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Structural Validity of Eureka Interest Inventory among Indonesian High School Student: An Analysis on Holland's RIASEC Model

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Abstract. High school students are in the process of discovering their self-awareness. However, at this age, many high school students face confusion in making decisions about their vocational interest at their school, choosing between natural and social sciences. In response, the Eureka Interest Inventory (EII) was introduced and developed to assist students in measuring their vocational interests and abilities related to work activities based on the RIASEC Holland model. Therefore, the present study aims to assess the structural validity of the RIASEC Holland model among high school students and to determine any differences in validity based on gender and academic major. The sample population comprised 1609 high school students aged 17-19 years old. The validity of the measurement tool was evaluated using The Randomization Test of hypothesized Order Relations (RTOR) and analyzed using RStudio software. Additionally, the study used the Multidimensional Scalling (MDS) technique to describe the position of each RIASEC Holland personality type in graphical form. The results showed that the RIASEC Holland model has a good fit with the observed data. Additionally, no significant variations were observed in the fit of the model between male and female students, as well as between students majoring in natural and social sciences.

Keywords: Eureka Interest Inventory, high school student, Holland's RIASEC Model, vocational interest

Validitas Struktural Eureka Interest Inventory pada Siswa Sekolah Menengah Atas: Sebuah Analisis Model RIASEC Holland

Abstrak. Siswa SMA sedang berada pada tahap memiliki tanggung jawab untuk mengenali dirinya sendiri. Namun di usia tersebut, siswa SMA banyak mengalami kebingungan dalam mengambil keputusan untuk penjuruan mereka di sekolah, antara IPA atau IPS. Oleh karena itu, Eureka Interest Inventory (EII) hadir dan dikembangkan untuk membantu siswa dalam mengukur minat kejuruan mereka melalui tingkat minat dan persepsi kemampuan terkait aktivitas kerja berdasarkan model RIASEC Holland. Penelitian ini bertujuan untuk menganalisis validitas struktural Model RIASEC Holland pada siswa SMA dan untuk menguji perbedaan validitas model berdasarkan jenis kelamin dan jurusan, dengan menggunakan skor EII. Penelitian ini melibatkan 1609 siswa SMA sebagai partisipan dengan rentang usia 17-19 tahun. Validitas alat ukur dievaluasi dengan menggunakan The Randomization Test of hypothesized Order Relations (RTOR) dan dianalisis dengan menggunakan software RStudio. Selain itu, penelitian ini juga menggunakan teknik the Multidimensional Scale (MDS) untuk mendeskripsikan posisi setiap tipe kepribadian RIASEC Holland dalam bentuk grafik. Hasil penelitian menemukan bahwa model RIASEC Holland memiliki kecocokan yang baik dengan data yang diamati. Pada penelitian ini tidak terdapat perbedaan model kecocokan yang signifikan antara antara laki-laki dan perempuan, serta antara jurusan IPA dan IPS.

Kata Kunci: Eureka Interest Inventory, minat kejuruan, Model RIASEC Holland, siswa Sekolah Menengah Atas

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Many students who have completed their junior high school education typically choose to continue their studies at the senior high school level. However, in certain circumstances, these students may not be adequately prepared to make a decision regarding their academic major, leading to confusion in their course of study (Ananta & Wirawan, 2018; Rohmah & Azzahrah, 2021). This lack of maturity in decision-making is evidenced by their indecision when selecting a major in college, as they may at times choose a major in high school that is not in line with their desired field of study (Hana, 2020). Science is frequently favored over social studies, as it is perceived as being superior in society and is thought to be populated by intellectually superior individuals with greater opportunities (Hana, 2020; Rahman & Awaru, 2019). As noted by Satria (2011), these societal beliefs can impact the decisions of both parents and students when choosing a major.

High school students in their adolescent stage are faced with the important responsibility of recognizing their academic and vocational interests, and making informed decisions about their future careers. Alignment between interests and chosen major can have positive outcomes for students, such as facilitating adaptation to the academic environment and increasing persistence in the chosen field (Allen & Robbins, 2008; Nye et al., 2012). Additionally, it can serve as a stress buffer, enhance resilience (Waitsman, 2012) and improve self-efficacy, thereby positively impacting academic achievement (Akturk & Ozturk, 2019; Komarraju & Nadler, 2013). On the other hand, mismatches between interests and chosen major can lead to negative consequences, including internal conflicts, stress, depression, despair, lack of motivation, difficulties in learning, and poor academic performance (Rohmah & Azzahrah, 2021; Wulandari et al., 2022). Studies have also indicated that choosing an inappropriate major can result in low levels of class participation and academic failure, including dropouts (Khan et al., 2013). Hence, accurately recognizing and understanding individual interests is a crucial aspect of making informed decisions about higher education and future careers. To address this, an instrument for measuring students' vocational interests are highly needed.

Currently, RIASEC is one of the most popular and influential interest theories in vocational psychology (Gottfredson, 1999). According to Holland (1997), interest can manifest in the activities or work carried out by individuals. It is organized into six categories, which have an impact on an individual's personality, namely Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) (RIASEC) (Flores et al., 2021). RIASEC can also be used to determine an individual's preferences and dislikes that influence their choice of work environment and activities (Armstrong et al., 2011). However, this model encounters language obstacles leading to student confusion and adverse effects on their career decisions (Darni et al., 2021; Darni et al., 2020).

