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Conceptual Model and Psychometric Validation of the Mindler Multidimensional Career Decision-Making Battery

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Abstract: Work is integral to human functioning. The joy of working is maximized when people make choices based on intrinsic motivation and develop themselves to their full potential. This article reports the conceptual model, development, and validation of the Multidimensional Career Decision-Making Battery, popularly called the Mindler Battery, a measure of career specialty choice for Indian students. The Mindler Battery was constructed using a career choice model based on five broad dimensions, namely: orientation style, interest, aptitude, personality, and socio-emotional intelligence. The rationale and description for each dimension was developed as a result of thorough item construction and analysis. Standardized norms and reliability and validity estimates were prepared to interpret the dimensions of the Mindler Battery. Implications for use of the battery in career decision-making, career counseling, and career research are discussed.

Introduction

Weinert (2001) defined the term 'career' as a pattern of work experiences comprising the entire lifespan of a person. A person's career is observed in several stages to reflect the transition from one life stage to the next. Collin and Young (1998) view career as the interaction of individuals with organizations and society. This interaction, as Savickas et al. (2009) proposed, is no longer just a sequence of jobs but a story that working people build about themselves.

Greenhaus (2003) explained that much career-related behaviors explicitly or implicitly involve a career decision, for example: to pursue a particular work domain, to increase or decrease involvement in work, or to change occupational fields. Career decision-making is of great importance in present times because people are looking for more significant ways to engage with their work (Weiss, Skelley, Haughey, & Hall, 2004). These decisions are not just related to any one developmental life stage but are instead aligned with the entire lifespan of a person (Rosenthal & Pilot, 1988). Career has major bearing on lifestyle as it determines an individual's earnings, job security, friends and acquaintances, residence, and leisure time.

Feldman (2002) cautioned that the longer youth are undecided about their career goals the longer they may stay underemployed. The longer they stay underemployed, in turn, the less desirable they become as candidates for higher skilled jobs. It is critical that young adults not delay career decision-making and that they engage in career counseling to build a promising future. The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2002), in their handbook of career counseling, explained that

career counseling with youth consists of four elements:

1. Helping individuals to gain greater self-awareness in areas such as interests, values, abilities, and personality style.
2. Connecting individuals to resources to increase their knowledge about jobs and occupations.
3. Engaging individuals in the decision-making process to choose career paths well-suited to their own interests, values, abilities, and personality style.
4. Assisting individuals to be active managers of their career paths (including managing career transitions and balancing various life roles) as lifelong learners seeking professional development over the lifespan.

The career elements described above emphasize the significance of ensuring a match between person and career. The assessment and evaluation of interests, values, abilities, and personality are considered critical in career planning and decision making. Psychological assessments have become an important method for exploring the many facets of career. In career counseling, a variety of career assessment tools (such as inventories, questionnaires, and tests) are used to support objective career choice. These assessments primarily evaluate career aspirants on the following constructs (Jigău, Tăsica, & Muscă, 2007):

- Areas of interest or preference in the sphere of occupations.
- Aspects of personality compatible with certain occupational fields.
- Skills, abilities, aptitudes, and levels of performance required in various occupational areas.

Career assessment is broadly based on three constructs: interest, personality, and cognitive assessment. Various studies have explored how career inventories based on these three constructs can be helpful in vocational guidance and career decision-making. A broad overview of the assessment tools used to measure each of these constructs follow below:

Career Assessment Based on Interest

The interest model developed by Holland (1959, 1997) is the most widely adopted theoretical framework for interest measurement. Holland organized vocational interests into six types that form a hexagon structure collectively referred to as RIASEC: *realistic interest* in working with things, machinery, tools, or working outdoors; *investigative interest* in being analytical and curious about things (including: mathematics, physical, and social sciences; and biological, and medical sciences); *artistic interest* in creative expression, introspection, writing, and the visual and performing arts*; social interest* in helping people; *enterprising interest* in working in leadership or persuasive roles directed toward achieving economic objectives; nd *conventional interest* in working in well-structured environments, especially business settings (Su, Rounds & Armstrong, 2009). Holland's interest model has received robust empirical support (Armstrong, Hubert, & Rounds, 2003; D y & Rounds, 1998; Tr cey & Rounds, 1993).

