



GENERALIZABILITY OF DELAY OF GRATIFICATION: DIMENSIONALITY AND FUNCTION¹

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Summary.—There is a debate about the factor structure of adults' ability to delay gratification and mixed findings concerning the relationship between delay of gratification and achievement. Three studies were conducted to show that delay of gratification had two components. In Study 1, exploratory factor analyses showed that the Generalizability of Deferment of Gratification Questionnaire had two factors: Controlling-Impulse and Planning-and-Waiting. Study 2 verified the two-factor structure by confirmatory factor analysis and demonstrated acceptable reliability, construct and divergent validity. Specifically, Planning-and-Waiting was correlated with delay-discounting, self-control, uncertainty avoidance, Openness, Conscientiousness, Agreeableness, and self-efficacy, whereas Controlling-Impulse was correlated with self-control, Conscientiousness, and Agreeableness. Moreover, Planning-and-Waiting was the unique predictor of CFC-Future, but Controlling-Impulse predicted substantive variance in both CFC-Future and CFC-Immediate. Study 3, using multi-wave and multi-source data, further showed that only Controlling-Impulse was an important predictor of long-term performance and creative performance, supporting the distinctiveness of the two factors.

Delay of gratification is a choice orientation in which individuals try to forego an immediate gratification to attain a more valuable outcome later on (Mischel, 1974). Many studies have documented the importance and implications of the ability to delay gratification in early childhood for lifelong development (see Ayduk, 2007, for review). As a kind of self-regulation, previous research even indicates that delay of gratification has a bigger effect on academic performance than IQ does, because delay of gratification may help students display more academic engagement behavior (Duckworth & Seligman, 2005).

Although delay of gratification is so important, its structure is still not clear. The experimental paradigm of delay of grati

abandoning enjoyment and maintaining goals—this has never been supported in empirical research. There are inconsistent results regarding the relation between delay of gratification and other constructs in previous research. For instance, delay-discounting is often used as an equivalent of delay of gratification (Reynolds, De Wit, & Richards, 2002), but the relation between the two variables is unclear (Kirby, Winston, & Santiesteban, 2005). This might be due to multiple components in delay-of-gratification questionnaires and their different functions. A multi-dimensional questionnaire might help explain why there has been inconsistency in reports of delay of gratification predicting other behaviors.

The current research will address the above questions by employing exploratory and confirmatory factor analysis, and re-examining the validity and function of delay of gratification. Specifically, Ray and Najman's (1986) Generalizability of Deferment of Gratification Questionnaire (GDGQ) will be used. Apparently, the GDGQ is the only measure of the general personality trait rather than delay of gratification in a specific situation (e.g., Ward, Perry, Woltz, & Doolin, 1989; Bembenuity & Karabenick, 1998). In addition, GDGQ has been widely accepted and used; there is a good deal of research investigating how delay of gratification relates to various behaviors and traits, such as academic behavior (Bembenuity & Karabenick, 1998), life satisfaction (Caldwell & Mowrer, 1998), organizational commitment and job satisfaction (Witt, 1990a), consideration of future consequences (Strathman, Gleicher, Boninger, & Edwards, 1994), gambling behavior (Parke, Griffiths, & Irwing, 2004), social responsibility (Witt, 1990b), and debt (Norvilitis & MacLean, 2006). For these reasons, the GDGQ was adopted to explore the structure of delay of gratification.

Factor Structure of Delay of Gratification

Delay of gratification may have a two-factor structure, based on both theoretical claims and semantic analysis of the GDGQ's items. From a theoretical viewpoint, Mischel (1974) proposed a two-phase model for delay of gratification. During phase 1, "delayers" would make a choice to abandon immediate gratification for the sake of a delayed but more valuable outcome. During phase 2, "delayers" would maintain their choice until the eventual goal was achieved. (For example, in Mischel's experiment, children had to overcome the immediate temptation for a piece of cookie and wait 15 minutes for two cookies.) Delay of gratification may have two factors: one is abandoning the immediate gratification, and the other is maintaining the choice or planning for the larger future reward. The

Other items, such as "I enjoy a thing all the more because I have to wait for it or plan for it," aim to assess whether individuals could plan in advance and wait for a long time.

Metcalf and Mischel (1999) proposed a two-system framework in the processing of delay of gratification, a cognitive "cool" system and an emotional "hot" system, a mechanism underlying anger induction, expression, and regulation (Lok, Bond, & Tse, 2009). When the hot impulse for immediate but smaller value reward is triggered, the cool system will control impulse as well as strategically plan for the larger reward. According to this processing perspective, delay of gratification may have a two-factor structure, quite similar to that predicted from Mischel's theory.

Convergent Validity

Convergent validity represents the extent to which a scale relates to other measures of the same or similar constructs (Hinkin, 1998). We adopted delay-discounting, self-control, and consideration of future consequence as convergent criteria which are always regarded as having overlap with delay of gratification in theoretical constructs (Reynolds, *et al.*, 2002; Petrocelli, 2003).

Delay-discounting refers to "the reduction in the present value of a future reward as the delay to that reward increases" (Kirby, Petry, & Bickel, 1999; pp. 78), often viewed as reflecting processes equivalent to delay of gratification (Rachlin, Brown, & Cross, 2000). The more remote a future reward is, the lower the present value it has, and, therefore, the less likely the reward is to be chosen among current alternatives (Kirby, *et al.*, 1999). Researchers have pointed out that delay-discounting is related to time perception and future orientation (Schweizer, 2002; Scholten & Read, 2006; Zauberman, Kim, Malkoc, & Bettman, 2009) than to impulse control (Steinberg, Graham, O'Brien, Woolard, Cauffman, & Banich, 2009). Thus, it could be expected that a planning-and-waiting factor, rather than a controlling-impulse factor, would be negatively correlated with the delay-discounting rate.

