DOCUMENT RESUME

ED 460 157 TM 033 632

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TITLE Assessing the Multidimensionality of a Unidimensional Scale: The Problems and Potential of the Need for Closure Scale for Educational Research.

PUB DATE 2001-11-00

NOTE 28p.; Paper presented at the Annual Meeting of the Mid-South Educational Research Association (30th, Little Rock, AR, November 14-16, 2001). Contains areas of light type.

PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.

DESCRIPTORS Beliefs; *Cognitive Processes; Correlation; Educational Research; Factor Analysis; *Factor Structure; Higher Education; *Test Use; *Undergraduate Students

IDENTIFIERS *Closure; *Dimensionality (Tests)

ABSTRACT

The dispositional motivation of individuals to engage in information processing was studied through an instrument, the Need for Closure Scale (NFCS) (A. Kruglanski and others, 1996), developed to measure differences in the need for structure and closure. One goal of the two studies reported was to address criticisms related to the dimensionality of the measure and issues pertaining to its use as a unidimensional measure. The first study considered the proposed two-factor structure of the scale through the responses of 478 undergraduate students who also completed the Schommer Belief Scale (SBS) (M. Schommer, 1990). Results suggest that the NFCS is not unidimensional. The correlations between the NFCS and the SBS subscales demonstrated differential patterns, and exploratory factor analysis suggested two factors. A second study in which 210 college students completed the NFCS and the Defining Issues Test also suggested that the NFCS is multidimensional. Nevertheless, the instrument appears useful for educational research, although, until measurement issues are resolved, it is not appropriate to use the NFCS in clinical or educational practice. (Contains 2 figures and 35 references.) (SLD)

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RUNNING HEAD: Assessing multidimensionality

ED 460 157

Assessing the multidimensionality of a unidimensional scale: The problems and potential of the Need for Closure Scale for educational research

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TM033632

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As we go about our lives, we often find ourselves confronted with people who seem to need definite answers more so than others, irrespective of the valence of those answers. Many of them are highly uncomfortable in circumstances in which potential outcomes are unknown and strive to obtain "facts" that can be used to render clear and unambiguous judgments – seemingly recasting even the most complex and ill-structured problem situations in well-structured terms. Consider the following three examples:

Example 1: An employee who seeks and uses clear and definite structures in his/her life may exhibit considerable impatience with respect to an employer's thoughtful consideration of whether or not a raise will be given to employees within the company. Even if the employer mentions that the raise is predicated on the final year-end budget and other related factors, that employee may, nonetheless, exhibit irritation with the ambiguous nature of the situation. Although the individual certainly may prefer to obtain a raise, even more so he/she may desire to obtain a definite answer (positive or negative) due to a need to arrive at some closure on the matter. In contrast, other employees low in this structuring need may deal with the ambiguity by discussing why or why not the raises might be given (e.g., economic situation, costs/benefits to the company), using the issue as a springboard to other discussions (e.g., world economics, etc.), or simply choosing to focus on other activities at work that they could be satisfied with.

Example 2: A student may demonstrate low patience and lack involvement in those classes that fail to provide definite answers and, instead, ask students to use their own judgments in solving ill-structured problems. In contrast, other students may become quite involved in the knowledge construction process in these classes and actively become engaged in working on ambiguous problems in order to generate meaning and build connections in long-term memory.

Example 3: A client comes to therapy in order to obtain some type of relief of depression, desiring a solution, any solution to the problem. After a session or two, the clinician makes suggestions as to possible strategies for dealing with depression. The client willingly accepts these suggestions at face value without considering costs and benefits or approaches to strategy implementation. In contrast, a different client engages the clinician in a discussion about the effectiveness of those strategies and weighs each of them with respect to how well they may work for him/her.

In each of these cases, not only was the role of epistemics, or beliefs about knowledge, demonstrated, but also (and more importantly) motivated cognition (Cacioppo, Petty, & Jarvis, 1996). Specifically, in each story, the main characters demonstrated different motivational orientations to thinking about a problem at hand. In story 1, the main character worried excessively about the lack of solution to the raise issue, whereas other co-workers utilized this as an opportunity to engage the issue mentally. In story 2, the main character was disconcerted by the lack of structure afforded by the instructor and chose not to be engaged in problem solving, whereas his/her classmates appreciated the opportunity to work on ill-structured problems. In the final story, one individual chose to accept what the clinician stated at face value without thinking any further about the issue. whereas the second person adopted a questioning perspective.

Why might the individuals in these stories demonstrate differences in the motivation to process information? Quite simply, because each may perceive different costs/benefits associated with the activity of information processing itself. Indeed, although we often assume that individuals like the primary characters above may simply be acting arbitrarily in terms of their responses to the problems presented them, it is important to consider that their behavior is partly a function of the perceived costs and benefits associated with information processing. To the extent that individuals perceive processing in negative fashion, they should demonstrate less of a tendency to process information and greater reliance on available structures (internal and/or external). To the extent that benefits in processing are perceived, individuals should demonstrate heightened cognitive activity and less need to draw on or obtain immediate structures (Kruglanski, 1989).

In the following studies, individuals' dispositional motivation to engage in information processing activity will be ascertained by an instrument developed to measures differences in need for structure and closure: the *Need for Closure Scale*. One goal of this paper is to address criticisms related to the dimensionality of the instrument and issues pertaining to its use as a unidimensional measure (Neuberg, Judice, & West, 1997a). As such, the dimensionality of the instrument will be re-assessed in the two studies reported later. Secondly, despite the problems with the unidimensional interpretation, I propose that the scale does hold benefit for educational research and theory. Linking factors derived from the scale to other important educational constructs does this. This will be accomplished by way of structural equation modeling procedures. At this juncture, I turn to the theory behind the need for closure construct.

Theory behind need for closure: What does the scale supposedly measure?

According to Kruglanski and Webster (1996), individuals are constantly seeking to make sense out of their worlds and, as such, engage various processing opportunities in order to generate coherent and predictable models of their experiences. As such, individuals have a natural proclivity to create models of their experiences that can be used to structure later experiences, thereby obviating the ongoing need to generate knowledge anew. In other words, as individuals come into contact with new experiences, they often generate hypothetical models that are based more on personal theory and less on the data of experience (Kuhn, 1989).

