Congruence scores, ranging from 0 to 28, were calculated with higher scores representing increasing levels of congruence. Iachan's (1990) recommendations for dealing with tied codes were followed.
7. Hexagon congruence index (HCI) (Swaney & Prediger, 1985). Congruence scores can range from 0 to 180, with higher scores representing *decreasing* levels of congruence. Based on the data/ideas and things/people dimensions said to underlie Holland's (1973) hexagon, the HCI was calculated by firstly calculating data/ideas and things/people scores. The following formulas were used:
 Data/ideas score = (2.0 x R) + (1.0 x I) - (1.0 x A) - (2.0 x S) - (1.0 x E) - (1.0 x C)
 Things/people score = (0.0 x R) - (1.7 x I) - (1.7 x A) + (0.0 x S) + (1.7 x E) + (1.7 x C)
 These scores were then converted to angles by computing the arc tangent of the data/ideas score divided by the things/people score. The difference between the resultant angles is the HCI.
8. C Index (Brown & Gore, in press). Congruence scores range from 0 to 18 with higher scores representing increasing levels of congruence. The C index represents an extension of Holland's (1973) first-letter agreement, since it utilises a comparison of first, second and third letters in the person and environment codes. The following formula was then used:

$$C = 3(X1) + 2(X2) + (X3)$$

where X1 were scores (3, 2, 1 and 0) assigned to each comparison on the basis of the hexagonal distance between the letters (3 = identical P and E letters, 2 = adjacent hexagonal position, 1 = alternative hexagonal positions, 0 = opposite hexagonal positions).

9. Euclidean Distance. This congruence measure involved direct measurement of the distance between data/ideas and things/people coordinates. High scores indicate a *lack* of congruence The following formula was used:

$$d^2 = \text{sqrt}(z_1^2 + z_2^2)$$

where z_1 = things/people score of job *minus* things/people score of person, and z_2 = data/ideas score of job *minus* data/ideas score of person

Procedure

All forms used in this study were suitable for self-administration. Subjects were told that they were participating in a survey on occupational stress and given standardised instructions on form completion. Approximately half of the subjects completed the forms in a group testing format, the remainder completed them in their own time. All subjects were offered written summarised feedback on their occupational stress levels. Total testing time was between sixty and ninety minutes.

Results

Data screening procedures included the usual checks for normality, heteroscedasticity, univariate and multivariate outliers, and linearity and multicollinearity. PRELIS, a datascreening package developed by Joreskog(1988), was used for this purpose. The data were satisfactory apart from moderate skewness on two variables. Transformation of the variables removed the skewness but made no difference to any of the analyses which are about to be reported, so the original data set was used as the basis for all calculations. Descriptive statistics for the OSI variables are reported in Table 1.

Table 1
Means, standard deviations, and alpha coefficients for the OSI subscales.

Scales	Items	Mean	SD	Alpha	Alpha*
Role Overload (RO)	10	27.51	6.7	0.77	0.83
Role Insufficiency (RI)	10	25.06	8.0	0.83	0.90
Role Ambiguity (RA)	10	21.67	6.1	0.74	0.78
Role Boundary (RB)	10	23.63	7.6	0.76	0.82
Responsibility (RE)	10	24.81	6.6	0.70	0.71
Physical Environment (PE)	10	18.75	7.1	0.81	0.85
Total ORQ (ORQ)	60	141.44	26.0	0.68	0.89
Vocational Strain (VS)	10	18.86	5.8	0.75	0.71
Psychological Strain (PSS)	10	22.70	8.1	0.89	0.89
Interpersonal Strain (IS)	10	21.88	6.0	0.75	0.81
Physical Strain (PHS)	10	22.18	7.9	0.81	0.87
Total PSQ (PSQ)	40	85.62	23.4	0.87	0.94
Recreation (RE)	10	24.36	7.5	0.81	0.71
Self Care (SC)	10	24.12	6.3	0.69	0.73
Social Support (SS)	10	39.01	7.8	0.83	0.83
Rational/Cognitive (RC)	10	34.96	6.2	0.77	0.78
Total PRQ (PRQ)	40	122.46	20.4	0.70	0.88