Self-control is the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them (Tangney, Baumeister, & Boone, 2004). In recent decades, the experimental paradigms of delay of gratification have always been used as a way to measure one's self-control ability in laboratory settings (Mischel, 1961, 1974; Mischel, Shoda, & Rodriguez, 1989), and the inability to delay gratification is often considered to be caused by a loss of self-control (Muraven & Baumeister, 2000). Previous research also indicated that most acts of self-control involved both sacrificing short-term happiness and achieving long-term well-being (Rachlin, 2000). Therefore, self-control is likely related to both planning-and-waiting and controlling-impulse factors.

When people decide to delay gratification, they must consider immediate vs. future consequences. Past research has documented a positive relation between delay of gratification and consideration of future consequences; the latter refers to the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes (Strathman, *et al.*, 1994; p. 743). The Consideration of Future Consequences scale (CFC scale) comprises two underlying subfactors: concern with immediate consequences (CFC-Immediate) and future consequences (CFC-Future), respectively (Petrocelli, 2003; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). Because planning-and-waiting focuses on delayers' insistence on waiting for a more valuable reward in the future, it may be more closely related to CFC-Future. Controlling impulses focuses on delayers making the choice to abandon immediate gratification, so a controlling-impulse factor may be more closely related to CFC-Immediate.

Criterion-related Validity

Criterion-related validity, or the extent to which a construct is related to variables derived from theory, is an important aspect of construct validity (Hinkin, 1998). We chose the measures Consideration of Future Consequences, three dimensions of a Big Five personality measure (Conscientiousness, Agreeableness, and Openness), uncertainty avoidance, and self-efficacy as validity criterion measures.

Big Five personality measures are among the most widely used personality assessments. Some scores have been found to be related to delay of gratification behavior. Krueger, Caspi, Moffitt, White, & Stouthammer-Loeber (1996) found that 12- and 13-year-old boys who more often chose the delayed option were described as conscientious, agreeable, and open to experience by their mothers. Because the ability to delay gratification is a competency that may be predictable from multiple aspects of personality, Openness, Conscientiousness, and Agreeableness were adopted as criterion variables. The two delay-of-gratification factors should have different correlations with these three personalities.

Uncertainty avoidance represents the extent to which the individuals feel threatened by uncertain or unknown situations (Hofstede, 1991). Previous research has indicated that one of the effective ways to avoid uncertainty is to plan carefully (Rauch, Frese, & Sonnentag, 2000). We also infer that when a person plans for a future larger reward or promotion at work, he also is planning to avoid uncertainty. Therefore, uncertainty avoidance should be related to the planning-and-waiting factor of delay of gratification; in contrast, there may be little relationship between uncertainty avoidance and the controlling-impulse factor.

In previous research, it has been found that students reporting greater delay of gratification were higher in self-efficacy (Bembenutty & Karabenick, 1998), and adults' self-efficacy was associated positively with their actual delay behaviors, such as dieting (Rosenbaum & Ben-Ari Smira, 1986). Self-efficacy refers to the belief about being able to control challenging environmental demands by means of taking adaptive action (Bandura, 1977). People higher in self-efficacy are more confident that they will have a positive future (Kerpelman & Mosher, 2004). For these reasons, it can be predicted that self-efficacy would be more closely related with the planning-and-waiting than the controlling-impulse factors of delay of gratification.

Functions of Different Delay of Gratification Factors

Previous research has shown that delay of gratification could predict people's performance over a long time. For example, 4-year-old children who waited longer in delay of gratification task achieved higher SAT scores as adolescents (Mischel, Shoda, & Peake, 1988; Mischel, *et al.*, 1989). However, only cross-sectional studies have shown that delay of gratification was correlated positively with employees' job performance (Miller, Woehr, & Hudspeth, 2002). No study has demonstrated empirically that delay of gratification can predict job performance over a period of time. In the current study, longitudinal data were gathered to assess the causal relationship between delay of gratification and job performance. Specifically, a multi-dimensional delay of gratification questionnaire was used to identify which component of delay of gratification might predict job performance. At the same time, this study could be further evidence of the two-component construct of delay of gratification.

The expected relation between delay of gratification and job performance is based on two lines of logic. Firstly, Mischel's early research (Mischel, 1981; Mischel & Mischel, 1983) found that effective delay in the children's waiting paradigm included the ability to control and divert their attention from temptation effectively and distract themselves from the excessive arousal of short-term outcomes purposefully; both are strategies of controlling impulses. Secondly, in academic performance Bembenutty and Karabenick (1998) showed that students with higher scores on academic delay of gratification could postpone "the immediately available opportunities to satisfy impulses in favor of pursuing important but remote academic rewards or goals." Based on these previous findings, it can be inferred that the controlling-impulse factor would be more closely related to adults' job performance than a planning-and-waiting factor.

Apart from job performance, the roles of the two delay-of-gratification factors on creative performance were examined. Creativity in the

employment arena is the production of novel and useful ideas by employees—idea that can be the starting points for innovation (Oldham & Cummings, 1996). Creativity in the current samples of high-tech company employees should be an indicator of performance, because when employees exhibit creativity at work they produce novel, potentially useful ideas about organizational products, practices, services, or procedures (Shalley & Zhou, 2008). Therefore, it was predicted that the relations between the two delay-of-gratification factors and creative performance would be similar to their relations with job performance.

In the current study, the possible two-factor structure of the GDGQ was first examined using exploratory factor analysis in Study 1. In Study 2, the GDGQ's two-factor structure was verified by confirmatory factor analyses and its validity was examined. In Study 3, the roles of the two delay-of-gratification factors in predicting job and creative performance were explored.

Study 1

Study 1 explored the possible factor structure of GDGQ. For research purposes, adult samples were recruited from organizations and an Exploratory Factor Analysis (EFA) of the GDGQ's 12 items was conducted to obtain a preliminary view of the overall relational structure of these items.

METHOD

Participants

Participants were recruited from four information technology companies in China. A total of 322 applicants (190 men) were asked to complete the GDGQ voluntarily. The average age was 27.2 yr. ($SD = 4.0$). Among these participants, 98.4% had a college diploma or higher degree.