In many instances, this tendency to rely on pre-existing schema has benefits. To be sure, it affords predictability in situations that contain constraints highly similar to previous events and allows for scripted action (Alba & Hasher, 1983; Anderson, 1984) when less variability in responding is needed. Or it may be useful as in the case where the actual data matches the personal theory (Anderson, 1984). For example a restaurant script affords individuals the predictability in how to behave and the order in which different events sequences are due to occur. Additionally, in many cases the circumstances of going into a restaurant, ordering, eating, and paying rely cohere with one's personal theory of what should go on in a restaurant. As such, cognitive structures have the potential to allow for less effortful processing of mundane or daily tasks – tasks that need not require effortful processing – and, at the same time, may afford relative accuracy when personal theory is consistent with relevant data. .

Even so, there is a downside to this tendency to structure information and to use them it unreflectively in many circumstances. Quite often, it is necessary to consider diagnostic information as opposed to prototypical information (Kruglanski, manuscript in preparation) when forming judgments. For example, the use of stereotypes is the result of generating an initial hypothesis about others based on prior knowledge and then under-adjusting that knowledge to fit the external data (Kruglanski, manuscript in preparation; Smith & Gordon, 1998). Unlike our primary structuring tendency (accomplished through the application of prior knowledge to new or relatively new circumstances), this requires going beyond what we *think* we "know" or what appears clearest to our perceptions to the *generation of multiple structures* (or models) in which to judge our experiences. In this case, the generation of competing models allows for better judgments to be made – with the obvious constraint that the most appropriate model is that which

fits relevant external information the best. It is this process that would appear to make us distinctly human.

Clearly, the first process in the act of "knowing" – perception – is the easiest to enact. In fact, this process occurs in automatic fashion (Bartlett, 1932; Higgins, 1996), drawing on prior knowledge to form on-line models of our experiences. In contrast, the second process appears to require a motivational component because it is clearly a more effortful process of *intentionally* constructing competing interpretations of experience. Thus, whereas the first process is generally an unintentional process, the second occurs when an individual is aware and active in the processing of information.

Although individuals often rely on previous structures to make sense out of their experiences, there are times when those structures within long-term memory fail to conform to the constraints of a situation. This may occur because too great of a discrepancy is noted between what is stored in long-term memory and the data of experience. In this case, a sense of incomprehensibility emerges. For example, although we may know what death is and what the stages of grief are, when someone we know or care about dies we may experience a sense a sense of shock and disbelief. In a sense, the structures that we have available for making sense out of the death experience on an intellectual level do not jibe with the personal implications aroused in us. Similarly, research in the moral judgment domain has found that individuals who attempt to recall and reconstruct moral arguments above their modal stage of moral development are less able to comprehend and re-create those arguments (Narvaez, 2001), presumably because they do not have an adequate schema available from which to interpret them accurately.

For those cases in which one fails to have adequate schema to structure their experience, they are faced with one of three choices. They can draw on whatever resources are available in order to construct a new model, thereby reorganizing their knowledge in order to adapt to an incomprehensible situation (e.g., Piaget, 1970); they can choose to adopt a strategy of obtaining a simple structure by means of relying on and seizing upon external information (e.g., attitudes and beliefs expressed by an authority figure such as a teacher or significant other) (Kruglanski & Webster, 1996); or they may simply languish in ambiguity as in the case of the office worker in story 1. In the second case, what we have is a motivated tendency to seek out the easiest solution to a problem without engaging in more sophisticated cognitive activity, whereas the first

represents a willingness to wrestle with prior knowledge in order to construct an adaptable solution to a problem.

According to Kruglanski and Webster (1996), individuals experience competing motivations to maintain and use simple structures or to avoid these structures in the service of constructing more sophisticated models of experience. Some of these motivations may be aroused by situational constraints such as time pressures, mental fatigue, or external distractions (Kruglanski, 1989; Kruglanski & Webster, 1996). Others may be related to personality dispositions (Webster & Kruglanski, 1994) – which is the focus of this paper. As such, individuals may choose to enact their cognitive apparatuses in order to generate competing models in order to test personal theories, whereas others may simply adopt the strategy of using what is already available and accessible in memory (Higgins, 1996) to make sense out of experience. Furthermore, individuals are faced with incomprehensible situations, some may tend toward constructing knowledge out of whatever is available to him/her, whereas others may simply "seize" upon whatever information is externally available in order to bring a sense of closure (Kruglanski & Webster, 1996). In general, it would appear that cognitive motivation plays a large part in how we ultimately go about processing information.

Need for nonspecific closure represents a personality dimension associated with particular motivational implications for processing. Specifically, individuals high in this need are assumed to be consistently motivated to obtain definite and simple structures (closure), to avoid circumstances that would require the generation of multiple competing models – "epistemic freezing – and to seize upon available information in order to structure experience in cases of incomprehensibility (Kruglanski & Webster, 1996). As such, costs associated with absence of closure may be loss of predictability, lack of enjoyment or interest in processing activity, the perception of processing as being too difficult or unrewarding and so forth. Perceived benefits of closure are predictability and order and a sense of completion on issues and a sense of certainty in one's knowledge. In contrast, those low in need for closure are more likely to generate competing hypotheses and to engage in constructive efforts (even when available cognitive structures in memory do not directly correspond to experience). In general, they may prefer to generate more complex structures and greater numbers of competing models out of a fear of invalidity (Webster & Kruglanski, 1994), desire for excitement, the perceived narrowing of

choices associated with simple structures, or fears of boredom engendered by closures obtained on simple knowledge representations (Kruglanski, manuscript in preparation).

The Need for Closure Scale was developed by Kruglanski and associates in order to measure individuals' dispositional need to structure their experiences, avoid ambiguity, and to seek closure as quickly as possible. Given its non-directional focus, it addresses individuals' desire to obtain a "definite answer to problem, any answer" (Kruglanski & Webster, 1996). Thus, unlike specific closure that is premised on motivational accounts in which individuals seek out answers to fit their preferences (e.g. ego-enhancing), the motivation being tapped by the Need for Closure Scale is nonspecific. Finally, the scale has been utilized in a number of experimental studies demonstrating predictive validity. In line with Kruglanski's theory of lay epistemics (1980), the scale has been demonstrated to predict primacy effects (Webster & Kruglanski, 1994), aspects of group interaction (DeGrada, Kruglanski, Mannetti, & Pierro, 1999), self-enhancing beliefs (2000), low susceptibility to persuasion (Kruglanski & Webster, 1993), and aspects of memory and judgment (Dijksterhuis, Knippenberg, Kruglanski, & Schaper, 1996). Additionally, it has been shown to discriminate between known groups (Webster & Kruglanski, 1994) and exhibit reasonable discriminant validity with other social psychological constructs such as dogmatism, authoritarianism, and need for cognition (Webster & Kruglanski, 1994).