Although RIASEC is a widely popular theory, and even the RIASEC scale is frequently used in Indonesia to measure an individual's career planning and development (Thamrin et al., 2023), but there have been limited studies on the validity of Holland's RIASEC models among Indonesian senior high school students. One such study, conducted by Juliana and Gunawan (2021), aimed to test the validity and reliability of the Indonesian version of the South African Career Interest Inventory Short Form (SACII-SR). The sample consisted of 332 high school and vocational students, and the results indicated that the SACII-SR was valid with good reliability. However, this study only conducted convergent validity and internal consistency reliability tests. Another study by Anggraini et al. (2020) also tested the validity and reliability of Holland's career instrument, the Holland Code Test from Interest Item Pool (IPP). The sample consisted of 220 students, and the results indicated that 43 items were valid, while 5 were invalid, with good reliability. However, both studies have limitations in terms of the number of participants, quality of measuring instruments, and analysis methods.

In addition, Thamrin et al. (2023) and Tasrif (2022) have developed a measurement tool for the Indonesian version of the Holland RIASEC model to test reliability and validity to students in Indonesia. The measurement tool of both studies achieved high reliability, with Cronbach's Alpha values ranging between 0.601 and 0.699. However, none of the previous studies in Indonesia have analyzed the influence of gender on students' interests. As stated by Deng et al. (2007), the issue of gender can often confuse the RIASEC.

Another study most closely related to this research, was conducted by Nistal et al. (2019) to examine the validity of Holland and Gati's RIASEC model regarding students' vocational interests in Mexico. This research also used the Randomization Test of hypothesized Order Relations (RTOR) and the Multidimensional Scalling (MDS) as analytical methods. The findings indicated that these models can offer a suitable reflection of the vocationnal interests of these students.

Given the diversity of interests that individuals possess, it is imperative to have appropriate measuring tools to identify these interests. The Eureka Interest Inventory (EII) has been developed and adapted to the Indonesian culture to meet this requirement. Structured based on Holland's RIASEC theory, which is widely recognized in psychology as a theory of interest, the EII aims to measure the RIASEC Model. To establish the validity of the EII in measuring the RIASEC Model, it is necessary to provide robust psychometric evidence. Hence, this study aims to analyze the structural validity of Holland's RIASEC Model in high school students and to examine the differences in model validity based on gender and major of study as reflected by the EII scores.

Method

Participants

Participants in this study were 1609 grade 12 high school students aged 17 to 19 years (*M* = 17, *SD* = 2.08). Most participants majored in Natural Sciences (68.37%) and Social Sciences (31.63%), with 39.22% male and 60.78% female.

Instruments

EII was used to measure the students' areas of interest in the present study. The EII was structured based on The Hexagon RIASEC theory (Holland, 1973; 1985; 1997), which consists of six personality types, namely RIASEC. It comprises 48 items relating to the work activities of each type, with two scales in the respective items. On the first scale, participants rated their level of interest in the activities, with 1 denoting "strongly dislike" to 7 representing "strongly like." Meanwhile, on the second scale regarding perceived ability, the participants considered their capability in carrying out the assigned activities, whereby 1 denotes "strongly incapable" and 7 is "strongly capable." Interest level scores and perceived ability were summed to obtain a composite score.

Data analysis

The Randomization Test of hypothesized Order Relations (RTOR) was used to investigate the validity of the circular/hexagonal model (Hubert & Arabie, 1987). Therefore, the Randomization Test of hypothesized Order Relations (RTOR) is adept at assessing structural consistency within a dataset. This method contrasts with approaches such as Confirmatory Factor Analysis (CFA), which entails confirming the number of factors and the pattern of observed variable loadings on these factors, thereby examining the structure itself. RTOR is a confirmatory analysis of a hypothesized order relations pattern concerning correlation matrices (Tracey, 1997). Therefore, the RTOR properly informs one how each hypothetical model of order relations fits the correlation matrix. It provides the exact significance level *(p)* of the prediction number met by the data, compared to the null hypothesis of random reordering and the Correspondence Index (CI), divided by the 72 predictions of the Holland model (Tracey, 1997). CI is the number of predictions that were met minus the number not met. Its values are between -1 and 1, where higher values indicate a better fit (Tracey, 2000). RTOR was obtained using RStudio software to analyze the fit model of the EII score based on Holland's circular or hexagonal model as well as to determine whether the fit model in one group was better than that in the other.

In addition, the Multidimensional Scaling (MDS) technique was used to spatially describe the graphical representation of the position of each RIASEC Holland personality type in a two-dimensional space. The EII scores were converted to the Euclidean distance matrix using the ALSCAL procedure from SPSS 22 to obtain MDS. This procedure provides a goodness-of-fit measure of stress and a squared correlation coefficient (R^2). The stress measurement shows the difference between the distance in the solution and the transformed data. Stress values fall between zero and one, while the acceptable values start from .05, and end at zero, indicating a better fit between the distance and the transformed data. The R^2 coefficient is the proportion of the variance in transformed proximity (distance), acceptable values start from .6 and end at one, indicating a good fit (Davison & Sireci, 2000). Multidimensional Scaling (MDS) is valuable for visualizing the relationships among various items or categories, facilitating an understanding of which items are more closely related within the context of the studied dataset. The low stress and high R^2 values suggest that the two-dimensional representation is a reliable reflection of the actual relationships among the items.