Measures

The 12-item Generalizability of Deferment of Gratification Questionnaire (GDGQ; Ray & Najman, 1986) was used to measure general delay of gratification. The respondents rated to what extent they agreed with each item on a 7-point scale with anchors 1: Strongly disagree and 7: Strongly agree.

Translations

The GDGQ was translated and back-translated using approved techniques (Bracken & Barona, 1991). Firstly, a researcher whose native language was Chinese translated the scales from English to Chinese. Then, a Chinese translator majoring in English who did not know the study's purpose completed the back-translation. Thirdly, another researcher compared the two English versions and checked whether each item's mean-

ing was equivalent or not. Finally, any differences were discussed and a final translated version was agreed upon by the two researchers and the translator.

RESULTS

Before Exploratory Factor Analysis, the scores of 6 items were reversed in the GDGQ (e.g., "I like to spend my money as soon as I get it"). The KMO measure of sampling adequacy (.74) and the Bartlett test of sphericity (569.62, $p < .001$) demonstrated adequate multivariate normality. EFA was conducted using SPSS Version 18.0. Principal component analysis (PCA) was performed on the 12 items. A two-factor solution was finalized based on the criteria: factor eigenvalues greater than 1, interpretability of factors, and at least 3 strongly loading items per factor (DeCoster, 1998). In addition, the scree plot suggested that the absolute slope showed little decrease after two factors. Item 10 was eliminated because its loadings were less than .30 on both factors. Although the cumulative variance of the two factors was not very high (39.58%), extracting three factors would have violated the principle that the number of items would be less than three in subsequent factors (Kaiser, 1974). The first factor was labeled Controlling-Impulse, since these items represent not succumbing to immediate gratification. The second factor was labeled Planning-and-Waiting, because these items suggest a willingness to wait for a possibly larger reward and plan for the future (see Table 1).

Study 2

Confirmatory factor analysis (CFA) was run with AMOS Version 7.0 to confirm the two-factor structure obtained in Study 1, with all GDGQ items loading on two latent factors. In this study, the convergent and criterion-related validity of the two-factor GDGQ also were examined.

METHOD

Participants and Procedure

Sample 1.—A new sample of Chinese participants (129 men, 193 women) were recruited from various occupations using a snowball sampling technique via e-mails containing study information, the link to the survey, and instructions to forward the e-mail to friends and colleagues. The respondents voluntarily filled out the questionnaires online. They had a mean age of 28.1 yr. ($SD = 6.80$), and 76.0% had a college diploma or higher degree. The GDGQ, uncertainty avoidance, and the Consideration of Future Consequences scale were administered (see below).

Sample 2.—Another sample of 165 Chinese people (69 men, 96 women; M age = 27.1 yr., $SD = 3.6$) were recruited from an auto dealership in a sales training course. Among these participants, 90.9% had a college diploma or

TABLE 1
FINAL VERSION OF GENERALIZABILITY OF DEFERMENT OF GRATIFICATION QUESTIONNAIRE
IN STUDY 1 (N = 322)

Scale Item	Component Loading		Communality
	CI	PW	
9. [I like to spend my money as soon as I get it.] (R)		.02	.60
5.2 [I am constantly "broke." (R)		.18	.44
6. >			
[I agree with the philosophy: "Eat, drink and be merry, for tomorrow we may be all dead." (R)		.14	.38
4. >			
[When I am in a supermarket, I always tend to buy a lot of things I hadn't planned to buy.] (R)		.10	.34
7. [I describe myself as often being too impulsive for my own good.] (R)		.10	.36
3. >			
[I tended to save my pocket money as a child.]		-.26	.32
1. >			
[I am good at saving my money rather than spending it straight away.]		.25	.32
2. >			
[I enjoy a thing all the more because I have had to wait for it and plan for it.]		.05	.48
12. [I am good at planning things way in advance.]		.17	.46
8. [I fairly often find that it is worthwhile to wait and think things over before deciding.]		.15	.40
11. > >			
[I can tolerate being kept waiting for things fairly easily most of the time.]		.01	.25
Variance explained (Total = 39.58%)	23.75	15.83	

Note.—CI = Controlling-Impulse; PW = Planning-and-Waiting. Boldface loadings are major factor loadings. (R) Item is reverse scored.

higher degree. The GDGQ, delay-discounting rate scale, three Big Five subscales (Agreeableness, Conscientiousness, Openness), and a self-control scale were administered (see below).

Measures

All of the following questionnaires' items were rated on a 7-point scale with anchors 1: Strongly disagree and 7: Strongly agree, except for the

delay discounting rate scale. Since this study used translated scales, CFA was run on each scale to ensure that the factor structure was the same as that of the original scales. Internal consistency reliabilities were checked as Cronbach's α and McDonald's ω (see Table 2 for complete information).

Uncertainty Avoidance Scale (Dorfman & Howell, 1988).—The 7-item Uncertainty Avoidance Scale was used to measure the tendency to avoid uncertainty. Example items are as follows: "Standard operating procedures are helpful to employees on the job." A higher score indicates the respondent's stronger tendency to avoid uncertainty. Internal consistency reliability of the scale was acceptable. The one-factor structure fit to the present data well: GFI = .98, AGFI = .96, CFI = .99, RMSEA = .051.

Consideration of Future Consequence Scale (CFC: Strathman, et al., 1994).—The 12-item scale was used to estimate the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes (Strathman, et al., 1994). The CFC has two subscales labeled CFC-Future (e.g., "I consider how things might be in the future, and try to influence those things with my day to day behavior") and CFC-Immediate (e.g., "My behavior is only influenced by the immediate") (Petrocelli, 2003; Joireman, et al., 2008). Higher scores on both the CFC-Total and CFC-Future scales reflect a higher concern with future consequences, whereas higher scores on the CFC-Immediate scale reflect a higher concern with immediate consequences. Internal consistency reliabilities of the scales were acceptable. The two-factor structure fit the present data acceptably: GFI = .94, AGFI = .88, CFI = .88, RMSEA = .082.