Many interest inventories that are used to help individuals make educational and career-related plans are based on Holland's RIASEC model. The Strong Interest Inventory (Donnay, Morris, Schaubhut, & Thompson, 2005) and the Uniact Interest Inventory (American Coll. Testing Program, Iowa City, Ia., 1991) have either explicit scales to assess RIASEC types or methods to convert interest scale scores to Holland's system. The U.S. Department of Labor's O*NET occupation classification (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999) is also linked to the RIASEC construct.

Su, Rounds and Armstrong (2009) examined the magnitude and variability of sex differences in vocational interests using the meta-analysis for Holland's (1959, 1997) categories, Prediger's (1982) Things–People

and Data–Ideas dimensions, and the STEM (Science, Technology, Engineering, and Mathematics) interest areas. Technical manuals of 47 interest inventories utilizing 503,188 respondents were used. The inventories, like Chronicle Career Quest (CCQ), Career Decision Inventory (CDI), Career Interest Inventory (CII), Campbell Interest and Skill Survey (CISS), Career Occupational Preference System Interest Inventory (COPS), Gordon Occupational Check List (GOCL), Guilford-Zimmerman Interest Inventory (GZII), Interest Determination, Exploration, and Assessment System (IDEAS), Jackson Vocational Interest Survey (JVIS), Kuder Career Search with Person Match (KCS), Kuder General Interest Survey (KGIS), Kuder Occupational Interest Survey (KOIS), Occupational Aptitude Survey and Interest Schedule: Interest Schedule (OASIS: IS), Ohio Vocational Interest Survey (OVIS), Vocational Interest Inventory (VII), Vocational Research Interest Inventory (VRII), and World of Work Inventory (WOWI) were used for meta-analysis. Results indicated that men favor working with things and women wish to work with people, producing a large effect size (d = .93) on the Things–People dimension. Males showed stronger realistic (d = .84) and investigative (d = .26) interests, and females showed stronger artistic (d = .35), social (d = .68), and conventional (d = .33) interests.

Career Assessment Based on Personality-Interest Linkages

Another area of focus in the literature has been on the relationship between interest and personality domains. With ample empirical support, a moderate degree of overlap has been observed between certain broad interests and personality domains referred to as the Personality–Interest (P-I) overlap. Sullivan and Hansen (2004) and Mount, Barrick, Scullen, and Rounds (2005) viewed interests as reflecting individual differences in the types of activities that individuals find enjoyable and motivating, whereas personality represents behavioral tendencies that play a role in motivating and determining success in activities.

Consensus of P-I convergence at the broad level of the Big Five personality model and Holland's Big Six typology of interests is found in various research studies. The following are the four strongest correlations found in the meta-analyses conducted by Larson and Borgen (2002) and Barrick, Mount, and Gupta (2003), respectively: (1) Openness with Artistic (.48, .39), (2) Extraversion with Enterprising (.41, .41), (3) Extraversion with Social (.31, .29), and (4) Openness with Investigative (.28, .25). These findings indicate that vocational interest and personality traits correlate considerably. A person is well suited for a career when his or her dispositional traits are compatible with preferences for activities as assessed by interests.

Using meta-analysis, Staggs, Larson, and Borgen, (2007) revised Ackerman and Heggestad's (1997) identification of four trait complexes that propose personality and interest (P-I) linkages. The authors reviewed research studies that specified correlations between general and specific measures of vocational interests, like the Strong Interest Inventory (Campbell, 1987), and personality, like the Multidimensional Personality Questionnaire (MPQ: Tellegen, 1982). The meta-analysis was executed using 2,023 participants from five databases and included gifted adolescents, college students, and adult career clients. The substantive P-I correlations ranged from .20 to .49 - reflecting between 4% and 24% shared variance.

Another meta-analysis conducted by Staggs (2004) advanced the knowledge of P-I linkage by comparing the Big Six and a competing model of personality to the Big Five, namely the Big Three, as measured by the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982; Tellegen & W□ller, 2008). In addition to confirming the results of

previous studies, Staggs confirmed the substantial relationship between artistic interests and openness to experience (MPQ absorption), enterprising interests and extraversion (MPQ social potency), and social interests and positive affectivity. She discovered the inverse relationship between realistic interests and harm avoidance, as evidenced by a MPQ primary scale with low scores. This finding reflected a tendency for individuals with realistic interests to seek out excitement and danger.