Results

Descriptive analysis, reliability, and EII summary scores correlation matrix

Table 1

Descriptive Statistics, Internal Consistency, and Intercorrelations Matrix of Total EII Scores in the Total Sample

Categories	M	SD	α	R	I	A	S	E	C
R	44.01	18.46	.709	-					
I	56.24	16.93	.680	.445**	-				
A	67.08	16.54	.712	.151**	.370**	-			
S	73.08	15.64	.707	.050	.398**	.450**	-		
E	72.29	16.26	.695	.234**	.173**	.415**	.475**	-	
C	60.24	16.51	.682	.577**	.228**	.183**	.069*	.501**	-

Note. R = *Realistic*, I = *Investigative*, A = *Artistic*, S = *Social*, E = *Enterprising*, C = *Conventional*
*$p < .05$, **$p < .01$

Table 1 shows that type S personality had the highest mean score than the others (*M* = 73.08), while I had the lowest mean score (*M* = 56.24). Overall, the Cronbach's Alpha coefficient (á = .735) showed that EII was reliable (Kaplan & Saccuzzo, 2017). Cronbach's Alpha coefficient on each dimension ranged from acceptable (.680 for type I) to good (.712 for type A).

The highest correlations were found for the adjacent types in the circumplex model (R with C; I with R; A with S; S with E; E with C, and C with R). Furthermore, the value of the correlation coefficient ranges from .445 to .577. The lowest correlation between the RIASEC types ranges from .050 to .173. Types R, I, S, and E had lowly correlates with their opposite types (R with S; I with E; S with R; and E with I). Type A had the lowest correlation with R, and C had the lowest correlation with S, which occupies an alternate position.

RTOR analysis

Table 2

Results of The RTOR of EII Scores in The Holland Model

Group	Prediction		CI	*p*
	Met	Tied		
Gender				
Male	65	0	.806	.017
Female	65	0	.806	.033
School Majors				
Natural Sciences	66	0	.833	.017
Social Sciences	67	0	.861	.017
Total	65	0	.806	.017

Note. A total of 72 order predictions were made with respect to the RIASEC correlation matrix; Met = indicates the number of times the order predictions hypothesized by the Holland Model match the observed data; Tied = indicates the number of times the observed data do not clearly support one order prediction over another, meaning there are instances where the observed data equally support two or more different order predictions; CI (Consistency Index) = index measuring the consistency of the predicted order with the observed order.

Table 2 presents the results of the Randomization Test of hypothesized Order Relations (RTOR) for EII (Eureka Interest Inventory) scores within the Holland Model. The total sample, encompassing various gender and school majors, was found in the good fit category using the RTOR. In the total sample, 65 of the 72 order predictions were met (CI = .806, *p* = .017). This indicates that the Holland model has a good fit with the observed data across all examined groups, as the majority of order predictions (65 or more out of 72) are confirmed. There was no difference in the number of predictions met between male and female subsamples (both at 65), suggesting that the Holland Model is consistent across genders within the analyzed subsample. The RTOR results for the Social Sciences subsample (CI = .861, *p* = .017) showed a slightly higher CI value compared to the Natural Sciences subsample (CI = .833, *p* = .017), with 67 of the 72 order predictions met. It may indicate that the Holland Model is slightly more consistent with data from Social Sciences subsamples.

In Table 2, the values for “Tied” are consistently zero across all groups, indicating that there were no instances in which order predictions were indistinguishable or equally strong for two different orders. This absence of tied predictions implies that each order comparison could be categorized as either met or not met, as detailed in Table 3.

Table 3

Results of the Test of Difference in Fit of the Comparison According to Gender and School Majors in the Holland Model

Group	Prediction met			CI	*p*
	both	1 met 2 not	2 met 1 not		
Male vs. Female	62	3	3	.000	.533
Natural Sciences vs. Social Sciences	62	4	5	.014	.517

Note. both = indicates the number of times the Holland Model's predictions were met for both groups in the comparison; 1 met 2 not = Indicates the number of times the predictions were met for the first group but not the second; 2 met 1 not = Indicates the number of times the predictions were met for the second group but not the first; CI (Consistency Index) = index measuring the consistency of the predicted order with the observed order.

Table 3 presents the test results of the difference in fit due to the comparison between the matrices of gender (male vs. female) and school majors (Natural Sciences vs. Social Sciences) within the Holland Model. The model's predictions were met 62 times in both gender and school major comparisons. Specifically, in the gender comparison, there were three instances where the model's predictions were met for males but not for females, and conversely, three instances where predictions were met for females but not for males. In school majors comparison, the model's predictions met for Natural Sciences in four instances but not for Social Sciences. Additionally, there were five instances where the model's predictions were met for Social Sciences but not for Natural Sciences.

The randomization test of differences revealed that there were no statistically significant differences in the fit of the tight circular order model across gender (CI = .000, p = .533) and school majors (CI = .014, p = .517). This suggests that the Holland Model exhibits a comparable level of fit across both genders and various school majors.

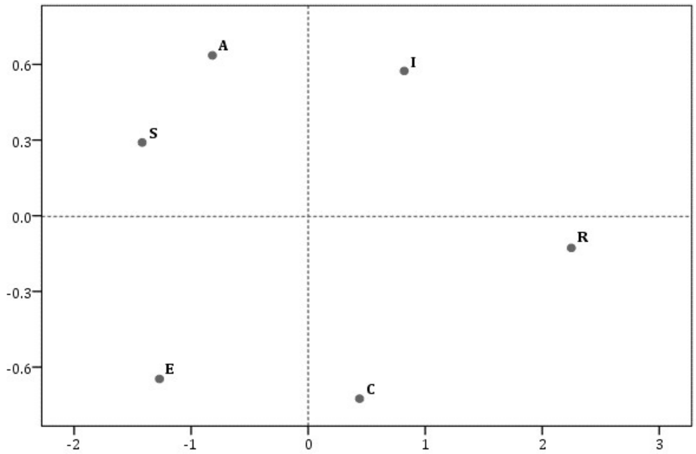
MDS analysis

The MDS procedure was performed on the total sample, gender (male vs. female), and school major (natural sciences vs. social sciences) matrices to obtain a thorough explanation of the difference in the goodness of fit as a function of this variable in the RTOR test. Goodness-of-fit measurement results obtained from the MDS in Figures 1 to 5 showed that the two-dimensional solution provided a good fit to the observed data. The "stress" value quantifies the extent of discrepancy between the distances among pairs of items in the MDS configuration and the distances in the observed data. This metric serves as an indicator of the MDS model's fit adequacy to the data. R-squared (R^2) is a metric that quantifies the degree of fit between the observed data and the statistical model being tested. This metric represents the proportion of variance in the dependent variable that is predictable from the independent variables in the model. This metric represents the proportion of variance in the dependent variable that can be predicted from the independent variables in the model. As shown in Figures 1 to