General Self-Efficacy Scale (GSE: Jerusalem & Schwarzer, 1992).—The 10-item scale measures the global confidence in one's coping ability across a wide range of stressful situations (e.g., "I am confident that I could deal efficiently with unexpected events"). High scores on the scale represent a more confident attitude towards stress-coping. Internal consistency reliability of the scale was good. The one-factor structure fit the present data acceptably: GFI = .97, AGFI = .92, CFI = .97, RMSEA = .076.

Delay-Discounting Rate Scale (Kirby & Marakovi, 1996).—The discount rate indicates the steepness of the reduction in present value with increases in delay (Kirby, et al., 1999). The higher the rate at which a person discounts future rewards, the lower the present values of future rewards are and the less effect those rewards will have on current choices (Kirby, et al., 1999). Kirby and Marakovi's (1996) monetary-choice questionnaire was used to estimate each participant's discount rate. The questionnaire included 27 questions and each question offered participants two options: an immediate reward and a delayed reward. Based on participants' choices of the immediate reward across 27 trials, a k value was calculated

TABLE 2
DESCRIPTIVE STATISTICS AND PEARSON CORRELATIONS AMONG VARIABLES FOR SAMPLE 1 IN STUDY 2 (N = 322)

Variable	M	SD	Correlations												
			1	2	3	4	5	6	7	8	9	10			
1. Gender	1.60	0.49													
2. Age	28.14	6.78	.01												
3. PW	4.63	0.93	-.13*	-.06	(.60/.62)										
4. CI	4.75	1.05	-.06	.16†	.18†	(.75/.70)									
5. Deferment of gratification	4.71	0.80	-.10	.11*	.57†	.91†	(.73/.72)								
6. CFC-Total	4.32	0.73	-.17†	-.12*	.23†	.26†	.31†	(.70/.78)							
7. CFC-Future	4.40	0.72	-.18†	-.05	.29†	.25†	.33†	.73†	(.72/.76)						
8. CFC-Immediate	4.26	0.94	.13*	.13*	-.14*	-.21†	-.26†	-.93†	-.42†	(.70/.74)					
9. Uncertainty avoidance	5.01	0.97	-.04	.13*	.36†	.10	.23†	.09	.27†	.03	(.70/.77)				
10. Self-efficacy	4.59	0.96	-.15*	-.05	.45†	.08	.25†	.17*	-.21†	-.11	.33†	(.86/.85)			

Note.—Gender: men = 1; women = 2; CI = Controlling-Impulse; PW = Planning-and-Waiting. Cronbach's alphas and McDonald's omegas (α/ω) are on the diagonal in brackets. * $p < .05$. † $p < .01$.

according to a given formulation. k is a parameter that reflects the extent to which future rewards are diminished in value as a function of the delay that must be endured to receive them. The distributions of k s were approximately normalized using the natural log transformation, so the following calculations were based on $\text{Ln}k$ (see Kirby, *et al.*, 1999, for review). Higher k and $\text{Ln}k$ indicate participants' stronger tendency to choose an immediate reward.

Agreeableness, Conscientiousness, and Openness scales (Saucier, 1994).—These three personality traits were measured using Saucier's (1994) Big Five mini-markers, which include 40 adjectives tapping the five factors Extraversion, Neuroticism, Agreeableness, Conscientiousness, and Openness. In the present study, internal consistency reliability and model fit were acceptable: Agreeableness's α was .67, (GFI = .97, AGFI = .92, CFI = .96, RMSEA = .064); Conscientiousness's α was .79, (GFI = .96, AGFI = .90, CFI = .96, RMSEA = .077); Openness's α was .73, (GFI = .97, AGFI = .94, CFI = .99, RMSEA = .027).

Self-control Scale (SCS; Tangney, *et al.*, 2004).—The brief, 13-item version was used to estimate participants' self-control ability. Example items include "I am good at resisting temptation" and "I say inappropriate things" (reverse scored). Participants' higher scores on the scale reflect greater capacity to override their thoughts, feelings, and habitual patterns of behavior. In the present study, Cronbach's α was .75. The one-factor structure fit the present data acceptably: GFI = .90, AGFI = .85, CFI = .88, RMSEA = .064.

Translation

Except for the Chinese version of the Self-Efficacy Scale (Schwarzer, Bäßler, Kwiatek, Schroder, & Zhang, 2008), other scales used in Study 2 were translated and back-translated by the approach described in Study 1.

RESULTS

To assess the factor structure of the GDGQ, confirmatory factor analysis procedures were conducted using structural equation modeling in Sample 1 by using maximum likelihood estimation (Arbuckle & Wothke, 1999). Items were retained based on two indices: the modification index of each item ($MI > 4$) and the factor loading ($\lambda > .30$). The result verified the two-factor structure obtained in the EFA and had acceptable fit: GFI = .95, AGFI = .90, CFI = .89, RMSEA = .079 (Sample 1); GFI = .87, AGFI = .87, CFI = .87, RMSEA = .08 (Sample 2). Moreover, the chi-square test of differences indicated that the two-factor model provided a statistically significantly better fit than the one-factor model: Sample 1, $\chi^2 = 41.88$ ($p < .001$); Sample 2, $\chi^2 = 61.40$ ($p < .001$). All items loaded statistically significantly ($ps < .001$) on the latent variable. Factor loadings ranged from .30 to .73. Thus, the results of the EFA and CFA supported the hypothesis that delay of gratification had a two-factor structure, Controlling-Impulse and Planning-and-Waiting.

Reliability and Validity

Cronbach's α and McDonald's ω were calculated for each scale (Table 2 and Table 3) (Zinbarg, Yovel, Revelle, & McDonald, 2006). Many scales are assumed to be primarily a measure of one latent variable. If that is true, the latent variable should account for the majority of the variance in the scale scores. Omega is calculated based on confirmatory factor analysis and is a more accurate estimate (McDonald, 1999; Zinbarg, Revelle, Yovel, & Li, 2005).