Career Assessment Based on Ability and Aptitude

Aptitude and ability assessments are also used widely to determine the optimal match between person and occupation. Abilities are as important as interests in career choice and development (Gottfredson, 2003). However, broad cognitive abilities tend not to correlate much with either vocational interests or personality (e.g., Ackerman & Heggestad, 1997). The relative independence of the cognitive and non-cognitive domains means that cognitive assessments provide useful information that cannot be obtained from non-cognitive personality trait inventories.

According to Kuncel, Hezlett, and Ones (2004), ability tests can be broadly classified into three categories: verbal tests (including the MCAT Verbal and Cooperative Reading Test – Total Score), mathematical tests (including the MCAT Quantitative and Doppelt Mathematical Reasoning), and tests assessing general cognitive ability, called 'g', and reasoning. Examples of tests in the general cognitive ability and reasoning category are the Raven Progressive Matrices (Burke, 1985), Army Alpha (Yerkes, 1921), Watson Glaser test (Watson & Glaser, 1980), and Wechsler-Bellevue test (Wechsler, 1946). Gottfredson (2003) also suggested that general aptitude test batteries such as the Differential Aptitude Tests (DAT), Armed Services Vocational Aptitude Battery (ASVAB), and General Aptitude Test Battery (GATB) can be administered to confirm either the general level or shape of an individual's aptitude profile, especially when occupations require mechanical or spatial ability.

A series of meta-analyses were conducted to test the criterion validity of general mental ability (GMA) and specific cognitive ability tests for predicting job performance ratings and training success in the European Community (EC). The operational validity of GMA and other specific cognitive abilities (including: verbal, numerical, spatial-mechanical, perceptual, and memory) was examined across 10 EC member countries (N ranged from 946 to 16,065), (Salgado, Anderson, Moscoso, Bertua, & Fryut, 2003). For General Mental Ability (GMA) tests like Differential Aptitude Test (DAT), the General Aptitude Test Battery (GATB), Factor G, and Matrix were used. To assess verbal ability, the Mill-Hill Vocabulary Test, DAT- Verbal Reasoning, and GATB-Vocabulary test were examined. Tests like DAT- Numerical Reasoning, Mathematic Test, and Arithmetic Reasoning were used to assess Numerical Ability. Spatial-Mechanical ability was assessed using Dial Reading, Wechsler Adult Intelligence Scale (WAIS) Blocks, DAT-Spatial Reasoning, and the Visualization Test. Tests like Toulouse-Pieron Test, Dichotic Attention Test, Stroop Test, and Instrument Reading were used to test perceptual ability. Memory was tested using the Visual Memory Test, Memory of Words, and Associative Memory Test. The results showed that tests of GMA and specific cognitive ability are strong predictors of job performance and training success across the EC.

Career Development and Assessment in Indian Settings

Recent models of career development and assessment (e.g., Blustein & Ellis, 2000; Lent, Brown, & Hackett, 2000) have focused on the importance of incorporating contextual constructs like culture. In India, limited

conceptual and linguistic equivalence of measurement of the Vocational Preference Inventory (VPI) (Holland, 1985) was found (Leong, Austin, Sekaran, & Komarraju, 1998). Cultural values play an undeniable role in influencing a person's career development and subsequent career selection (Gupta, & Tracey, 2005).

From a traditional perspective, the principle of Karma Yoga forms the core of the Indian philosophy of work (Mulla & Krishnan, 2006). In Bhagavad Gita, it is used in three ways: (1) as a special skill, device, intelligent method, or graceful way of performing actions (Gita ch□pter 2, verse 50); (2) □s composure of mind towards success or failure (Gita chapter 2, verse 48); □nd (3) as the device for eliminating the natural tendency of karma to create bondage (Gita chapter 2, verse 50).

In conducting content analysis of the Bhagavad-Gita, Mulla and Krishnan (2006) identified two dimensions of Karma Yoga: (1) duty orientation, and (2) the absence of desire for rewards. These scales were tested on a sample of 75 executives. Using hierarchical regression and a test for moderation, results were compared with two facets of personality, namely: (1) conscientiousness, and (2) dutifulness and striving for achievement. The researchers found that belief in Indian philosophy enhanced duty orientation, while absence of desire for rewards enhanced life satisfaction. Gupta and Tracey (2005) also developed a Dharmic Adherence Scale (DAS) and Career Exploration Scale (CES) to study interest-occupation congruence and career exploration behaviors in a sample of 107 white and 83 Asian Indian American college students. They found through hierarchical regression that Asian Indians showed less congruence. These scales have not been widely applied in Indian settings.