5, stress values ranged from .05 to .11, meaning the model had a good to fair fit (Kruskal & Wish, 1978). R^2 values ranged from .90 to .99, meaning that from 90% to 99% of the variance in the transformed data was explained by the distances in the solutions.

Figure 1

Two-Dimensional Scaling Solutions for Total Sample

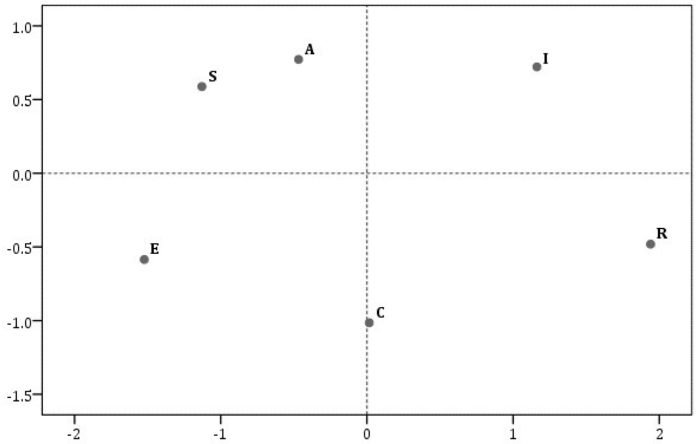


Note. Stress = .07; R^2 = .97

In the total sample, a stress value close to 0 indicates a very good fit (Stress = .07), suggesting that the model accurately represents the distances or dissimilarities between the items. Additionally, an R-squared (R^2) value of .97 implies that the two-dimensional MDS model accounts for 97% of the variance in the data. This high value indicates a very good fit of the model to the data observed.

Figure 2

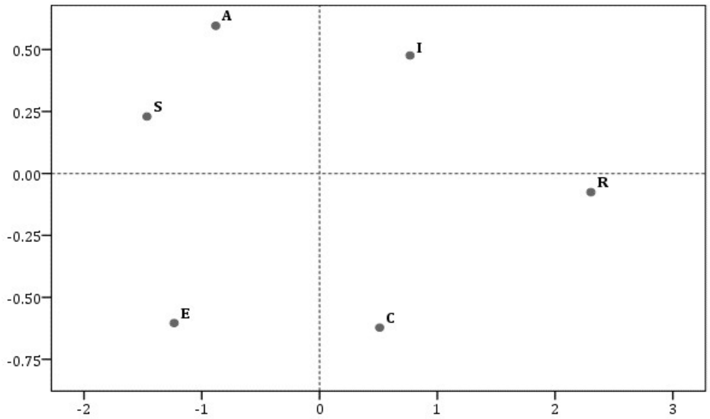
Two-Dimensional Scaling Solutions for Male



Note. Stress = .11; R^2 = .90

Figure 3

Two-Dimensional Scaling Solutions for Female



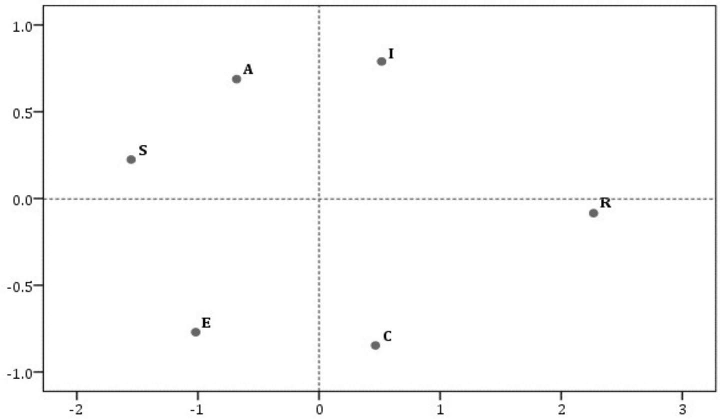
Note. Stress = .05; R^2 = .98

Figures 2 and 3 illustrate the differences in the relationships between RIASEC interest types between male and female. While both gender subsamples demonstrate a good fit with the MDS model, the female subsample exhibits a lower stress value and a higher R-squared (Stress = .05, R^2 = .98) compared to the male subsample (Stress = .11, R^2 = .90). This suggests that the relationships among interest types are more accurately mapped for females than for males.

Figure 4 and 5 illustrate the differences in the relationships between RIASEC interest types between Natural Sciences and Social Sciences. While both school majors subsamples demonstrate a good fit with the MDS model, Natural Sciences subsample exhibits a lower stress value and a higher R-squared (Stress = .05; R^2 = .99) compared to Natural Sciences subsample (Stress = .08; R^2 = .96). This suggests that the relationships among interest types are more accurately mapped for Social Sciences than for Natural Sciences.