The internal consistency reliabilities of Controlling-Impulse and the overall scale were acceptable (Cronbach's $\alpha = .70$ to $.75$; McDonald's $\omega = .70$ to $.78$; see Tables 2 and 3), while Planning-and-Waiting had relatively poorer internal consistency (Cronbach's $\alpha = .60$; McDonald's $\omega = .62$ to $.64$). The two subscales were weakly related in both samples (Sample 1, $r = .19$; Sample 2, $r = .21$). Item-total correlations were low to moderate, ranging from $.28$ to $.63$ (Sample 1) and $.33$ to $.61$ (Sample 2).

Table 2 and Table 3 display the descriptive statistics and correlations among measures. Controlling-Impulse and Planning-and-Waiting showed different relationships with validity measures. In Sample 1, Uncertainty Avoidance was significantly and positively related with Planning-and-Waiting, but not to Controlling-Impulse. Self-efficacy was significantly and positively related to Planning-and-Waiting and delay of gratification, but not to Controlling-Impulse. In Sample 2, Lnk was significantly and negatively related to Planning-and-Waiting, but not to Controlling-Impulse: with more willingness to wait for the possible larger reward and plan for the future, the delay discounting rate was lower. Agreeableness, Conscientiousness, and Self-control were significantly and positively related to Planning-and-Waiting and Controlling-Impulse, whereas Openness was only significantly and positively related with Planning-and-Waiting, but not with Controlling-Impulse.

CFC-Total and CFC-Future were significantly and positively related with Planning-and-Waiting and Controlling-Impulse, and CFC-Immediate was significantly and negatively related to both the scales (Table 2). A series of multiple regression analyses were run to examine the unique contributions of the Planning-and-Waiting and Controlling-Impulse subscales in predicting CFC-Future and CFC-Immediate. For CFC-Immediate, age and gender were controlled in Step 1; in Step 2, Controlling-Impulse and Planning-and-Waiting were entered together. Results showed that the only unique predictor of CFC-Immediate was Controlling-Impulse ($\beta = -.18$, $t_{319} = -3.55$, $p < .01$), not Planning-and-Waiting ($p = -.09$). In the same way, CFI-Future was found to be predicted by both Planning-and-Waiting ($\beta = .18$, $t_{319} = 4.30$, $p < .01$) and Controlling-Impulse ($\beta = .14$, $t_{319} = 3.59$, $p < .01$).

As for divergent validity, the result indicated that the average variance extracted (AVEs) of the two factors in Sample 1 and 2 were $.28$ and

TABLE 3
DESCRIPTIVE STATISTICS AND PEARSON CORRELATIONS FOR SAMPLE 2 IN STUDY 2 (N = 165)

Variable	M	SD	Correlations																	
			1	2	3	4	5	6	7	8	9	10								
1. Age	27.07	3.57	-																	
2. Gender	1.54	0.50	.08	-																
3. PW	4.75	0.97	.07	-.09	(.60/.64)															
4. CI	4.74	0.95	.12	-.06	.21†	(.70/.70)														
5. Deferment of gratification	4.71	0.75	.11	-.10	.62†	.88†	(.70/.71)													
6. Lnk	-4.00	1.48	.00	.10	-.20*	-.14	-.20*	-												
7. Agreeableness	5.65	0.70	.09	.05	.29†	.25†	.32†	.02	(.67/.75)											
8. Conscientiousness	5.08	0.86	.19	-.12	.37†	.31†	.42†	-.13	.49†	(.79/.79)										
9. Openness	5.03	0.70	-.18+	-.27++	.34†	.14	.28†	-.15	.41†	.44†	(.73/.73)									
10. Self-control	4.74	0.81	.17+	.02	.38†	.40†	.51†	-.11	.24†	.41†	.31†	(.75/.88)								

Note.—Gender: men = 1; women = 2; CI = Controlling-Impulse; PW = Planning-and-Waiting; Lnk = Delay-Discounting Rate; Cronbach's alphas and McDonald's omegas (α/ω) are on the diagonal in brackets. * $p < .05$. † $p < .01$.

.38, which was larger than the square of the correlation between the two factors (Sample 1, .16; Sample 2, .04), indicating that divergent validity is acceptable (Formell & Larcker, 1981).

Study 3

In Study 3, the two-factor model's predictive validity was examined via correlation analysis and linear regression. It was hypothesized that these two factors would function differently in predicting employees' long-term achievement in organizations, such as performance and creative performance. In the first two studies, self-report data from the same source was used; here, to reduce common method bias, supervisors' ratings of performance and creative performance were elicited three months after the employees were administered the self-report measures.

METHOD

Participants and Procedure

An independent sample, including 85 participants (49 men, 36 women) were recruited from four private and foreign Chinese information technology companies. The average age was 27.7 yr. ($SD = 3.2$), and 97.6% had a college diploma or higher degree. Participants were classified by job position: 63 were front-line employees (74.1%), 16 were mid-level managers (18.8%), four were senior managers (4.7%) and two did not report their job responsibilities (2.4%).

To reduce common method errors, data were collected in two waves. All employees were asked to complete the GDGQ and the three scales from the Big Five personality scale (Time 1). Three months later (Time 2), their supervisor-rated job performance and creative performance scores were collected.

Measures

Delay of gratification.—The 11-item two-factor GDGQ established in Study 1 and 2 measures delay of gratification.

Job performance.—Farh and Cheng's (1997) 4-item superior-rating performance scale was used as the measure of job performance. Superiors rated their subordinates (e.g., "He/she is one of the best employees in my department") on a 7-point Likert-type scale with anchors 1: Very strongly disagree and 7: Very strongly agree. The translated Chinese version had been used in the past (e.g., Aryee & Chen, 2006). In the present study, Cronbach's α was .89.

Creative performance.—Creative performance was assessed by George and Zhou's (2001) 13-item scale. Superiors rated their subordinates (e.g., "Suggests new ways to increase quality") on a 7-point Likert-type scale with anchors 1: Very strongly disagree and 7: Very strongly agree. The

translated Chinese version has been used in the past (e.g., Zhou, Shin, Brass, Choi, & Zhang, 2009; Wang & Cheng, 2010). In the present study, Cronbach's α was .89.