* Alpha coefficients from Osipow and Spokane(1987) provided for comparison

The means, standard deviations, and reliabilities for the whole sample were very similar to those reported in the technical manual for the Occupational Stress Inventory (Osipow & Spokane, 1987, p.9). The major differences between the reliabilities were for the three major scales, with the present study reporting lower reliabilities than those shown in the manual. Subsequent factor analyses suggested that lack of unidimensionality, particularly within the Occupational Roles Questionnaire, accounted for this finding. All analyses were conducted at the individual subscale level where reliability estimates were quite acceptable.

Before inspecting the correlations between congruence indices and OSI measures, the correlations among the congruence indices themselves were examined. These can be found in the bottom right-hand corner of Table 2.

Table 2
Correlations Among Scales of the OSI with Measures of Congruence (N=154)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)		
(1) Role Overload																											
(2) Role Insufficiency	-12																										
(3) Role Ambiguity	28 *	33 *																									
(4) Role Boundary	22 *	55 *	54 *																								
(5) Responsibility	49 *	-02	14 *	14 *																							
(6) Physical Environ	15 *	25 *	26 *	41 *	21 *																						
(7) Vocational Strain	23 *	58 *	46 *	68 *	25 *	28 *																					
(8) Psychol. Strain	22 *	47 *	43 *	68 *	25 *	29 *	71 *																				
(9) Interpers. Strain	21 *	29 *	37 *	48 *	23 *	34 *	54 *	64 *																			
(10) Physical Strain	15 *	29 *	26 *	45 *	08	23 *	53 *	69 *	60 *																		
(11) Recreation	-09	-13	-25 *	-22 *	05	-13	-18	-37 *	-33 *	-34 *																	
(12) Self Care	-05	-24 *	-25 *	-26 *	-03	-12	-27 *	-37 *	-28 *	-39 *	48 *																
(13) Social Support	-03	-09	-19 *	-12	-03	02	-21 *	-24 *	-25 *	-20 *	31 *	36 *															
(14) Rational-Cognit.	-02	-15 *	-36 *	-22 *	04	-06	-30 *	-36 *	-35 *	-33 *	39 *	46 *	35 *														
(15) Total Stress	52 *	58 *	67 *	79 *	51 *	62 *	68 *	63 *	52 *	40 *	-21 *	-26 *	-12	-21 *													
(16) Total Strain	23 *	47 *	44 *	67 *	24 *	33 *	80 *	91 *	81 *	85 *	-37 *	-40 *	-27 *	-39 *	65 *												
(17) Total Coping	-07	-20 *	-35 *	-28 *	01	-09	-32 *	-45 *	-41 *	-42 *	75 *	76 *	71 *	72 *	-26 *	-48 *											
(18) Hol.	06	-04	-13	-13	-11	-05	-19 *	-06	-12	-04	01	02	04	-01	-14 *	-12	02										
Dichotomous																											
(19) Hol. Hexagon	-16 *	06	-05	-04	-19 *	-16 *	-10	-00	01	-04	03	04	-03	01	-14 *	-04	02	55 *									
(20) Iachan M.	-00	-24 *	-19 *	-26 *	-15 *	-15 *	-34 *	-20 *	-27 *	-22 *	08	04	04	13	-27 *	-30 *	09	69 *	35 *								
(21) Zener Schnuelle	-01	-17 *	-14 *	-20 *	-08	-22 *	-19 *	-03	-21 *	-12	05	09	-04	05	-23 *	-15 *	05	57 *	26 *	71 *							
(22) K-P1	-15 *	03	-13	-07	-12	-12	-15 *	03	-14 *	-07	04	06	06	06	-14 *	-09	07	80 *	68 *	56 *	58 *						
(23) K-P2	-14 *	01	-13	-09	-11	-12	-13	00	-12	-06	08	10	10	07	-15 *	-09	12	77 *	71 *	55 *	54 *	93 *					
(24) Hex. Congruence	12	07	08	08	16	20 *	13	02	08	01	-11	-08	-04	-07	19 *	07	-10	-54 *	-69 *	-50 *	-46 *	-70 *	-75 *				
(25) C Index	15 *	06	-06	-04	-11	-13	-05	07	-09	00	06	08	02	05	-11	-01	07	59 *	68 *	41 *	45 *	86 *	90 *	-70 *			
(26) Euclidean Dist.	03	22 *	07	12	17 *	21 *	22 *	08	20 *	10	-08	-03	-02	-08	23 *	17 *	-07	-47 *	-50 *	-61 *	-61 *	-61 *	-59 *	77 *	-55 *		