Figure 4

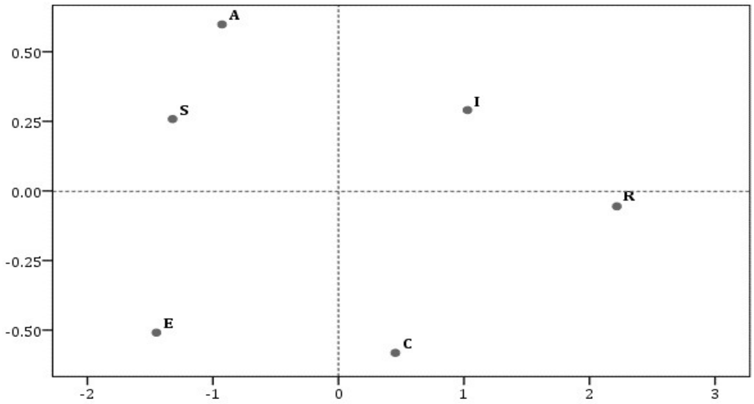
Two-Dimensional Scaling Solutions for Natural Sciences



Note. Stress = .08; R^2 = .96

Figure 5

Two-Dimensional Scaling Solutions for Social Sciences



Note. Stress = .05; R^2 = .99

MDS solutions were performed on the total sample, gender (male vs. female), and school majors (natural sciences vs. social sciences) matrices. Each solution results in a disparity matrix, as shown in Table 4. The spatial representations in any matrix case illustrate the six types distributed in the hypothesized R-I-A-S-E-C order, as shown in Figures 1 to 5, even though it does not shape a perfect circle. In addition to studying the results of the MDS graph, this study also examined the disparity matrix of each RIASEC dimension.

The disparity matrix (Table 4) presents the exact distance between each RIASEC interest type. According to the table, interest types that are more similar to each other are positioned closer together compared to those that are dissimilar. For instance, in the total sample, type R is closer to I (disparity = 1.564) than A (disparity = 3.137). Similarly, in the female subsample, type R is closer to I (disparity = 1.602) than to A (disparity = 3.244). Similar results were observed in the male and social sciences subsample matrices. In the natural sciences subsample, R is closer to C (disparity = 1.861) than to I. Additionally, types R, C, and I (disparity = 1.901) are closer together compared to A (disparity = 3.029).

Table 4

Disparity Matrix from The MDS Solutions in The Total Sample and Each Group Sample

	R	I	A	S	E	C
Total Sample						
Realistic (R)	-					
Investigative (I)	1.564	-				
Artistic (A)	3.137	1.804	-			
Social (S)	3.703	2.135	1.185	-		
Enterprising (E)	3.579	2.418	1.303	.965	-	
Conventional (C)	1.817	1.405	1.830	2.132	1.603	-
Male						
Realistic (R)	-					
Investigative (I)	1.428	-				
Artistic (A)	2.628	1.931	-			
Social (S)	3.267	2.062	1.459	-		
Enterprising (E)	3.478	3.004	1.673	1.084	-	
Conventional (C)	1.890	2.054	1.889	2.011	1.344	-
Female						
Realistic (R)	-					
Investigative (I)	1.602	-				
Artistic (A)	3.244	1.774	-			
Social (S)	3.789	2.156	1.099	-		
Enterprising (E)	3.596	2.268	1.191	.922	-	
Conventional (C)	1.801	1.203	1.818	2.165	1.670	-
Natural Sciences						
Realistic (R)	-					
Investigative (I)	1.901	-				
Artistic (A)	3.029	1.566	-			
Social (S)	3.884	1.931	1.436	-		
Enterprising (E)	3.369	2.202	1.448	1.072	-	
Conventional (C)	1.861	1.695	1.878	2.295	1.326	-
Social Sciences						
Realistic (R)	-					
Investigative (I)	1.210	-				
Artistic (A)	3.207	2.019	-			
Social (S)	3.552	2.313	.090	-		
Enterprising (E)	3.713	2.597	1.166	.857	-	
Conventional (C)	1.787	1.099	1.798	1.987	1.854	-

In Total sample, the smallest disparity is between S and E types (disparity = .965), suggesting these types are most similar within the total sample. The largest disparity is between R and S types (disparity = 3.703), suggesting these are the most dissimilar within the total sample.

Gender-based analysis of the male subsample reveals the smallest disparity between S and E types (disparity = 1.084), indicating these types are most similar among males. The largest disparity is seen between A and R types (disparity = 2.628), indicating these are the most dissimilar among males. Similar results were obtained for the female subsample, suggesting a similar pattern to the male sample regarding these types. The smallest disparity is between S and E types (disparity = .922). The largest disparity is between A and R types (disparity = 3.244), which is slightly larger than in the male sample.

Regarding school majors, the Natural Sciences subsample shows the smallest disparity between S and E types (disparity = 1.072), aligning with the findings from the gender-based subsamples. The largest disparity is between S and R types (disparity = 3.884), which is also consistent with the total sample pattern. For the Social Sciences subsample, the smallest disparity is between I and C types (disparity = 1.099), which differs from the other samples. The largest disparity is between E and A types (disparity = 3.713), which is a unique combination compared to the other subsamples.

Discussion

The purpose of this study is to analyze the structural validity of Holland's model among high school students and to examine the differences in the validity of these models according to gender and school major, using EII scores. The characteristics features of Holland's model include structuring vocational interests into six types and spatial arrangement into a hexagonal or circular arrangement. The assumption of Holland's model was verified using RTOR and MDS techniques. The results of these statistical analyzes are straightforward, demonstrating that the structure of vocational interests of high school students can be adequately explained using Holland's RIASEC model.