Problems with the Need for Closure Scale

Despite its demonstrated reliability and its ability to predict both expected and unexpected social psychological outcomes (Kruglanski, Atash, DeGrada, Mannetti, & Webster, 1997) concerns have been raised regarding the scale. One of the main concerns has been raised by Neuberg et al. (1997a) who have suggested that the scale measures is multidimensional as opposed to unidimensional as originally argued by Kruglanski and colleagues.

A primary focus of Neuberg et al. (1997a) critique was that Kruglanski and his colleagues constructed the Need for Closure Scale based on two earlier, but conceptually distinct, scales derived from Kruglanski's theory of lay-epistemics (Kruglanski, 1980): Need for Structure and Personal Fear of Invalidity (Thompson, Naccarato, & Parker, unpublished manuscript). According to Neuberg et al. (1997a), Thompson et al.'s measure – reformulated by Neuberg and Newsom (1993) – measures the same thing as Kruglanski's scale. In effect, both address need for closure (although using somewhat different terminologies) since they were both largely derived from Thompson et al's measure. Where Neuberg et al. (1997a) diverge from

Kruglanski and colleagues was in their use of items from the Personal Fear of Invalidity Scale (Thompson et al., unpublished manuscript). In effect, given Thompson et al.'s assertion that the two scales represent distinct constructs, the inclusion of items from both in the Need for Closure Scale is inappropriate. According to Neuberg et al. (1997a), three items comprising Kruglanski's Decisiveness facet were taken from the Personal Fear of Invalidity Scale – thereby making it "highly redundant" with that scale.

Neuberg et al. (1997a) supported their argument by demonstrating that the subscales of the NFCS were differentially correlated to measures of a number of different social psychological constructs including dogmatism, authoritarianism, and need for cognition. They reasoned that if the Need for Closure Scale is truly a unidiminsional instrument, then the patterns of correlations among the subscales with other scales should be similar. Secondly, they questioned Webster & Kruglanski's (1994) approach to factor analyzing the Need for Closure Scale by entering the correlations of all items into a measurement model in which all items loaded onto the superordinate need for closure construct and then correlated the error terms for each item within each subscale. In effect, they argued, Webster and Kruglanski (1994) artificially improved the fit of the model by correlating the error terms – a fit that was still less than optimal.

Kruglanski et al. (1997) challenged the assertion that he proposed a unidimensional model to the scale by suggesting that his scale measures "heterogenous potential *sources* [italics added]" (p. 1009) of need for closure rather than aspects of the construct. As such, he argued that the full-scale score should be used because each subscale addresses a different perceived cost and or benefit to obtaining or not having closure. Ironically, this approach to explaining the use of the full scale appears to be a convenient explanation given that his earlier scale analytic procedures and earlier remarks that the scale measures "a single latent variable" (Neuberg, West, Judice, & Thompson, 1997).

Based on the literature, it is clear that there are ambiguities regarding whether or not the Need for Closure Scale should be used as a unidimensional instrument. On the one hand, the scale has demonstrated significant reliability and validity in many studies noted in the experimental social psychology literature. However, according to Neuberg et al.'s (1997a, 1997b) critiques, there is evidence to support the assertion that the scale should be considered as multidimensional in nature – assessing two distinct processing tendencies: Need for Closure and Decisiveness/Fear of Invalidity. One function of the following research, therefore, is to re-assess

the dimensionality of the instrument in order to determine whether or not Neuberg et al.'s (1997) arguments hold up in four tests (two with exploratory factor analysis, two with confirmatory factor analysis) addressing the factor structure of the scale.

Given the ambiguity of the research and literature on the Need for Closure Scale, the question as to whether or not it holds potential benefits for educational research and practice is a relevant one. Although this question may be in the forefront of the reader's mind at this moment, it must be noted that even if the scale does tap two distinct processing tendencies, each may ultimately serve to benefit research in education – and without discarding the need for closure construct. To be sure, Webster and Kruglanski's (1994) and Newberg and Newsom (1993) have operationalized the construct of need for closure in two different, yet clearly related scales and, as such, have come up with striking similarities in their experimental research. Thus, although the Need for Closure Scale may tap two distinct constructs, we must remember that one may still adequately capture need for closure.

Potential benefits of the Need for Closure Scale in educational research: Orientation to the following studies

Despite the problems with the Need for Closure scale described above, it may hold some utility in educational research as a two-factor scale: assessing Need for Closure and Decisiveness. As discussed earlier, dispositional need for closure represents a tendency to view information processing as high on cost and low on benefits (Kruglanski & Webster, 1996). This appears to be of high relevance in education because many individuals we seek to instruct fail to demonstrate reliable motivation to think about issues and to engage in more complex knowledge construction activities – especially when faced with ill-structured learning situations or situations in which they must find some way to comprehend material that is difficult to understand (King & Kitchener, 1994; Perry, 1970).

At this point, the reader may wonder how exactly the Need for Closure Scale may benefit research in education. Within the educational and psychological literature, engagement in learning tasks has been described as being heavily mediated by motivational processes. In effect, motivation serves as an intermediate point between personal and task-related beliefs and task engagement (Bandura, 1977; Husman & Lens, 1999), the assumption being that particular beliefs motivate individuals to engage in particular types of processing activities. Given that the Need for Closure Scale measures dispositional tendencies with respect to information processing, the

inclusion of the scale in research could serve as a link between predictors of task engagement and outcomes of that engagement.

Thus, one way in which the scale may be used is to examine the relationships between closure needs, decisiveness, and educational outcomes. Specifically, if the two factors proposed to comprise the Need for Closure Scale, Need for Closure and Decisiveness, were to demonstrate significant relationships to different kinds of educational outcomes (e.g., grades, changes in conceptual knowledge, changes in reasoning ability), then it would seem that the scale might be useful as an tool for studying intraindividual difference factors associated with outcomes of learning. This proposition is explored in study 2 below as the link between need for closure and decisiveness, academic achievement, and moral reasoning is examined.