Note: Decimal points omitted

*Correlations above approximately 0.13 significant at 0.05 level (one-tailed)

Correlations between congruence measures ranged from 0.35 between the Iachan M and Holland Hexagon indices to 0.93 between the two Kwak-Pulvino indices. The positive manifold shown by these correlations provides evidence of a general factor, as expected among purported measures of the same construct, but 25 of the 36 coefficients were lower than the 0.70 cutoff that is often interpreted as an indication of multicollinearity (Tabachnick & Fidell, 1989). By the same token, the 0.93 correlation between the two K-P measures indicated singularity so the K-P1 measure was omitted from further analyses. The K-P2 index, which made use of the correlations obtained with the present sample, was retained leaving a set of eight indices. To assess the dimensionality of these eight congruence measures, a maximum likelihood analysis with root one criterion and oblique rotation was conducted on the nine congruence measures. The Factor loadings are presented in Table 3.

Table 3

Factor Pattern Matrix for Congruence Measures

Congruence Measure	FACTOR 1	FACTOR 2
C index	.98	-.10
K-P 2	.92	.09
Holland Hexagon	.76	-.04
Hexagon Congreunce Index	-.66	-.18
Iachan M	-.12	.99
Zener-Schnuelle	.07	.71
Euclidean Distance	-.42	-.50
Holland Dichotomous	.31	.48
Eigenvalues	4.79	0.85
Percent Variance Explained	60.00	10.70

Two factors emerged that accounted for 70.7% of the total variance. Factor one was defined by high loadings on the C index, Kwak-Pulvino index, Holland Hexagon and Hexagon Congruence indices. The Iachan M, Zener-Schnuelle and Euclidian Distance indices loaded on Factor 2. The Holland Dichotomous measure loaded equally on both factors. The two factors were correlated 0.63. The results of these analyses raised some doubts about the status of any one of these variables as a measure of congruence. The measures had a lot in common but there was scope for different patterns of relations with external variables such as stress. For this reason, the main analyses for this study were conducted with the individual congruence measures, rather than with composite indices derived from summative techniques or factor analytic solutions. The relevant results are to be found in the bottom left-hand corner of Table 2.

It was expected that there would be a negative correlation between various congruence indices and stress and strain scores with the measures based on the hexagonal model showing the strongest relation. The first point to note from Table 2 is that none of the indices correlated with OSI measures of coping resources (vars. 11-14, & 17). There is nothing in the literature to suggest that coping resources would be related to congruence and no further mention will be made of these subscales. Dealing

then with the two broad measures of stress and strain (vars. 15 & 16), it can be seen that all but one of the indices correlated with total stress score and three of the indices correlated with total strain score. The Iachan M index had the highest coefficients, followed by the Zener-Schnuelle and Euclidean Distance indices. The C index had the lowest coefficients and was related to neither stress nor strain total scores. Turning next to the subscale scores, it can be seen that the pattern is repeated at this level. The Iachan M, Zener Schnuelle, and Euclidean Distance indices were related ($p < 0.05$) to a number of subscales, most notably Vocational Strain. The C index was related to just one variable, Role Overload.