RESULTS

Table 4 displays descriptive statistics and correlations among measures. Job performance and creative performance were significantly and positively correlated to Controlling-Impulse and delay of gratification, but were not statistically significantly correlated to Planning-and-Waiting. Hierarchical regression analyses were conducted to assess the function of Controlling-Impulse and Planning-and-Waiting in predicting job performance and creative performance. Both the Controlling-Impulse and Planning-and-Waiting scores were mean-centered.

Predicting job performance ratings, Step 1 included control variables (age was deleted due to multicollinearity, $VIF > 10$) (Neter, Wasserman, & Kutner, 1990). Step 1 did not reach statistical significance ($R^2 = .08, p > .05$), but job position was a statistically significant predictor of job performance ratings ($\beta = .36, p < .05$). In Step 2, performance was regressed on Controlling-Impulse and Planning-and-Waiting. This step produced statistically significant results ($R^2 = .20, p < .01$; $R^2 = .12, F_{2,79} = 8.28, p < .01$). Controlling-Impulse was a statistically significant predictor of job performance ($\beta = .30, p < .01$).

Similarly, a regression was conducted to predict creative performance ratings. Step 1 was not statistically significant ($R^2 = .07, p > .10$), but Step 2 was ($R^2 = .25, p < .01$; $R^2 = .18, F_{2,79} = 12.28, p < .01$). Again, Controlling-Impulse scores were a statistically significant predictor of creative performance ratings ($\beta = .32, p < .01$). Taken together, Controlling-Impulse, but not Planning-and-Waiting, predicted both job performance and creative performance ratings, thus supporting a differentiation of the two factors of delay of gratification.

GENERAL DISCUSSION

The GDGQ is meant to measure delay of gratification among adolescents and adults, and has been regarded as a unidimensional scale. The purpose of the present study was to explore the possibility of a multidimensional structure. Data from four separate samples, with 894 participants in total, were obtained with multi-wave and multi-source methods. The results showed that the two-factor model fit the data better than the single-factor model. The two factors, labeled Controlling-Impulse and Planning-and-Waiting, had different correlation patterns with Openness, delay discounting, self-efficacy and uncertainty avoidance. Meanwhile, Controlling-Impulse predicted statistically significant amounts of variance in performance and creative performance, whereas Planning-and-

TABLE 4
DESCRIPTIVE STATISTICS AND PEARSON'S CORRELATIONS IN STUDY 3 (N = 85)

Variable	M	SD	Correlations										
			1	2	3	4	5	6	7	8			
1. Age	27.73	3.23											
2. Gender	1.42	0.50	-.20										
3. Job position	1.26	0.58	.47†	-.10									
4. Job performance	4.70	0.85	.16	-.07	.23*								
5. Creative performance	4.30	0.73	.12	-.03	.26*	.74†							
6. PW	5.32	0.67	.32†	-.32†	.19	.03	.07						
7. CI	4.19	0.90	-.35†	.16	-.03	.31†	.41†						
8. DG	4.75	0.54	-.09	.06	.09	.28†	.39†	-.09					

Note.—Gender: men = 1; women = 2; CI = Controlling-Impulse; PW = Planning-and-Waiting; DG = Deferment of Gratification. Cronbach's alphas and McDonald's omegas (α/ω) are on the diagonal in brackets. * $p < .05$. † $p < .01$.

Waiting did not. These results are consistent with recent arguments that similar constructs such as time orientation also have multiple dimensions (e.g., Zimbardo & Boyd, 1999; Joireman, *et al.*, 2008; Joireman, *et al.*, 2012).

With respect to evidence of convergent validity, the present research showed that the subscales Planning-and-Waiting and Controlling-Impulse both had statistically significant correlations with a measure of self-control, indicating that both of these two components are involved in the self-regulation process. Dramatically, although delay discounting is often used as an equivalent measure of individuals' ability to delay gratification (Reynolds, *et al.*, 2002), the understanding of the precise correspondence between delay of gratification and delay discounting is limited (Kirby, *et al.*, 2005). The findings may explain why the relationship between discounting rate and ability to delay gratification is mixed: because only one component of delay of gratification, Planning-and-Waiting, was significantly correlated with delay discounting rate. This finding is consistent with previous claims that delay discounting is more related to future planning (Schweizer, 2002; Scholten & Read, 2006; Zauberman, Kim, Malkoc, & Bettman, 2009) rather than impulse control (Steinberg, *et al.*, 2009).

As for Consideration of Future Consequences, each subscale was statistically significantly correlated with the two components of GDGQ. The two GDGQ subscales were differentially predictive of the two CFC subscales. Planning-and-Waiting only predicted statistically significant variance in CFC-Immediate (positively), in line with the hypothesis. In contrast, Controlling-Impulse predicted CFC-Immediate (negatively) and CFC-Future (positively). These results can be explained using the two-phase model of delay of gratification (Mischel, 1974). During phase 1, controlling an impulse, "delayers" would make the choice to abandon immediate gratification for the sake of delayed but more valuable outcome, ignoring the importance of the immediate consequences of behavior (low CFC-Immediate) and attaching importance to the future consequences of behavior (high CFC-Future). During phase 2, Planning-and-Waiting, "delayers" maintain their choice until the eventual goal is achieved (Mischel, 1974). People must focus on the future consequence of their choices to help them better plan and achieve long-term goals (high CFC-Future). Although the mechanism should be further examined, the different relationship between CFC subscales and delay of gratification dimensions provides supportive evidence for the two-factor structure.

In terms of criterion-related validity, the present study provided strong evidence that the subscales correlate with psychological variables in theoretically predictable ways. Uncertainty avoidance and self-efficacy were statistically significantly correlated with Planning-and-Waiting but not with Controlling-Impulse, which provides further evidence for the

two-factor structure of delay of gratification. As for three of the Big Five personality traits, only the measure of Openness showed discriminative correlation with the two factors of delay of gratification. Previous research has supposed that participants with Openness can manage to delay gratification because they can avoid focusing on the possibility of an immediate reward (Krueger, *et al.*, 1996). However, the results of the present study refuted this view and clarified that participants with Openness could delay gratification by planning and waiting for a large, delayed reward rather than by controlling impulses on an immediate reward.