A second aspect of the looking at benefits of the scale is to look at how the proposed factors within the scale are related to particular types of belief structures. In the motivation literature many of the belief structures tend to be task-specific, addressing such issues as instrumentality (Husman & Lens, 1999) or self-efficacy (Bandura, 1977). In contrast, given the domain-general nature of the Need for Closure Scale, it would make sense that beliefs associated with the scale factors would be domain-general in nature as well. One possible candidate for inclusion in this type of relationship is epistemological beliefs (Schommer, 1990), or beliefs about the nature of knowledge. Thus, in study 1, the relationship between two epistemological belief factors are included as predictors of two proposed Need for Closure Scale factors.

Prior to analyzing the links between the Need for Closure Scale and measures associated with the constructs presented above, the proposed factor structure of the scale is re-tested. If the two-factor structure holds up then it will be included in two models that link Decisiveness and Need for Closure to epistemic beliefs, academic achievement, and moral reasoning. If a single-factor holds up, then obviously, only Need for Closure will be related to these variables.

Study 1

Methods

Subjects

This study was based on the responses of 478 subjects. 105 subjects were male, while 373 were female. In terms of ethnicity, 87 subjects reported being African American, 3 Hispanic, 372 white, 7 Asian, and 5 as "Other".

Measures

*Need for Closure Scale (*hereafter, the *NFCS).* The NFCS was created in order to assess the dispositional need to arrive at definite and unambiguous solutions to problems. This measure contains five separate facets, each theoretically addressing a separate aspect of the need for closure construct: Preference for Order, Preference for Predictability, Decisiveness, Discomfort with Ambiguity, and Close-Mindedness (Webster & Kruglanski, 1994).

Preference for Order refers to an individual's need to have order and structure within one's environment, whereas Preference for Predictability addresses one's desire for secure and certain knowledge (Webster & Kruglanski, 1994). The third facet, Decisiveness, refers to one's perceived "urgency" to obtain closure on a topic, while Discomfort with Ambiguity addresses the assumption that individuals high in need for closure dislike the absence of an answer to a problem, even if the answer is not preferable. Finally, close-mindedness addresses the "unwillingness to have one's knowledge confronted" (Webster & Kruglanski, 1994, p. 1050).

The overall scale is reported to have reasonably high reliability in the .70's to .80's and has been demonstrated across multiple studies (e.g., Neuberg, et al. 1997a; Webster & Kruglanski, 1994). In terms of the validity of the NFCS, studies have demonstrated its ability to discriminate groups theoretically assumed to differ in addition to predicting a number of "unobvious" social psychological outcomes (Kruglanski, Atash, DeGrada, Mannetti, & Webster, 1997.

*Schommer Belief Scale (*hereafter, the *SBS).* This scale is composed of 63 items designed to measure subjects' epistemic beliefs, or beliefs about knowledge. The scale has been utilized in a number of research studies during the 1990's and has demonstrated good reliability and predicted a number of outcomes related to reading comprehension (Schommer, 1990; Schommer, Crouse, & Rhodes, 1992), conceptual change (Quian & Alvermann, 2000), cognitive processing (Kardash & Howell, 2000), & academic achievement (Schommer, 1993).

This scale is composed of 12 subscales that are entered into factor analyses as separate items, thereby allowing higher-order factors to emerge. The subscales tap beliefs that knowledge is certain and one should seek single answers; that ambiguity should be avoided and that one should not try to integrate information; that one cannot learn how to learn, ability to learn is innate, success is unrelated to hard work, and concentrated effort is a waste of time; that learning is quick, one should depend on authority, and that one should not criticize authority. Generally,

research has repeatedly demonstrated the presence of 3-4 factors in the scale: Quick Learning, Simple-Certain knowledge (1-2 factors), and Fixed Ability (Schommer, 1998).

Background information. Subjects' ethnicity and gender were obtained from a separate information sheet administered to them.

Procedure

This data was collected as part of a larger data collection investigating relationships among personal factors (e.g., beliefs, motivations) and moral judgment. For this portion of the research, subjects were given the SBS, NFCS, and background information sheet in nine sections of an undergraduate human development course. They were asked to fill out these measures at home and bring them back to an out-of-class session in order to complete the second of three rounds of data collection. All subjects were informed of the confidential and voluntary nature of the study. They were also informed that they would receive extra credit for participation.

Results

Plan of analysis

This analysis can be broken down into several steps. First, the intercorrelations between the Schommer Belief Scale (SBS) and Need for Closure Scale (NFCS) were calculated in order to determine if any systematic patterns would emerge. Theoretically, if the NFCS operates as a unidimensional scale, then its subscales should demonstrate similar patterns of correlations with the subscales from the SBS. Secondly, exploratory factor analyses were conducted on the subscales on the SBS and then on the Need for NFCS in order to form initial hypotheses at to how these subscales might be modeled during subsequent structural equation modeling procedures. It was predicted that 3-4 factors would emerge in this exploratory analysis – which is consistent with previous research using the SBS. More importantly, it was predicted that 2 factors, as opposed to 1, would emerge in the exploratory analysis of the NFCS, thereby demonstrating multidimensionality

Next, a measurement model was conducted using Lisrel 8.50 (Joreskog & Sorbom, 2001) in order to ascertain what latent constructs (e.g., Need for Closure, Decisiveness) and indicator variables should be entered into the final structural equation model. Finally, a structural equation model was generated to test the relationship between SBS and NFCS factors. It was hypothesized that the SBS factors would differentially predict those factors associated with the

NFCS, thereby providing additional support for the argument that the NFCS is comprised of more than a single factor.

Preliminary Analyses

Prior to conducting the factor analyses, the reliability of the SBS and NFCS was ascertained. Reliability of the NFCS was .8285, which was reasonably high. Alpha for the SBS was .6310, demonstrating reliability on the lower end of acceptability.

The next analysis examined the patterns of correlations between the NFCS and SBS subscales. Pairwise deletion was utilized in order to get the full range of correlations between subscales. Based on an analysis of the correlation matrix that was generated, it was clear that the NFCS subscales revealed different correlational patterns with the SBS subscales. Preference for Order correlated with the following SBS subscales: Can't Learn to Learn ($r=-.215$, $p<.001$), Avoid Ambiguity ($r=-.147$, $p=.001$), Seek Single Answers ($r=.250$, $p<.001$), and Learn First Time ($r=.206$, $p<.001$). Preference for Predictability correlated with the following subscales: Can't Learn to Learn ($r=-.120$, $p=.008$), Ability to Learn is Innate ($r=.129$, $p=.005$), Avoid Ambiguity ($r=.241$, $p<.001$), and Seek Single Answers ($r=.125$, $p=.006$). The largest significant correlation between Decisiveness and any SBS facet was with Concentrated Effort is a Waste of Time ($r=.130$, $p=.005$).