To summarise the practical significance of these findings, a series of simple regressions were conducted. Each of the nine measures of congruence was regressed on total scores obtained on the Occupational Roles Questionnaire (Stress) and Personal Strain Questionnaire (Strain). The results are shown in Table 4.

Table 4
Summary of results from regression analyses of stress, strain, and congruence variables

Congruence Measure	Dependent Variable					
	Stress			Strain		
	β	R ²	Adj R ²	β	R ²	Adj R ²
Iachan M	-.26**	.073	.067	-.30***	.088	.081
Holland Dichotomous	-.14	.020	.013	-.12	.013	.007
Holland Hexagon	-.14	.019	.013	-.04	.001	-.005
Zener-Schnuelle	-.23**	.052	.046	-.15	.023	.017
C index	-.11	.012	.006	-.01	.000	-.006
Hexagon Congruence	.19*	.036	.030	.07	.004	-.002
K-P 1	-.14	.020	.013	-.09	.007	.001
K-P 2	-.15	.023	.016	-.08	.007	.000
Euclidean Distance	.23**	.051	.045	.17	.028	.022

* $p < .05$ ** $p < .01$ *** $p < .001$

It can be seen that the different congruence measures accounted for between one and seven percent of the variance associated with the prediction of total stress scores on the Occupational Stress Inventory. By far the strongest predictor of stress was the Iachan M index ($F_{1,152} = 11.94$, $p < .001$), followed by the Zener Schnuelle index ($F_{1,152} = 8.42$, $p < .01$), the Euclidean Distance measure ($F_{1,152} = 8.15$, $p < .01$), and the Hexagon Congruence Index ($F_{1,152} = 5.69$, $p < .05$). These measures predicted seven, five, five, and four percent of the variance shared between congruence and stress, respectively. Similar analyses were carried out between the nine congruence measures and total scores obtained on the Personal Strain Questionnaire (Strain). Only the Iachan M index was found to significantly predict strain ($F_{1,152} = 14.6$, $p < .001$), accounting for nine percent of the variance associated with the prediction of strain.

Influence of Working Environment and Type on These Relationships

The use of 'composite' indices of fit, such as the measure of congruence employed in the present study, has been criticised (see Edwards, 1991, Hesketh & Gardner, 1993) on the grounds that composite measures mask quite important individual-environment interactions. In the present study, the most obvious manifestation of such

an interaction would be the finding that the relation between congruence and stress applies to some Holland types but not to others or that it holds in some environments but not in others. Not all occupations were well-represented in this sample of 154, so it was not possible to test this possibility thoroughly. Roughly half of the sample were working in Social environments (N=80), however, and a partial test was carried out by conducting separate regression analyses for this group and a group formed from the remainder of the subjects. The relation of the various congruence measures with stress and strain was the same across both groups.

Discussion

What conclusions can be drawn from these data about the relationship between congruence and stress and strain? Firstly, the strength of the relationship depends on the method of operationalising the construct of congruence, an outcome that was anticipated but not in the way shown here. The Iachan M and to a lesser extent the Zener-Schnuelle, both of which relied mostly upon the agreement between the letters describing the person's type and the letters describing the work environment and both of which had been shown to be related to stress and strain in the literature (Fogarty & Sutherland, 1991), were again related to stress and strain. The more hexagon-based measures (Kwak-Pulvino 1, 2 and the C index) were related to a smaller number of subscales of the OSI, to total stress score and not at all to total strain score. The Hexagon Congruence Index and the Euclidean Distance measure are also based on a structural model but it is the simpler data/ideas versus people/things model proposed by Prediger (1982). Of these two measures, the Euclidean Distance was more strongly related to stress and strain. Although not the main focus of this study, these findings raise further doubts about the method of operationalizing the construct of congruence and, in so doing, also question the structural basis of Holland's model. There can be no doubt that the hexagonally-based indices of congruence are an improvement on their predecessors, but only if the hexagonal arrangement of types applies. If measures that presume an underlying hexagonal structure show weaker correlations with external variables than measures which do not make such assumptions - as was the case in the present study - then one must consider the possibility that this structural feature of the model is inaccurate. Against this, it could be argued that measures such as the K-P2, which makes use of the correlations obtained among the different Holland types without relying upon an actual hexagonal arrangement, also failed to show a robust relationship with stress and strain. At this stage we can only say that we find the different patterns of correlation puzzling. The coefficients do not contradict one another, rather it is a case of some indices being more strongly related to stress and strain than others. The puzzlement stems from the fact that the supposedly weaker measures of congruence were the ones that displayed the stronger relations. The only other study of this kind (Camp & Chartrand, 1992) looked at the relation between congruence and satisfaction with study major among university students and found no significant correlations with any of the indices. The present study, which collected data from full-time employees, should be replicated before too much is made of the different correlational patterns.