The Need for a Multidimensional Career Decision-Making Battery

Many factors are involved in the process of making a career decision. Besides personality, interest, ability, and aptitude, various contextual factors also have their place in the career decision-making process. The nature of schooling, the familial context and influence of family members and close friends, the individual's socio-economic background, and the expectations that evolve from interactions between these factors act as prime determinants of career choice.

Despite the utility of standardized career choice inventories, few inventories have been developed in Indian settings that are contextual in assessing career choice. A need exists for the use of career decision-making tools in Indian settings to help students to make career choices in the most scientific, objective, and rational manner. The Multidimensional Career Choice Decision Making Battery (Mindler Battery) is a comprehensive psychometric inventory developed to help students discover and match to different careers based on assessment results on five broad dimensions: *orientation style, interest, personality, aptitude, and socio-emotional intelligence*. It was designed to serve as a meaningful and essential tool to be used in career development and counseling in Indian settings. The battery assesses the test-taker on 56 parameters and helps them gain confidence in making career decisions. This article documents the method of the development of the multidimensional career decision-making battery, its theoretical model, test items, and norms, and its psychometric validation.

Conceptual Model of the Mindler Battery

The conceptual model of the Mindler Battery is a result of more than a year of research involving 40 Ph.D. scholars, academic researchers, industry experts, career counselors, and school teachers in India. A series of brainstorming sessions, 70 focus group discussions, and 18 expert workshops were

held to build the theoretical model of the battery. A team of psychometricians conducted extensive literature reviews to construct the Mindler 5-Dimension Career Discovery Model that is comprised of 56 parameters that span across five main dimensions: (a) orientation style, (b) interest, (c) personality, (d) aptitude, and (e) socio-emotional intelligence.

Dimension 1: Mindler Orientation Style Scale

Orientation style reveals what drives a student using four parameters based on Prediger's (1982) Things-People, and Data-Ideas dimensions: people orientation, administrative orientation, informative orientation, and creative orientation. These dimensions and their operational definitions are tabulated below.

Table 1
Parameters and Operational Definitions of the Mindler Orientation Style Scale

Parameters	Operational Definition
People Orientation	Ability to interact with people and have understanding of their problems and needs; drawn to seek close relationships with others.
Administrative Orientation	Good with impersonal work tasks in which one has to deal with facts, numbers, records, files, and data; prefers to work in an organized systematic manner while paying close attention to details.
Informative Orientation	Ability to work with machines, mechanisms, materials, tools, and processes; assertive and believes in doing things rather than talking about them.
Creative Orientation	Seeks novelty and likes to work with ideas; curious about understanding how things function.

Dimension 2: Mindler Interest Scale

The Mindler interest scale reveals what excites and fascinates the student in order to help identify career options that may be personally rewarding. The 20 interest parameters assessed in the Mindler Battery include: applied arts; commerce and management; defense services; design and graphics; distribution and logistics; education, training, and social services; engineering and technology; entrepreneurship, finance, and accounting; governance and administration; health, medicine, and fitness; hospitality; actuarial sciences; legal; marketing and advertising; media communication; performing arts; sales; science, mathematics, and research; social sciences; and humanities.

A career library was developed expanding on each of these 20 interest parameters to enhance a student's comprehensive understanding. Every career in the career library was elaborated upon topically, as follows: career summary, career opportunities, career path, academic institutes offering coursework, and description of job role.

Dimension 3: Mindler Personality Scale

The personality dimension of the Mindler Battery reveals what makes a student unique by identifying the test taker's consistent behavior patterns. It aims to identify unique combinations of student attributes that align

with career options. For this purpose, 15 personality parameters in six broad personality domains were identified and operationally defined, as described in Table 2.