Discomfort with Ambiguity correlated with the following SBS subscales: Knowledge is Certain ($r=.126$, $p=.006$), Can't Learn to Learn ($r=-.234$, $p<.001$), Depend on Authority ($r=.178$, $p<.001$), Ability to Learn is Innate ($r=.159$, $p=.001$), Avoid Ambiguity ($r=.297$, $p<.001$), Seek Single Answers ($r=.140$, $p=.002$). Finally, Close Mindedness correlated with the following SBS scales: Learning is Quick ($r=.100$, $p=.030$), Knowledge is Certain ($r=.146$, $p=.002$), Don't Criticize Authority ($r=.189$, $p<.001$), Ability to Learn is Innate ($r=.104$, $p=.026$), Avoid Ambiguity ($r=.365$, $p<.001$), Seek Single Answers ($r=.159$, $p=.001$), and Avoid Integration ($r=.190$, $p<.001$). Based on this preliminary analysis, the differential patterns of correlations between the NFCS and SBS subscales suggest a lack of unidimensionality in the NFCS.

Exploratory factor analyses

In the following two analyses, the factor structures of the NFCS and SBS were analyzed. In each analysis, listwise procedures were used in order to delete those subjects who failed to complete all protocols during data collection.

As suggested by Schommer (1993), the mean scores of the 12 subscales (comprising the SBS) were entered as variables into exploratory factor analysis in SPSS 10.0. Utilizing Varimax rotation and an eigenvalue cutoff of 1.0, three factors emerged from the data, accounting for 42.0% of the explained variance in the scale. The highest loading subscales associated with the first factor were Can't Learn to Learn, Learn the First Time, Concentrated Effort is a Waste of Time, and Knowledge is Knowledge is Certain. Those subscales loading most highly onto the second factor were Avoid Integration, Seek Single Answers, and Avoid Ambiguity. The highest loading subscales on the third factor were Learning is Quick, Ability to Learn is Innate, Don't Criticize Authority, and Success is Unrelated to Hard Work. Factor 1 accounted for 15.104% of the variance and was labeled Fixed Ability. Factor 2, accounting for 13.769% of the variance, was labeled Simple Knowledge. Finally, Factor 3, which accounted for 13.246% of the variance in SBS scores, was labeled Quick Learning. Although they are approximations (not all subscales loaded onto the same factors), the labels for these factors were derived from previous research conducted by Schommer (1990, 1993, 1998).

Most pertinent to the current investigation, the NFCS subscales were entered as variables using SPSS 10.0. Using Varimax rotation and an eigenvalue cutoff of 1.0, two factors were found to emerge accounting for 63.254% of the variance. Factor 1, labeled as "Need for Closure" accounted for 41.349% of the variance. This factor was comprised of the following subscales: Preference for Order, Preference for Predictability, Discomfort with Ambiguity, and Close-Mindedness. The only subscale comprising the second factor was Decisiveness accounting for 21.906% of the variance. Thus, it retained its name as "Decisiveness". Thus, based on this analysis, the suggestion that the NFCS is comprised of more than one factor was supported.

Testing the multidimensionality of the NFCS through structural equation modeling.

The purpose of utilizing structural equation modeling was to further demonstrate the multidimensionality of the NFCS by modeling unique relationships between the SBS factors and NFCS2 and Decisiveness. To be sure, if the best model is one in which the SBS factors load differently and uniquely onto the two NFCS factors, then this would further indicate that the NFCS is not merely a unidimensional instrument and should not be utilized as such. In addition, it was thought that by exploring the relationships between the epistemic belief factors and the two NFCS factors generated earlier, this would suggest potential avenues for theory building and educational practice.

As in the previous analysis, listwise deletion procedures were used in order to delete those subjects who failed to complete all protocols during this data collection, resulting in an N of 436. The correlation matrix obtained by correlating all of the NFCS and SBS subscales was subsequently entered into Lisrel 8.5 (Joreskog & Sorbom, 2001).

As a first step in any structural equation modeling procedure, it is generally best to construct a measurement model (Schumacker & Lomax, 1996). This model represents the expected relationships between observed variables and their latent factors. In several attempts at constructing a measurement model by loading the NFCS and SBS subscales onto their respective factors, poor fitting models were observed in the form of high and significant chi-square values (significant chi-square values indicate poor model fit), high Root Mean Square Error Approximations (above .05), and lower values on the Goodness of Fit and Adjusted Goodness of Fit indices (above .90 indicates good fit).

In the final measurement model, the latent construct "Need for Closure" was predicted by two of the five NFCS subscales, Preference for Order and Preference for Predictability. Due to the large error variances associated with Discomfort with Ambiguity and Close-Mindedness, these two subscales were not included in the model. In contrast to the Need for Closure construct, the "Decisiveness" factor was only predicted by the Decisiveness subscale.

In terms of epistemic beliefs, a superordinate factor called, "Belief in Simple and Certain Knowledge" was constructed, predicted by the SBS subscales Knowledge is Certain, Seek Single Answers, and Avoid Integration. It should be noted that although the subscale, Knowledge is Certain, was more highly associated with the Fixed Ability factor during the exploratory factor analysis, it also loaded highly onto the Knowledge is Simple factor. As such, it made theoretical sense to include it in the same superordinate factor with the other simple knowledge subscales. The second epistemic belief factor was derived from the subscales Success is Unrelated to Hard Work, Learning is Quick, and Don't Criticize Authority, which partially constituted the third factor obtained during the earlier factor analysis. This factor was re-named "Learning is Quick".

The fit indices for this model demonstrated reasonably good model fit. Although the p-value for the chi-square index was significant at p=.04865, it certainly neared non-significance. In addition, given that chi-square has been shown in structural equation modeling to be sensitive to sample size (Schumacker & Lomax, 1996), the value may not have been significant with a smaller sample size as. The second key index, Root Mean Square Error Approximation, fell at

.035 demonstrating good fit (below .05 suggests good fit). Additional indices suggesting good fit were the Normed Fit Index (.88), Comparative Fit Index (.95), Goodness of Fit Index (.98), and Adjusted Goodness of Fit Index (.97), all scaled from 0 to 1. Values at .90 and above on each suggest good fit (Schumacker & Lomax, 1996). As expected, all paths from observed variables to their respective latent constructs were significant.