The intercorrelation matrix shows that adjacent types (i.e, R with I), generally had a higher correlation coefficient than the opposite ones (i.e, R with S). These results aligned with previous studies, which also confirm the hexagonal model in RIASEC, where adjacent traits generally had a greater correlation value than the opposite ones (Artosandi, 2014; Roebianto et al., 2021). In general, the correlation coefficient value in the RIASEC typology was placed in the medium category (Albert, 2008). This is in line with the studies by Holland (1997) and Deng et al. (2007) that RIASEC traits need a moderate correlation to boost the visibility of congruence and differences between these traits.

The analysis of the structural validity of Holland's models, using EII scores in a sample comprising high school students, showed Holland's model to have a significantly good fit concerning the observed data. These results indicate better structural validity than previous studies (CI = .42, *p* = .050; Iliescu et al., 2013) and (CI = .65, *p* = .017; Nistal et al., 2019) carried out in similar populations which had lower levels of fit.

Furthermore, analysis of model fit by gender showed insignificant differences. In other words, the way and manner the males and females from this study sample represent the relationship structure between the RIASEC types was similar. The RTOR test results indicate a significantly good fit of Holland's circular order model based on the observed data in the male and female matrices, the level of fit was similar in the two matrices, and the test of difference in fit was insignificant. These results are consistent with previous studies that discovered no gender differences using Holland's circular order model in the student samples (Darcy & Tracey, 2007; Nagy et al., 2010; Nistal et al., 2019; Tien, 2009; Tracey & Robbins, 2005). The MDS solutions by gender show a RIASEC arrangement that looks like a hexagon and aligns with the hypothetical order (Holland, 1997; Armstrong et al., 2011). Although, the pattern was not clockwise and did not form a perfect hexagonal shape.

Analysis of model fit in accordance with the school majors also showed insignificant differences. The natural and social science students from the study sample represent the relationship structure between the RIASEC types in a similar way. The RTOR test results showed a significantly good fit of Holland's circular order model with respect to data in natural and social science matrices. The level of fit was similar in the two matrices, and the test of difference in fit was insignificant. Therefore, the fit models in all comparison groups presented predictions that met Holland's model. The MDS solutions by school majors show a RIASEC arrangement similar to a hexagon and follow the hypothetical order (Holland, 1997; Armstrong et al., 2011), even though the pattern was not clockwise and did not form a perfect hexagonal shape. These results were in accordance with the study by Super (1990) that students in the third year began to move from the exploration stage and started to make career decisions while having a better knowledge of themselves. In the third year of school, the students were focused on career guidance to continue their studies and were exposed to complex information about careers as well as interests associated with differentiation in the six types of RIASEC and their circulars (Danti, 2021; Istirahayu et al., 2018; Tracey, 2001; Yuliawati & Lathifah, 2022). Therefore, adolescents' interests' stability increases as their age, and its structure becomes more like a hexagonal model (Šverko & Babarović, 2006; Tracey, 2002; Tracey et al., 2006). This assumption was completely supported by the results of several previous cross-sectional and longitudinal studies (Helwig, 2003; Šverko & Babarović, 2006; Tracey, 2002).

The limitation of the present study is centered on the high school sample. This tends to limit the generalizability of the results. Therefore, further study is expected to be able to examine other age groups or levels of education.

Conclusions

This study provides empirical evidence of the structural validity of Holland's RIASEC model in a sample of high school students, using their scores from the Eureka Interest Inventory (EII). The results of the study demonstrate that the RIASEC model can accurately represent the vocational interests of these students. Furthermore, the present study contributes to the understanding of the validity of Holland's RIASEC model among Indonesian high school students and provides new evidence for the construct validity of the EII as a tool for measuring vocational interests. The EII is therefore considered a useful tool for use in vocational and career guidance, particularly for students who are majoring in natural and social sciences.

Suggestion

In future studies, it would be beneficial to broaden the scope of examination to include different age groups,educational levels, and cultural differences. Additionally, incorporating multiple methods and a larger sample size could provide a more comprehensive analysis of the validity of the Eureka Interest Inventory (EII). Otherwise, the use of other different statistical methods is also necessary, such as employing Confirmatory Factor Analysis (CFA) or Structural Equation Modeling (SEM) to validate the model further.

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References

Akturk, A. O., & Ozturk, H. S. (2019). Teachers' TPACK levels and students' self-efficacy as predictors of students' academic achievement. *International Journal of Research in Education and Science (IJRES)*, *5*(1), 283–294. https://www.ijres.net/index.php/ijres/article/view/543/pdf

Albert, J. R. G. (2008). *Basic statistics for the tertiary level* (1st ed.). Rex BookStore.

Allen, J., & Robbins, S. B. (2008). Prediction of college major persistence based on vocational interests, academic pre paration, and first-year academic performance. *Research in Higher Education*, *49*(1), 62–79. https://doi.org/10.1007/s11162-007-9064-5

Ananta, P. A. W., & Wirawan, I. M. A. (2018). Pengembangan sistem pendukung keputusan pemilihan jurusan kuliah di perguruan tinggi dengan metode Dempster-Shafer (Studi kasus di bimbingan konseling SMA N 1 Seririt). *Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika (KARMAPATI)*, *7*(2), 66-75. https://doi.org/10.23887/karmapati. v7i2.15274

Anggraini, W., Kurniawan, F., Susilawati, S., & Hasna, A. (2020). Validitas dan realibilitas instrumen teori pilihan karir Holland di Indonesia. *Bulletin of Counseling and Psychotherapy*, *2*(2), 68–73. https://doi.org/10.51214/bocp.v2i2.34