Despite a lack of agreement among the congruence indices, this study has still yielded important information about the relation between congruence and stress/strain. At the broad scale level, eight of the nine measures (if one includes both K-P indices) contributed to the prediction of occupational stress, three contributed to

the prediction of occupational strain (see Table 4). At the individual subscale level (Table 2), choosing cases where the Iachan M, Zener-Schnuelle, and Euclidean Distance indices agreed, congruence was found to be related to the Role Insufficiency, Responsibility, and Physical Environment subscales of the Occupational Roles Questionnaire (Stress). The first of these subscales measures the extent to which there is a match between personal interests and job demands. Thus, it could be described as a stress indicator that should be sensitive to incongruence. The relation with Responsibility, which measures the extent to which people feel they have responsibility for others in the organization, is less clear and we have no explanation for this finding. The Physical Environment subscale measures the degree of physical comfort in the work environment. It is conceivable that this variable might show quite strong individual-environment interactions. A Realistic type, for example, might be quite tolerant of noise, heat, and other physical discomforts whilst some other type might experience considerable stress in such situations. The three stress variables which were not correlated with all three indices mentioned above were Role Overload, Role Boundary, and Role Ambiguity. Role Overload measures the extent to which one's workload is thought to exceed one's ability, training, or resources. It is probably more sensitive to other components of the P-E fit model, such as the abilities dimension proposed in the work adjustment model (Dawis & Lofquist, 1984). Role Boundary measures the extent to which people feel they have a stake in the success of the organization. Role Ambiguity has to do with confusion regarding work expectations. Both of these were correlated with the Iachan M and Zener-Schnuelle indices, so there is some evidence of association with congruence.

When the relation between congruence and strain is considered, five of the congruence indicators were related to Vocational Strain with two more measures just failing to reach significance. This variable measures the extent to which the individual experiences strains such as boredom, dread, lack of interest, and poor concentration. The largest correlation was with the Iachan M index (-0.34). Of all the subscales in the OSI, Vocational Strain should show the highest correlation with congruence. Interpersonal Strain was another variable which correlated with a number of indices of congruence. This variable reflects the strain felt by unsatisfactory personal relationships related to the work situation. Given that Holland has described his types as representing personality dimensions, it is not surprising that mismatches lead to interpersonal strain.

What can be said about these correlations? On the positive side, it is unlikely that the significant correlations noted in this study occurred by chance alone. There were consistencies in the present data which reduce the acceptability of chance explanations. The most compelling evidence comes from the direction of the correlations noted in Table 2. Taking into consideration the fact that some indices are scored in opposite directions, virtually all coefficients had the right sign. Further evidence of consistency can be found in the factor analytic outcomes reported in Table 3. It was possible to extract two correlated factors and, when this was done, the variables which were related most strongly to stress and strain were all associated with the second factor. The distinguishing feature of the markers for this factor was that they did not make use of the hexagonal arrangement of types. Further evidence of consistency can be found in what could be termed patterns of convergent validity. Agreement is greatest among all indices on variables that are most obviously related to congruence (e.g. Vocational Strain) and also among those least obviously related to congruence (e.g. coping resource measures). On the negative side, none of the