Based on a good fitting measurement model, the next procedure is to construct a model indicating the relationships among latent variables. In this analysis, the epistemic factors, Simple and Certain Knowledge and Learning is Quick, were entered as predictors of Need for Closure and Decisiveness. The final model demonstrated that Belief in Simple and Certain Knowledge and Learning is Quick both predicted Need for Closure. In contrast, only the path from Belief in Simple and Certain Knowledge predicted Decisiveness, suggesting that the belief that Learning is Quick is not related to Decisiveness. As with the last model, this one also demonstrated reasonably good fit, although in this case the fit indices were less favorable. The chi-square value was significant at .00651; however, the Root Mean Square Error Approximation was .045. Although the Normed Fit Index was .85, the Comparative Fit Index suggested good fit at .92. Finally, the Goodness of Fit and Adjusted Goodness of Fit indices suggested a good model at .98 and .96, respectively.

Dicussion

Based on this set of analyses, the hypothesis that the Need for Closure Scale (NFCS) is not a unidimensional instrument was supported. First, the correlations between the NFCS subscales and the SBS subscales demonstrated differential patterns of relationships. As argued by Neuberg et al. (1997a), if the NFCS is indeed a unidimensional instrument, then it would be assumed that its subscales would demonstrate similar relationships with other related variables. Clearly, this was not the case. Secondly, exploratory factor analysis suggested the presence of two factors constituting the NFCS, accounting for a significant proportion of the variance. These factors were labeled Need for Closure (Factor 1) and Decisiveness (Factor 2). As a final test of the multidimensionality of the NFCS, a structural equation model was generated that examined the relationships two epistemic factors, Beliefs in Simple and Certain Knowledge and belief that Learning is Quick, the two NFCS factors. Results suggested that Beliefs in Simple and Certain Knowledge and the belief that Learning is Quick exhibited different patterns of relationship with the NFCS factors, suggesting different epistemic belief effects on the constructs, Need for

Closure and Decisiveness. Whereas Beliefs in Simple and Certain Knowledge and the belief that Learning is Quick predict Need for Closure, only Belief in Simple and Certain Knowledge predicted Decisiveness. In study 2, the relationship between the two proposed factors and moral reasoning and academic performance are ascertained.

Study 2

Subjects

In this study, 235 subjects were administered the Defining Issues Test and Kruglanski's Need for Closure Scale during two separate administrations (2 classes during spring, 2001 and 2 classes during summer, 2001) at a Southeastern university in an undergraduate human development class. One hundred seventy-seven subjects identified themselves as white, 41 as African American, two as Hispanic, and four as "Other". Five subjects were left unidentified. Subjects' grade point averages ranged from 1.00 to 4.00 on a 4.00 scale. Although 235 subjects participated in the study, 25 did not pass the validity check in the Defining Issues Test (see below). As a result, 210 subjects were retained for subsequent analysis.

Measures

Need for Closure Scale (NFCS). See description in study 1.

Definining Issues Test (DIT). This test assesses how individuals reason about different moral issues. In this test, subjects read moral dilemmas and then respond to stage-typed moral arguments by rating their perceived degree of importance – after which they rank them. The point is to obtain an idea of how individuals come to make judgments about moral issues by examining the patterns found in subjects' advocacy of stage-typed items. The two main developmental indices provided by the DIT are P, the average ranked principled item, and N2, a recent extension of the P score that adjusts for lower stage reasoning. The DIT has over 25 years of empirical support for its validity and reliability and has been used in hundreds of studies. See Rest et al. (1999) for validity and reliability information.

Background measures. Subjects' scores (math, social studies, science, English, composite) on the American College Test and/or College Board Scholastic Aptitude Test (verbal, math, composite) were obtained with permission from participants in this study. Additional background information includes GPA and ethnicity.

Procedures

Subjects in the spring 2001 human development classes were administered the aforementioned questionnaires during class period. Those in the summer 2001 classes were given the measures to take home and bring back during the next class period. All subjects were instructed on the confidentiality and voluntary nature of the study. Extra credit was given for participation.

Results

Plan of analysis

In this set of analyses, several steps were conducted. First, an exploratory factor analysis was again conducted in order to examine the factor structure of the NFCS. It was hypothesized that the two-factor structure observed in study 1 would be replicated. Next, a measurement model was constructed using the NFCS subscales, moral reasoning indices (P and N2), verbal reasoning indices (ACT English and Social Studies scores), and grade point average. Finally, the pattern of relationships among these variables was examined in a structural equation model. It was hypothesized that if the two-factor structure was reproduced, then they would exhibit differential patterns of relationships to moral reasoning and grade point average. The purpose of including verbal reasoning indices was to offer a possible competing factor that might contribute more to the outcome variables than either Need for Closure and/or Decisiveness.

Exploratory factor analysis

As in study 1, the NFCS subscales were entered as variables into factor analysis using SPSS 10.0. Using Varimax rotation and an eigenvalue cutoff of 1.0, a two-factor solution emerged, thereby replicating the factor structure obtained in the first study. The cumulative variance accounted for in this model was 65.042. Interestingly, although the Decisiveness subscale comprised the bulk of the variance in the second factor, Discomfort with Ambiguity also loaded highly on this factor (-.599) as well as the first factor (.579).

Modeling the relations between NFCS factors, grade point average, and moral reasoning

After several iterations, the final measurement model involved loading the NFCS subscales, DIT indices, ACT domain scales, and grade point average onto five latent constructs: Verbal Ability, Moral Reasoning, Need for Closure, Decisiveness, and Academic Achievement. In this model, grade point average was the only indicator of Academic Achievement as was the

Decisiveness subscale the only indicator of the factor, Decisiveness (as in the previous structural equation modeling analysis). As such, the error variance for both was set to zero.

The final model included Preference for Order and Preference for Predictability as the clearest indicators of the Need for Closure factor. Although Discomfort with Ambiguity loaded highly on both Need for Closure and Decisiveness factors during the earlier exploratory factor analysis, it was allowed to load only onto the Need for Closure factor in the model. This is because the subscale loaded highly onto the Need for Closure factor in study 1 (suggesting a measure of replicability), efforts to load the subscale uniquely onto the Decisiveness factor resulted in non-positive definite matrices, and there was no theoretical justification for loading it onto the Decisiveness factor. As with study 1, Close-Mindedness was not included in the final model.