Table 2
Domains, Parameters, and Operational Definitions of the Mindler Personality Scale

Domains	Parameters	Operational Definitions
Passion Quotient	Liveliness	Having abundant or intense enthusiasm and curiosity to gather knowledge.
	Intense Pursuit	Clear intention, goals, interest, commitment, and a strong desire to pursue a chosen path.
Interpersonal Quotient	Extraversion	Ability to talk easily to others and assert viewpoints; prefers working in groups rather than working alone.
	Agreeableness	Ability to sympathize, trust, and be warm, concerned, and cooperative towards others.
	Team Work	Ability to include not only one's own views but also the views of others while making a decision.
Work Quotient	Perfectionism	Desire to strive for high standards of excellence.
	Perseverance	Determination of an individual to complete a task irrespective of the obstacles.
	Practical	Being more concerned with practice than theory.
	Organization Skills	Ability and style of an individual to structure, plan, and meet their goals.
Ego Strength	Resilience	Ability to pursue chosen path despite stress, high-risk status, challenges, and hardships.
	Locus of Control	Individual's perception of the power they have over events that happen in their lives. People with this trait believe that they have control over their own destiny and are confident in their own skills.
Leadership Quotient	Enterprising	Being assertive, confident, high on risk- taking capacity, and having the ability to persuade others.
	Decision-Making Capacity	Tendency to choose effectively from alternatives using reasoning and critical thinking.
Ethical Quotient	Moral Conformity	Matching attitudes, beliefs, and behaviors to group norms so as to fit into the group.
	Integrity	Being honest and living by universal principles of right and wrong.

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Dimension 4: Mindler Aptitude Test

Aptitude focuses on the inherent strengths of a student and their unique expertise. Mindler's aptitude assessment aims to predict and match the potential of a student with related career options. The 10 aptitude parameters measured in the battery along with their operational definitions are defined in Table 3.

Table 3
Parameters and Operational Definitions of The Mindler Aptitude Test

Parameters	Operational Definitions
Abstract Aptitude	Ability to work with new concepts and abstract ideas, and to recognize patterns and similarities.
Spatial Aptitude	Ability to manipulate shapes in two dimensions or to visualize three-dimensional objects presented as two-dimensional pictures.
Numerical Aptitude	Ability to quickly grasp mathematical functions and to use them to analyze and solve mathematical problems.
Mechanical Aptitude	Capacity to grasp and use mechanical concepts and principles to solve problems.
Verbal Aptitude	Capacity to comprehend words and sentences and to deduce meaningful relationship from them.
Language Usage Aptitude	Capacity to understand and use words while adhering to grammatical rules and structures to produce meaningful and novel sentences.
Creative Aptitude	Capacity to develop novel and diverse ideas and solutions for a given problem.
Info Tech Aptitude	Capacity to grasp and use principles and concepts of telecommunication and computers to manipulate electronic data to solve problems.
Logical Reasoning	Capacity to identify and isolate components of an argument to reach a conclusion.
Perceptual Speed	Capacity to quickly attend to and process information with precision.

Dimension 5: Mindler Socio-Emotional Intelligence Scale

The socio-emotional intelligence dimension of the battery reveals how well a student recognizes and manages emotions. This dimension was designed to help students understand their effectiveness in social situations, specifically, how well they recognize and manage their own emotions and interpersonal relationships. The operational definitions of the seven parameters included in the Mindler Socio-Emotional Intelligence Scale, each belonging to one of two domains, are described in Table 4.

Table 4
Domains, Parameters, and Operational Definitions of the Mindler Socio-Emotional Intelligence Scale

Domains	Parameters	Operational Definitions
Knowing Self	Emotional Self-Awareness	Being aware of and recognizing one's own emotions.
	Emotional Self-Efficacy	Belief in the capability to understand and deal with one's own emotions.
	Emotional Regulation	Managing one's own constructive and destructive emotions well through stress, anger, and anxiety management.
	Motivation	Being focused on achievement while possessing drive nd optimism; being committed to one's values, needs, and goals.
Knowing Others	Empathy	Perceiving and being aware of the emotions of others and being sensitive to diverse populations.
	Pro-Social Behavior	Possessing the motivation to help others.
	Conflict Management	Ability to resolve conflicts through negotiation.

Method & Results

The goal of this study was to construct a psychometrically sound multidimensional battery of career decision-making for Indian students, which spanned three-phases. A brief summary of the first phase, the conceptual development of the Mindler 5-Dimensional Career Discovery Model, was reported in the prior section. The second phase focused on item development and validation for the Mindler Battery, while the third phase focused on establishing its psychometric properties. In the section to follow, reliability and validity analyses results are summarized along with standardized norms.

Phase I: Development of the Conceptual Model of the Mindler Battery

Phase I resulted in the Mindler 5-Dimension Career Discovery Model, which includes: orientation style, interest, aptitude, personality, and socio-emotional intelligence. The first dimension of the model, orientation style, was designed as preliminary screening criterion for career choice and consequently not subjected to statistical validation. It comprised of 15 situational items that reveals a student's proclivity to one of four orientation styles: people, administrative, informative, or creative. The remaining four dimensions were subjected to rigorous validation procedures reported here following.