Armstrong, P.I., Su, R., & Rounds, J. (2011). Vocational interests. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *The Wiley Blackwell handbook of individual differences* (pp. 608–631). Wiley. https://doi.org/10.1002/9781444343120.ch23

Artosandi, Y. S. R. (2014). Pengembangan instrumen minat vokasional berbasis tipologi Holland untuk eksplorasi karir siswa sekolah menengah pertama. *Prosiding Seminar Nasional Psikologi UMS 2014 (Psychometry Edition)*, 163–193. https://publikasiilmiah.ums.ac.id/handle/11617/6410

Danti, N. N. (2021). Upaya meningkatkan kemampuan perencanaan karier melalui layanan informasi karier pada saat pandemi COVID-19 bagi siswa di SMA

Negeri 2 Praya. *Jurnal Paedagogy*, *8*(2), 144-151. https://doi.org/10.33394/jp.v8i2.3498

Darcy, M. U. A., & Tracey, T. J. G. (2007). Circumplex structure of Holland's RIASEC interests across gender and time. *Journal of Counseling Psychology*, *54*(1), 17–31. https://doi.org/10.1037/0022-0167.54.1.17

Darni, R., Mursyida, L., & Samala, A. D. (2021). Career Exploration System (C-EXSYS) in era society 5.0 based on expert system. *Jurnal Teknologi Informasi dan Pendidikan*, *14*(2), 131–143. https://doi.org/10.24036/tip.v14i2.491

Darni, R., Novaliendry, D., & Dewi, I.P. (2020). Career development expert system application using the entrepreneurship personality inventory (Aplikasi *expert system* pengembangan karir menggunakan inventory kepribadian *entrepreneurship*). *Jurnal RESTI (Rekayasa Sistem dan Teknologi Informasi)*, *4*(1), 163–171. https://doi.org/10.29207/resti.v4i1.1626

Davison, M. L., & Sireci, S. G. (2000). Multidimensional scaling. In H. E. A. Tinsley & S. D. Brown (Eds.), *Handbook of applied multivariate statistics and mathematical modeling* (pp. 323–352). Academic Press. https://doi.org/10.1016/B978-012691360-6/50013-6

Deng, C.-P., Armstrong, P. I., & Rounds, J. (2007). The fit of Holland's RIASEC model to US occupations. *Journal of Vocational Behavior*, *71*(1), 1–22. https://doi.org/10.1016/j.jvb.2007.04.002

Flores, N., Moret-Tatay, C., Gutiérrez-Bermejo, B., Vázquez, A., & Jenaro, C. (2021). Assessment of occupational health and job satisfaction in workers with intellectual disability: A job demands–resources perspective. *International Journal of Environmental Research and Public Health*, *18*(4), 2072. https://doi.org/10.3390/ijerph18042072

Gottfredson, G. D. (1999). John L. Holland's contributions to vocational psychology: A review and evaluation. *Journal of Vocational Behavior*, *55*(1), 15–40. https://doi.org/10.1006/jvbe.1999.1695

Hana, L. (2020). Stigma superioritas IPA atas IPS di tingkat SMA. *Jurnal Studi Kultural*, *5*(2), 72–75. https://books.google.co.id/books?id=LgTzDwAAQBAJ&printsec=frontcover&hl=id#v=onepage&q&f=false

Helwig, A. A. (2003). The measurement of Holland types in a 10 year longitudinal study of a sample of students. *Journal of Employment Counseling*, *40*(1), 24–32. https://doi.org/10.1002/j.2161-1920.2003.tb00853.x

Holland, J. L. (1973). *Making vocational choices: A theory of careers*. Prentice-Hall.

Holland, J. L. (1985). *Making of vocational choices: A theory of vocational persona lities and work environments* (2nd ed.). Prentice-Hall.

Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Psycholo gical Assessment Resources.

Hubert, L., & Arabie, P. (1987). Evaluating order hypotheses within proximity matrices. *Psychological Bulletin*, *102*(1), 172–178. https://doi.org/10.1037/0033-2909.102.1.172

Iliescu, D., Ispas, D., Ilie, A., & Ion, A. (2013). The structure of vocational interests in Romania. *Journal of Counseling Psycho logy*, *60*(2), 294–302. https://doi.org/10.1037/a0032199

Istirahayu, I., Mayasari, D., Fitriyadi, S., & Damayanti, Z. (2018). Bimbingan karir terhadap pemilihan studi lanjut siswa kelas XII. *Jurnal Bimbingan dan Konseling Terapan*, *2*(2), 139-144. https://doi.org/10.30598/jbkt.v2i2.372

Juliana, N., & Gunawan, W. (2021). Uji validitas dan reliabilitas South African Career Interest Inventory Short. *Jurnal Psikologi*, *17*(2), 191-204. https://doi.org/10.24014/jp.v17i2.12676

Kaplan, R., & Saccuzzo, D. (2017). *Psychological testing: Principles, applications, and issues* (9th ed.). Cengage Learning.

Khan, Y. A., Ahamad, Z., & Kousar, S. (2013). Factors influencing academic failure of university students. *International Journal of Educational Administration and Policy Studies*, *5*(5), 79–84. https://doi.org/10.13140/2.1.2900.7360

Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, *25*, 67–72. https://doi.org/10.1016/j.lindif.2013.01.005

Kruskal, J. B., & Wish, M. (1978). *Multi dimensional scaling*. Sage Publications.