The fit indices for the final measurement model indicated acceptable fit. The chi-square value was almost non-significant at p=.03180, while the Normed Fit Index and Comparative Fit Index fell at .94 and .98, respectively. Additionally, the Goodness of Fit Index and the Adjusted Goodness of Fit Index indicated good fit with values of .94 and .90. The primary index suggesting less than optimal fit was the Root Mean Square Error Approximation, which fell at .068.

Based on the reasonable fit of the final measurement model, the latent variables were entered into a structural equation model with Moral Reasoning and Academic Achievement predicted by Verbal Ability, Need for Closure, and Decisiveness. The resulting model demonstrated fair fit with significant paths from Verbal Ability to Moral Reasoning and Academic Achievement. Need for Closure exhibited only one significant path, which was to Moral Reasoning. The paths from Decisiveness to Academic Achievement and Moral Reasoning were both non-significant. With respect to the model fit, the chi-square value was significant at .00756, while the Root Mean Square Error Approximation falling at .79 – clearly less than optimal. Even so, the Normed Fit Index, Comparative Fit Index, Goodness of Fit Index, and Adjusted Goodness of Fit indices suggested reasonably good fitat .93, .97, .95, .88, respectively.

Discussion

Based on this second set of analyses, it was again clear that the NFCS is not a unidimensional instrument, but is rather multidimensional. Not only were two factors extracted during exploratory and confirmatory factor analyses, but also the scales demonstrated differential

relationships with one of two outcome variables – Moral Reasoning. Specifically, only Need for Closure was related to this variable, while the path from Decisiveness to this factor was non-significant.

Interestingly, neither Need for Closure or Decisiveness was related to Academic Achievement as measured by grade point average. This may be explained by the fact that grade point average was the only indicator of academic achievement and, as such, may have been too unstable a predictor. This interpretation is supported by the fact that, despite the range of students in the undergraduate classes by year (freshmen to senior), by and large most of the classes were composed of freshmen and sophomores. Given that many younger college students do not do well during their first years and only later come to develop a more stable approach to their academics as they gain greater understanding of the college experience (Beers, 1988), a broader understanding of what it means to learn (Perry, 1970; Schommer, 1998), and more experience within their chosen fields of study (King & Kitchener, 1994), the case may be made that grade point average is probably a better predictor among older, as opposed to younger, college students. In line with this interpretation, lower grades during one's first couple of years are more likely to have a larger impact on grade point average as a function on the law of large numbers, whereby extreme scores (e.g., negative or positive) exert less weight on a distribution with increased sample size (e.g., number of classes in which grades are obtained).

Conclusion

The two studies reported above provide evidence that the NFCS does not operate as a unidimensional instrument, but rather as a multidimensional one. To be sure, in all factor analyses, two factors were generated from the scale: Need for Closure and Decisiveness. Additionally, when an important belief component – epistemic beliefs – was incorporated into a model as a predictor of the two NFCS factors, different effects were noted. Similarly, different outcome effects were noted when the NFCS factors were entered into a model predicting GPA and Moral Reasoning. Whereas GPA was predicted by neither factor, Moral Reasoning was predicted only by Need for Closure. This suggests that the two factors may have different educational implications.

Based on this research, the hypotheses under study were confirmed, suggesting that the NFCS can be fruitfully employed in educational theory and research. Even so, it is not suggested that the NFCS factors be utilized as an assessment device in order to determine individual

students' or clients' desires for closure and/or tendencies toward decisiveness. Quite simply, given additional, as yet unresolved measurement issues associated with the NFCS, it is clear that using the scale in clinical or educational practice is inappropriate. It is suggested that until these issues are resolved, or more effective ways of measuring need for closure and/or decisiveness are devised, that the NFCS be utilized in experimental or quasi-experimental designs to examine mean differences or to test correlational patterns between need for closure, decisiveness, domain-general belief structures, and educational outcomes.

As a final note, although the studies in this research address issues pertaining mainly to the association between need for closure and decisiveness and epistemic beliefs, grade point average, and moral judgment development, the reader should note that there are additional areas in which the NFCS may be applied. For instance, given the link between need for closure and memory (Dijksteruis et al., 1996) and persuasive (Webster & Kruglanski, 1994) effects, it seems plausible that need for closure may be fruitfully applied to the study of these phenomena within the educational content. To be sure, the extent to which students pay attention to and actively store information as well as the degree to which they are influenced by the teacher and each other may be partially determined by their needs for closure. Additionally, although Smith and Gordon (1998) found a relationship between stereotype usage and need for structure using Neuberg and Newsom's measure, it may be hypothesized that stereotype use might also be found among individuals who are high in closure needs, as assessed by the Need for Closure factor in the NFCS. Thus, this type of research may go a long way towards the study and reduction of bias within the classroom by teachers and students. Regarding Decisiveness, given the limited research in education this factor may hold future promise with respect to looking at how students engage academic and social information and how teachers ultimately formulate and enact decisions.