Some sample items of the orientation style scale include: "Your friend has to take part in a dance competition but is really nervous about taking initiative. What, according to you, could be the best help to offer?" and "Your elder sibling is getting married and there is a lot of work to be done for making wedding preparations. Which responsibility would you prefer?"

Phase II: Item Development and Item Analysis of the Mindler Battery

Theoretical model development was followed by design and construction of the battery items. Item responses were then scored for interest, personality, aptitude, and emotional and social intelligence dimensions. The Mindler Battery initially comprised of 1,789 items later subjected to statistical analysis. Two types of response categories are present in the instrument: continuously summated likert scale categories, and situational responses. During the pre-item definition phase, the inventory categories included likert scale, situational responses, and mixed situational responses. In the next step, the item pool was pilot-tested with a group of experts asked to critique the scale by indicating the items that were ambiguous, confusing, and redundant. Based on this feedback, the item pool was revised to include 1,662 final items.

As assessment of the instrument's psychometric properties relies heavily on statistical procedures, a large representative sample was taken to validate each item and standardize the instrument. This study included 8,046 student participants (4,852 m□le; 3,134 fem□les; and 60 gender unreported) studying in grades 9 through 12 in public (n = 3453), centralized (n =1582), and private (n = 3011) schools and colleges within various States of India. Students ranged in age from 13 to 28 years (mean = 19.31, SD = 5.64). Due to erroneous and missing data, some of the sample was discarded before doing item analysis. The final sample size for each of the scales are reported as follows: interest (n = 7663), personality (n = 6898), creative aptitude (n = 6898), aptitude (n = 6898), and social and emotional intelligence (n = 7890). The educational distribution by academic grade was 42% in grades 9 and 10, 36% in grades 11 and 12, 17% pursuing undergraduate study, and 5% engaged in post graduate study.

The statistical procedures used to analyze the Mindlers Battery's items were (a) Item Discrimination (b) Item Validity, and (c) Item Difficulty.

Item discrimination. As a measure of item discrimination, the chi-square test showed significant differences between items measuring interest, personality, creative aptitude, and socio-emotional traits. In the presence of high levels of any given characteristic, participants scored high in that trait, spread out widely across the range of possible scores rather than clumped together at one or two points. This pattern indicated high discriminating power (Kline, 1986), meaning the item distinguishes well between people with high or low levels of the characteristic or trait being measured.

With the aforementioned rationale and purpose in mind, chi-square statistics for 1,200 items were computed across interest, personality, creative aptitude, and socio-emotional intelligence scales. The critical value of chi-square at the specific degree of freedom was used as a standard criterion to reject or retain an item at .05 level of significance. Items with chi-square values less than the critical value were retained while remaining items were rejected as those items were not able to meet the equal probability hypothesis (i.e., the probability of having the frequencies in all the given categories as equal). Table 5 reprots sample statistics based on degree of freedom and critical chi square values. In total, 382 items were retained after item discriminant analysis.

Table 5
Item Discrimination Indices of the Mindler Interest, Personality, Creative Aptitude, and Socio-Emotional Intelligence Scales

Mindler Career Battery Dimensions	Number of items retained by experts	Sample Size	Response Categories	Degree of freedom (df)	Chi Square Critical value	Number of items rejected	Number of items finally retained
Interest	227	7663	4	3	7.82 (.05)	100	127
Personality	350	6898	4	3	7.82 (.05)	270	80
Aptitude (Creativity)	316	6898	4	3	7.82 (.05)	192	124
Socio-Emotional Intelligence	307	7890	4	3	7.82 (.05)	256	51

Item validity. An instrument is only considered valid when each item effectively discriminates between weak or strong scores within the group. Therefore, each item has to be both discriminative and valid. To assess the relationship between individual responses to each item and the corrected total score on the instrument, the Pearson product moment item-to-total correlation was significantly tested on the alpha levels. Item assessment interpretation of standard Pearson correlation coefficients was followed to analyze results. For all parameters, items with negative and low correlations were discarded. Following Kline's (1986) recommendations, items with midrange to high item-to-total correlations (.50 and above) were included in the final inventory. Out of 382 items obtained from discrimination indices, 254 items measuring interest, personality, creative aptitude, and emotional and social intelligence were retained in the item validity procedure. Resulting item validity indices are indicated in Table 6.