In addition, this study advances understanding of the functions of delay of gratification. Although Mischel (1974) proposed a two-phase model for delay of gratification, there is no research explaining which phase is more important in the process of delay of gratification. Compared with Planning-and-Waiting, Controlling-Impulse was a stronger predictor of supervisor's ratings of employees' performance and creative performance. Mischel's view of emphasizing the important role of Controlling-Impulse on task performance (Mischel, 1983) and the findings that impulsivity impairs performance in completing reasoning tasks (Schweizer, 2002), offer parallel explanations for this result. For objective reasons (e.g., chances of promotion) and subjective reasons (e.g., whether one's superior is favorable or not) in an organization, people with high delay of grati

eral items describing spending because they believed that "those who invest in their futures by saving their financial resources are more likely to be achievers and to be successful." Being able to control the impulse to spend money is an important expression of delay of gratification. While there are other domains which could be included in delay of gratification such as food, physical pleasures, social interactions, achievement, and so on (Hoerger, Quirk, & Weed, 2011), the factor was named Controlling-Impulse rather than Controlling-Spending for two reasons: (1) The goal was to assess the two-dimensional structure of the delay of gratification scale corresponding to Mischel's (1974) two-phase model, in which the first phase is to control the impulse toward an immediate reward and the second phase is to plan and wait for a future reward. Thus, a more general impulse was represented by the intention in the first stage of delay of gratification. (2) The items of Controlling-Impulse cover deferment of gratification in purchases as well as in other areas (e.g., "Would you describe yourself as often being too impulsive for your own good?" (Norvilitis & MacLean, 2010). Impulsive spending and buying are not equivalent. Future studies should extend the content of Controlling-Impulse to other related domains.

Conclusion

In conclusion, based on exploratory and confirmatory factor analysis, the present study provided evidence that delay of gratification has a two-dimension structure, described as Controlling-Impulse and Planning-and-Waiting. These two subscales had distinguishable correlations with delay-discounting rate, Openness, uncertainty avoidance, two Consideration of Future Consequences subscales, and self-efficacy. Furthermore, Controlling-Impulse and Planning-and-Waiting functioned differently in predicting job performance and creative performance as rated by superiors.

REFERENCES

- ARBUCKLE, J., & WOTHKE, W. (1999) *Amos 4.0 user's guide*. Chicago, IL: SmallWaters.
- ARYEE, S., & CHEN, Z. X. (2006) Leader-member exchange in a Chinese context: antecedents, the mediating role of psychological empowerment and outcomes. *Journal of Business Research*, 59, 793-801.
- AYDUK, O. (2007) Delay of gratification in children. In Y. Shoda, D. Cervone, & G. Downey (Eds.), *Persons in context: building a science of the individual*. New York: Guilford Press. Pp. 97-109.
- BANDURA, A. (1977) Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- BEMBENUTTY, H., & KARABENICK, S. (1998) Academic delay of gratification. *Learning and Individual Differences*, 10, 329-346.
- BRACKEN, B. A. T., & BARONA, A. (1991) State of the art procedures for translating, validating, and using psycho-educational tests in cross-cultural assessment. *School Psychology International*, 2, 119-132.

- CALDWELL, L. M., & MOWRER, R. R. (1998) The link between procrastination, delay of gratification, and life satisfaction: a preliminary analysis. *Psi Chi Journal of Undergraduate Research*, 3, 145-150.
- DECOSTER, J. (1998) *Overview of factor analysis*. University of Alabama, Department of Psychology Retrieved from: <http://www.stat-help.com/notes.html>.
- DORFMAN, P., & HOWELL, J. (1988) Dimensions of national culture and effective leadership patterns: Hofstede revisited. *Advances in International Comparative Management*, 3, 127-150.
- DUCKWORTH, A. L., & SELIGMAN, M. E. P. (2005) Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, 16, 939-944.
- FARH, J., & CHENG, B. (1997) Modesty bias in self-ratings in Taiwan: impact of item wording, modesty value, and self-esteem. *Chinese Journal of Psychology*, 39, 103-118.
- FORNELL, C., & LARCKER, D. F. (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 39-50.
- GEORGE, J., & ZHOU, J. (2001) When openness to experience and conscientiousness are related to creative behavior: an interactional approach. *Journal of Applied Psychology*, 86, 513-524.
- HINKIN, T. (1998) A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1, 104-121.
- HOERGER, M., QUIRK, S. W., & WEED, N. C. (2011) Development and validation of the Delaying Gratification Inventory. *Psychological Assessment*, 23, 725-738.
- HOFSTEDE, G. (1991) *Organizations and cultures: software of the mind*. New York: McGraw-Hill.
- HOFSTEDE, G. (2007) A European in Asia. *Asian Journal of Social Psychology*, 10, 16-21.
- JERUSALEM, M., & SCHWARZER, R. (1992) *Self-efficacy: thought control of action*. Washington, DC: Hemisphere.
- JOIREMAN, J., BALLIET, D., SPROTT, D., SPANGENBERG, E., & SCHULTZ, J. (2008) Consideration of future consequences, ego-depletion, and self-control: support for distinguishing between CFC-Immediate and CFC-Future sub-scales. *Personality and Individual Differences*, 45, 15-21.
- KAISER, H. F. (1974) An index of factorial simplicity. *Psychometrika*, 39, 31-36.
- KERPELMAN, J. L., & MOSHER, L. S. (2004) Rural African American adolescents' future orientation: the importance of self-efficacy, control and responsibility, and identity development. *An International Journal of Theory and Research*, 4, 187-208.
- KIRBY, K. N., & MARAKOVI, N. N. (1996) Delay-discounting probabilistic rewards: rates decrease as amounts increase. *Psychonomic Bulletin & Review*, 3, 100-104.
- KIRBY, K. N., PETRY, N. M., & BICKEL, W. K. (1999) Heroin addicts have higher discount rates for delayed rewards than non-drug-using controls. *Journal of Experimental Psychology*, 128, 78-87.
- KIRBY, K. N., WINSTON, G. C., & SANTIESTEBAN, M. (2005) Impatience and grades: delay-discount rates correlate negatively with college GPA. *Learning and Individual Differences*, 15, 213-222.
- KRUEGER, R., CASPI, A., MOFFITT, T., WHITE, J., & STOUTHAMER-LOEBER, M. (1996) Delay of gratification, psychopathology, and personality: is low self-control specific to externalizing problems? *Journal of Personality*, 64, 107-129.
- LOK, M. H., BOND, A. J., & TSE, W. S. (2009) Contrasting effects of a hot and a cool system in anger regulation on cooperative behaviours. *International Journal of Psychology*, 44, 333-341.