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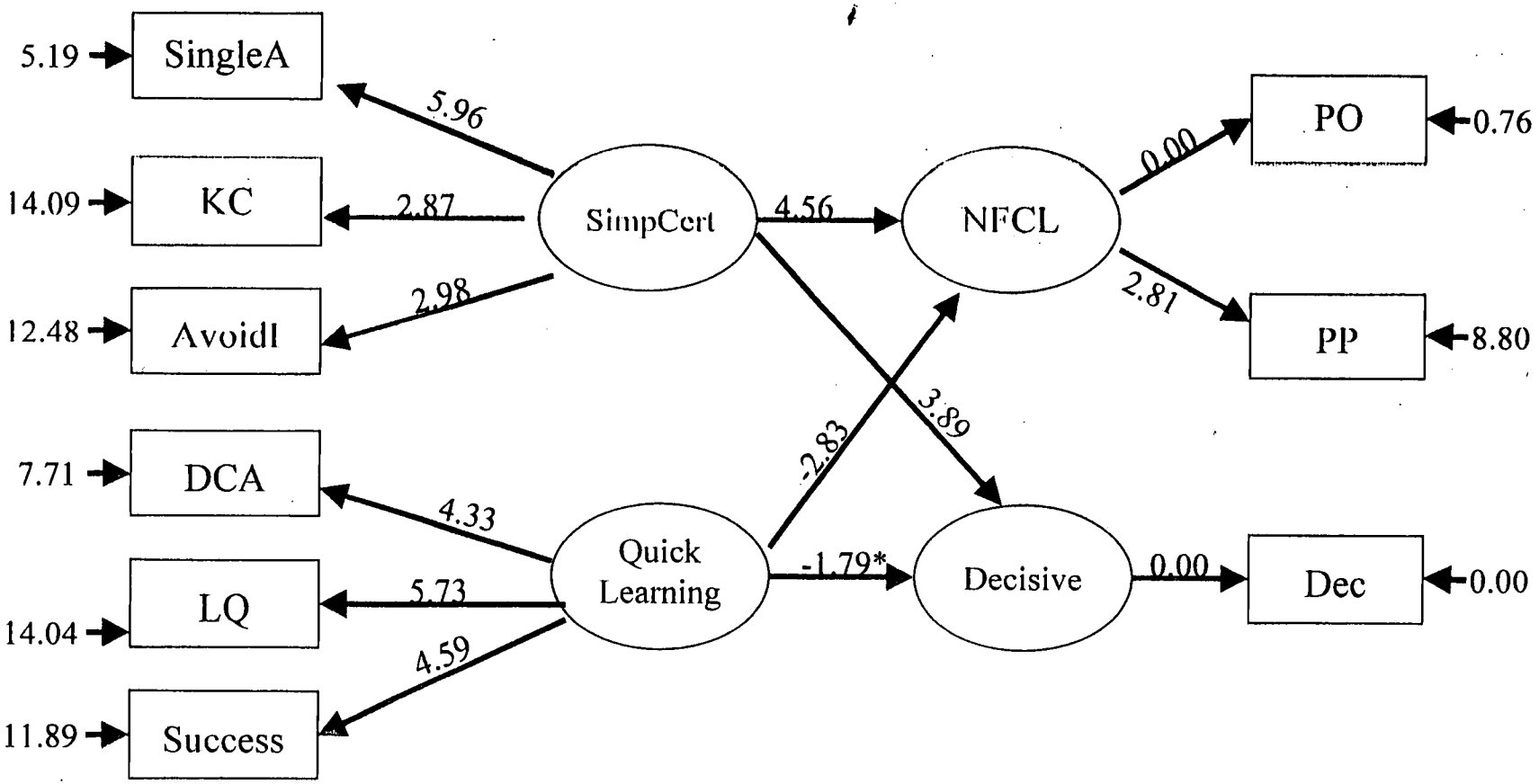

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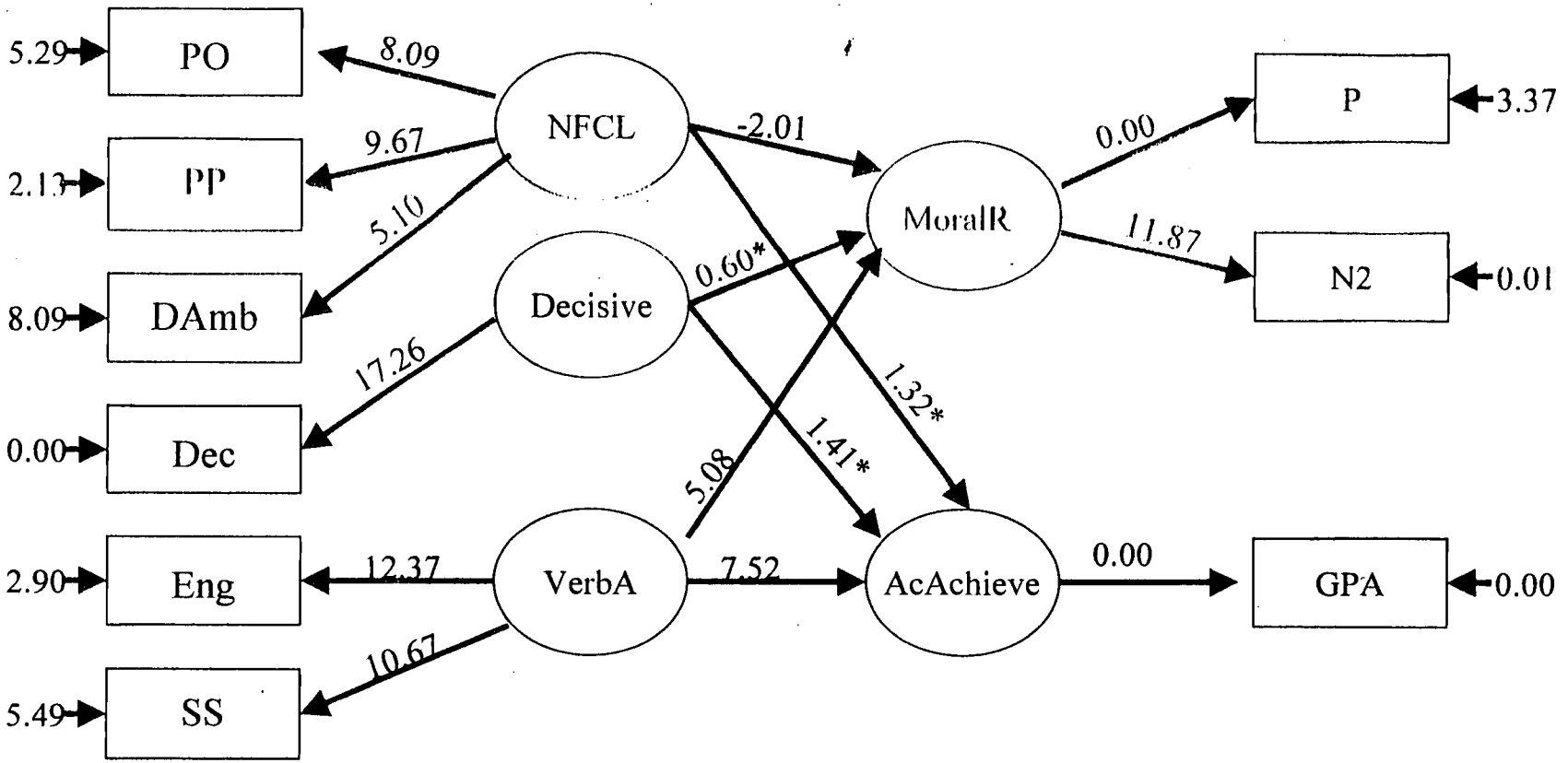
NFI=.85, CFI=.92, AGFI=.96

All values significant except those denoted by *



Chi-Square=38.56, P-value=.00756, RMSEA=0.079,
NFI=.93, CFI=.97, AGFI=.88

All values significant except those denoted by *

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