Table 6
Item Validity Indices of the Mindler Interest, Personality, Creative Aptitude, and Socio-Emotional Intelligence Scales

Mindler Career Battery Dimensions	Items Retained Through Item Discrimination	Sample Size	Response Categories	Degree of freedom (df)	Pearson Correlation Coefficient r	Rejected Items	Retained Items
Interest	127	7,663	4	3	.60	15	112
Personality	80	6,898	4	3	.68	0	80
Aptitude (Creativity)	124	6,898	4	3	.72	113	11
Socio-Emotional Intelligence	51	7,890	4	3	.71	0	51

Item difficulty. The difficulty value of an item is inversely proportional to the proportion of students who have answered it correctly. Performance variables on 9 parameters of the aptitude scale (all except the creative aptitude parameter) were analyzed using the item difficulty index. The p-value (i.e., the proportion of individual respondents in a sample that earned a passing score on an item) was computed for the aptitude test items. Items with p-values of 1.00 and .00 were discarded as they did not differentiate between individuals. As recommended by Ghiselli, Campbell and Zedek (1981), aptitude items of varying difficulty with an average p-value of .50 across items were retained in the Mindler Aptitude Test. Of the total number of 462 items measuring aptitude, 113 items were retained after calculating item difficulty indices, as indicated in Table 7.

Table 7
Item Difficulty Indices of the Mindler Aptitude Test

Mindler Aptitude Parameters	Original Number of items	Items Filtered	Sample Size	Response Categories	Number of Retained Items
Abstract	62	40	6,898	4	10
Verbal	51	30	6,898	4	12
Logical	52	32	6,898	4	11
Mechanical	46	29	6,898	4	16
Perceptual	44	30	6,898	4	15
Spatial	50	30	6,898	4	11
Language	52	30	6,898	4	13
Numerical	54	30	6,898	4	11
Infotech	51	35	6,898	4	14

Phase II resulted in the design and statistical validation of Mindler Battery items. In this process, 1,789 items were subjected to expert analyses and three statistical methods of item analysis. At phase II, the final instrument comprised of 367 items: 112 measuring interest, 124 measuring aptitude, 80 measuring personality, and 51 measuring socio-emotional intelligence. Examples of retained items follow in Table 8:

Table 8
Examples of Retained Items in the Mindler Battery

Scale	Retained Items
Interest	I would like to take a professional course on sales.
	I wish to become a medical student.
	I would like to design and implement government policies.
Personality	I try to understand the ways in which I can change myself.
	I respect and incorporate everyone else's ideas during a discussion.
	When my class got shuffled and my best friend got shifted to another section, it troubled me a lot.
Aptitude	It becomes uncomfortable for me to hold back my opinions. (Creative aptitude)
	The diameter of a circle is 9 cm. What is the area of circle? (Numerical aptitude)
	A valid formula in the Excel begins with? (Info-tech aptitude)
Socio-Emotional Intelligence	I tend to say certain things out of anger, which I would not say otherwise.
	For me the glass is always half full.
	I would call myself a people's person.

Phase III: Reliability Analyses and Standardized Norms of the Mindler Battery

Phase-III of the study was designed to establish the Mindler battery's psychometric properties to ensure its reliability and prepare sten norms. In a second round of data collection, 12,834 students attending grades 9-12 or university at public (n = 4,952), central (n = 3,658), and private (n = 4,224) institutions in various States in India were

given the Mindler Battery comprised of 367 items. Students ranged in age from 13 to 28 years (mean = 21.31, SD = 7.85). Due to erroneous and missing data, some of the sample was discarded from the scales before doing statistical analysis. The final sample size for each scale included: interest (n = 12,383), personality (n = 12,787), aptitude (n = 11,990), and social and emotional intelligence (n = 11,818). The educational distribution was 52% in Grade 9 and 10, 32% in Grade 11 and 12, 14% engaged in undergraduate education, and 2% pursuing post graduate degrees.

Reliability analyses. A psychological instrument's reliability is determined by its ability to give consistent scores stably over time. The Mindler Battery's reliability assessment was completed through test-retest, split-half, and cronbach alpha methods. Test-retest reliability assesses the stability of a set of scores on a particular test for a given sample over time by repeating the same test. The correlation between the test scores over time determines the reliability of the test. The time interval between the test-retest administrations of the Mindler Battery was kept constant at an interval of 15 days.