indicators of congruence had a really strong relation with stress or strain. The coefficients are very similar to those reported in the literature summarising the relation between congruence and job satisfaction where congruence is said to account for about 4.6% of the variance in satisfaction (Spokane, 1985; Assouline & Meir, 1987). Their practical significance will really depend on the relation between Iachan's measure of congruence and other known predictors of stress. The measures of coping resources included in the Occupational Stress Inventory, for example, had a stronger relation with stress and strain than any measure of congruence used here (see Table 2). Importantly, however, the congruence measures were unrelated to the coping measures, thus the seven percent explained by congruence was in addition to variance in stress/strain explained by coping. If this pattern were to be maintained as other fit indices, such as those described in the Theory of Work Adjustment (Dawis & Lofquist, 1984), were added to the equation, then the modest contribution of Iachan's congruence measure might well prove useful.

Conclusion

The suggestion that stress and strain should be inversely related to measures of P-E fit (Tziner & Dawis, 1988) now has some empirical support. The fact that the measure of P-E fit was obtained from Holland's model of career interests also reflects favourably upon that theory. The relation between congruence and stress may not be as strong as at first thought, but it is present. In reviewing this study and its findings, however, it must be acknowledged that this work is still in the exploratory stage. Some of the outcomes of the present study were not anticipated and further studies will have to be conducted to determine the value of the present approach. One question that needs to be considered is the choice of the OSI to operationalise the stress construct. Any measurement error in that area would weaken the relation between congruence and stress. The OSI has appeal because it employs subscales which might be expected to have differing relations with constructs such as congruence. Osipow and Spokane (1987) identified studies of P-E fit and stress as being particularly important for the further validation of their model. Table 1 suggests that the data obtained with this sample were in agreement with those reported in the OSI manual. The means for both sexes were much the same as those reported in the manual and the reliabilities for the individual subscales were also much the same. The only noticeable difference occurred with the reliabilities for the ORQ (stress) and PRQ (coping resources) major scales where figures reported in the present study were noticeably lower. These considerations aside, there is no reason to believe that the findings would have been any different with another measure of occupational stress.

A second question that must be considered is whether there are better measures of congruence than those employed here. As mentioned earlier, virtually all known measures of congruence have been subject to pointed criticism and the search for suitable measures continues. Some recent methodological innovations, such as Edwards' and Harrison's (1993) method of assessing three-dimensional fit, which they claim substantially increases the amount of variance explained in P-E fit studies, could not be used in the present study because the Occupations Finder, which uses only a three-letter code, was originally employed to determine the match between person and job. Edwards' method does not rely upon structural models and might well increase the magnitude of correlations between congruence and stress.

A third question concerns the use of composite measures, strongly criticised by Edwards (1991) and Hesketh and Gardner (1993). In the present context, this issue is linked with coping resources. There is a distinct possibility that different types will employ different coping strategies and that the consequences of mismatching will be more severe for some types than others. Sociable types, for example, may have a much better support network and find it easier to cope with difficult job circumstances. Realistic types may be more isolated. The spread of types in the present sample did not allow adequate exploration of these issues.

A final question concerns the wisdom of isolating specific aspects of P-E fit, such as congruence, and testing their relation with variables such as stress. The criticism often levelled against this approach is that the predictive utility of a variable can only be judged when it is weighed against the contribution of all other variables known to be operating in a particular context. A practical reply to this criticism is that in reality one only needs to know how it weighs against other variables likely to be *known* in the context. The appeal of the congruence measure is that most work environments have already been assessed and interest tests are widely used, making the derivation of a congruence index a relatively easy matter. It is worthwhile studying the contribution of this matching index in isolation because in some work situations it may be the only matching index obtainable.

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