Nagy, G., Trautwein, U., & Lüdtke, O. (2010). The structure of vocational interests in Germany: Different methodologies, different conclusions. *Journal of Vocational Behavior*, *76*(2), 153–169. https://doi.org/10.1016/j.jvb.2007.07.002

Nistal, M. T. F., Soto, J. K. M., & Zaragoza, F. A. P. (2019). The structural validity of Holland's and Gati's RIASEC models of vocational interests in Mexican students. *Electronic Journal of Research in Educational Psychology*, *17*(3), 707-730. https://core.ac.uk/reader/286590520

Nye, C. D., Su, R., Rounds, J., & Drasgow, F. (2012). Vocational interests and performance: A quantitative summary of over 60 years of research. *Perspectives on Psycholo gical Science*, *7*(4), 384–403. https://doi.org/10.1177/17456 91612449021

Rahman S. K., A., & Awaru, A. O. T. (2019). Labelling (Studi komparatif pada siswa jurusan IPA dan IPS di MAN Binamu Jeneponto). *Jurnal Sosialisasi: Jurnal Hasil Pemikiran, Penelitian dan Pengembangan Keilmuan Sosiologi Pendidikan*, *6*(1), 13–18. https://doi.org/10.26858/sosialisasi.v0i0.12801

Roebianto, A., Guntur, I., & Lie, D. (2021). Pengembangan tes minat berbasis Holland untuk pemetaan jurusan pada siswa Sekolah Menengah Pertama (SMP) & Sekolah Menengah Atas (SMA). *Persona: Jurnal Psikologi Indonesia*, *10*(1), 33–47. https://doi.org/10.30996/persona.v10i1.4622

Rohmah, A., & Azzahrah, F. (2021). Strategi coping nilai akademik pada mahasiswa salah jurusan. *Literasi: Jurnal Kajian Keislaman Multi-Perspektif*, *1*(2), 223–252. https://doi.org/10.22515/literasi.v1i2.3714

Satria, Y. (2011). Studi deskriptif tentang kepuasan siswa, orangtua dan guru terhadap sistem penjurusan di Sekolah Menegah Atas. *Indegenous Psychology Bulletin*, *1*, 203–211.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown, L. Brooks & Associates (Eds.), *Career choice and development* (pp. 197-261). Jossey-Bass.

Šverko, I., & Babarović, T. (2006). The validity of Holland's theory in Croatia. *Journal of Career Assessment*, *14*(4), 490–507. https://doi.org/10.1177/1069072706288940

Tasrif, E. (2022). RIASEC Holland's reliability and validity on personality of informatics engineering education students in higher education. *JPPI (Jurnal Penelitian Pendidikan Indonesia)*, *8*(1), 11-21. https://doi.org/10.29210/020221602

Thamrin, T., Giatman, G., & Syah, N. (2023). Reliability and validity of RIASEC Holland's on predicting success career for vocational students. *Jurnal Kependi dikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembela jaran*, *9*(3), 740-749. https://doi.org/10.33394/jk.v9i3.8704

Tien, H.-L. S. (2009). Cultural encountering: The applicability of Holland's typology in Taiwan. *Asian Journal of Counselling*, *16*(2), 193–226.

Tracey, T. J. G. (1997). RANDALL: A Microsoft FORTRAN program for a randomization test of hypothesized order relations. *Educational and Psychological Measure ment*, *57*(1), 164–168. https://doi.org/ 10.1177/00131644970 57001012

Tracey, J. T. (2000). Analysis of circumplex models. In H. E. A. Tinsley & S. D. Brown (Eds.), Handbook of applied multi variate statistics and mathematical modeling (pp. 641-664). Academic Press.

Tracey, T. J. G. (2001). The development of structure of interests in children: Setting the stage. *Journal of Vocational Behavior*, *59*(1), 89–104. https://doi.org/10.1006/ jvbe.2000.1787

Tracey, T. J. G. (2002). Development of interests and competency beliefs: A 1-year longitudinal study of fifth- to eighth-grade students using the ICA-R and structural equation modeling. *Journal of Counseling Psychology*, *49*(2), 148–163. https://doi.org/10.1037/0022-0167.49.2.148

Tracey, T. J. G., Lent, R. W., Brown, S. D., Soresi, S., & Nota, L. (2006). Adherence to RIASEC structure in relation to career exploration and parenting style: Longitudinal and idiothetic consi derations. *Journal of Vocational Behavior*, *69*(2), 248–261. https://doi.org/ 10.1016/j.jvb.2006.02.001

Tracey, T. J. G., & Robbins, S. B. (2005). Stability of interests across ethnicity and gender: A longitudinal examination of grades 8 through 12. *Journal of Vocational Behavior*, *67*(3), 335–364. https:// doi.org/10.1016/j.jvb.2004.11.003

Waitsman, M. C. (2012). *Dispositional resilience and person-environment fit as predictors of college student retention* (Doctoral dissertation, Clemson University). *All Dissertation.* 936. https:/ /tigerprints.clemson.edu/ all_dissertations/936

Wulandari, P. W., Stella, S., & Sarwilly, I. (2022). Hubungan ketidaksesuaian jurusan dengan stres mahasiswa dalam menjalan kan kegiatan perkuliahan: The relationship between department of disappoint ment and student stress in carrying out lecture activities. *Jurnal Interprofesi Kesehatan Indonesia*, *1*(2), 88–94. https://doi.org/10. 53801/ jipki.v1i02.9

Yuliawati, D., & Lathifah, M. (2022). Efektivitas layanan informasi karier terhadap pemahaman karier peserta didik kelas XII di SMA ITP Surabaya. *Edu Consilium: Jurnal Bimbingan dan Konseling Pendidikan Islam*, *3*(2), 1–14. https:// doi.org/10.19105/ec.v3i2.6025

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