The split-half method of reliability measures the internal consistency of the test. To achieve this measure, the test is divided randomly into two halves and correlated. In the Mindler Battery, the Spearman-Brown prophesy formula was used to correct the split-half coefficients.

Cronbach's alpha determines the internal consistency of the test items in continuous response format. As a guideline, reliability coefficients are deemed acceptable at levels equal or greater than .6 (Nunnaly & Bernsein, 1994). The reliability coefficients of the Mindler Battery are reported in Table 9.

Table 9

Reliability Indices of the Mindler Battery

Mindler Dimensions	Sample Size	Number of Items	The Split-Half Coefficient	Cronbach Alpha Coefficient	Test-Retest Coefficient
Interest	12,383	112	.84	.93	.62
Personality	12,787	80	.76	.91	.67
Aptitude	11,990	124	.86	.94	.71
Socio-Emotional Intelligence	11,818	51	.76	.89	.63

Validity analyses. The Mindler Battery's item validity was statistically established by computing corrected item-total correlations (see Table 6). Content validity was established subjectively by consulting with 120 Subject Matter Experts (SME's) selected through snowball sampling. Six SME's in each of the 20 careers in the career library reviewed and took the battery in paper-pencil format. SME's provided feedback about the relevance of the items to their careers and were then interviewed to gain new

perspectives or information about the measured constructs. Results and feedback were analysed by a team of psychometricians, researchers, and industry experts for validation. Feedback was incorporated in the initial item screening, item pool, and final battery results.

Standardized norms. Test scores obtained during the second round of data collection were rescaled to a 10-point system of norms, called sten scores, which fell in a normal distribution curve with a midpoint of 5.5. From the midpoint, five parts lie on each side with +/- .5 SD in the mean difference. The sten norms of the Mindler Battery were constructed to minimize differences between raw scores. This standard frame of reference was established to interpret test taker results by comparing them with the normative sample. The Mindler Battery includes sten norms for all dimensions across age, grade, and gender.

Phase III of the study established the Mindler Battery's psychometric properties. Reliability was established using three methods: test-retest, split-half, and cronbach's alpha. Validity was established through content and item validation. Finally, sten norms were prepared to aid scoring and interpretation of results.

Discussion

The purpose of this study was to develop a rationally based, psychometrically strong, multidimensional career decision-making battery for utility within the Indian context. Of the five dimensions initially proposed, orientation style was eliminated for statistical validation and used only for initial test taker screening. The four scales that were subjected for validation (Interest, Personality, Aptitude, and Socio-Emotional Intelligence) were tested across samples. The estimated reliability correlations were found to be quite high. The concern about dimension uniqueness was established through validity measures. Findings from the measurement indices revealed that the battery was highly reliable and results from the goodness-of-fit chi-square indices suggested that the predicted construct configurations and relations are acceptable.

In future, the confirmatory factor analysis method is suggested to test the Mindler Battery's factor structure according to the theoretical model. This method is advantageous as it will provide a more rigorous factor structure to the battery and will evaluate the measurement characteristics and construct validity of the confirmatory analysis separately.

The Mindler Battery can be used in schools, universities, and career counseling centers to help students identify their career choices. It could help students in grades 8 and 9 to determine which academic paths and subjects to pursue. Through the Mindler report, students in grade 10 to 12 can learn about courses and colleges to target, while college students can gain better understanding about their potential. The Mindler Battery usually takes 90 – 110 minutes to complete and provides a detailed report of each parameter in well-defined categories. A student who scores average or below average in a particular parameter is provided with a developmental plan within the report for each career in the library. Once students are aware of their potential career choices, strengths, and development plans, they experience less career anxiety and become more certain of their career paths.

Conclusion

To conclude, the Mindler Battery is a well-developed career decision-making instrument that integrates various success elements to help students make informed career choices. The Mindler Battery will be a useful tool for academicians, researchers, and school counselors who are interested in career development and predictors of career

success. Moreover, the researchers postulate that the Mindler Battery will be a useful tool among specialists and experts in career counseling, university career service centers, and human resource managers to help clients in their career development. The Mindler Battery is also a useful tool to employ with students who need deeper self-understanding to enable their successful and self-directed career management.

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