- McDONALD, R. P. (1999) *Test theory: a unified treatment*. Hillsdale, NJ: Erlbaum.
- METCALFE, J., & MISCHEL, W. (1999) A hot/cool-system analysis of delay of gratification: dynamics of willpower. *Psychological Review*, 106, 3-19.
- MILLER, M., WOEHR, D., & HUDSPETH, N. (2002) The meaning and measurement of work ethic: construction and initial validation of a multidimensional inventory. *Journal of Vocational Behavior*, 60, 451-489.
- MISCHEL, W. (1961) Father-absence and delay of gratification: cross-cultural comparisons. *The Journal of Abnormal and Social Psychology*, 63, 116-124.
- MISCHEL, W. (1974) Processes in delay of gratification. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. Vol. 7. New York: Academic Press. Pp. 249-292.
- MISCHEL, W. (1981) Metacognition and the rules of delay. In J. H. Flavell & L. Ross (Eds.), *Social cognitive development: frontiers and possible futures*. New York: Cambridge Univer. Press. Pp. 240-271.
- MISCHEL, W., & MISCHEL, H. N. (1983) The development of children's knowledge of self-control strategies. *Child Development*, 54, 603-619.
- MISCHEL, W., SHODA, Y., & PEAKE, P. (1988) The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology*, 54, 687-696.
- MISCHEL, W., SHODA, Y., & RODRIGUEZ, M. (1989) Delay of gratification in children. *Science*, 244, 933-938.
- MURAVEN, M., & BAUMEISTER, R. F. (2000) Self-regulation and depletion of limited resources: does self-control resemble a muscle? *Psychological Bulletin*, 126, 247-259.
- NETER, J., WASSERMAN, W., & KUTNER, M. (1990) *Applied linear models*. Homewood, IL: Irwin.
- NORVILITIS, J. M., & MACLEAN, M. G. (2010) The role of parents in college students' financial behaviors and attitudes. *Journal of Economic Psychology*, 31, 55-63.
- OLDHAM, G., & CUMMINGS, A. (1996) Employee creativity: personal and contextual factors at work. *Academy of Management Journal*, 39, 607-634.
- PARKE, A., GRIFFITHS, M., & IRWING, P. (2004) Personality traits in pathological gambling: sensation seeking, deferment of gratification and competitiveness as risk factors. *Addiction Research & Theory*, 12, 201-212.
- PETROCELLI, J. V. (2003) Factor validation of the Consideration of Future Consequences Scale. *Journal of Social Psychology*, 143, 404-413.
- POGSON, C., COBER, A., DOVERSPIKE, D., & ROGERS, J. (2003) Differences in self-reported work ethic across three career stages. *Journal of Vocational Behavior*, 62, 189-201.
- RACHLIN, H. (2000) *The science of self-control*. Cambridge, MA: Harvard Univer. Press.
- RACHLIN, H., BROWN, J., & CROSS, D. (2000) Discounting in judgments of delay and probability. *Journal of Behavioral Decision Making*, 13, 145-159.
- RAUCH, A., FRESE, M., & SONNENTAG, S. (2000) Cultural differences in planning-success relationships: a comparison of small enterprises in Ireland, West Germany, and East Germany. *Journal of Small Business Management*, 38, 28-41.
- RAY, J., & NAJMAN, J. (1986) The generalizability of deferment of gratification. *Journal of Social Psychology*, 126, 117-119.
- REYNOLDS, B., DE WIT, H., & RICHARDS, J. B. (2002) Delay of gratification and delay discounting in rats. *Behavioural Processes*, 59, 157-168.
- ROSENBAUM, M., & BEN-ARI SMIRA, K. (1986) Cognitive and personality factors in the delay of gratification of hemodialysis patients. *Journal of Personality and Social Psychology*, 51, 357-364.

- SAUCIER, G. (1994) Mini-markers: a brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment*, 63, 506-516.
- SCHOLTEN, M., & READ, D. (2006) Discounting by intervals: a generalized model of intertemporal choice. *Management Science*, 52, 1424-1436.
- SCHWARZER, R., BÄBLER, J., KWIATEK, P., SCHRODER, K., & ZHANG, J. X. (2008) The assessment of optimistic self-beliefs: comparison of the German, Spanish, and Chinese versions of the General Self-efficacy Scale. *Applied Psychology*, 46, 69-88.
- SCHWEIZER, K. (2002) Does impulsivity influence performance in reasoning? *Personality and Individual Differences*, 33, 1031-1043.
- SHALLEY, C. E., & ZHOU, J. (2008) Organizational creativity research: a historical overview. In J. Zhou & C. E. Shalley (Eds.), *Handbook of organizational creativity*. London, UK: Lawrence Erlbaum Associates. Pp. 3-31.
- STEINBERG, L., GRAHAM, S., O'BRIEN, L., WOOLARD, J., CAUFFMAN, E., & BANICH, M. (2009) Age differences in future orientation and delay discounting. *Child Development*, 80, 28-44.
- STRATHMAN, A., GLEICHER, F., BONINGER, D. S., & EDWARDS, C. S. (1994) The consideration of future consequences: weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology*, 66, 742-752.
- TANGNEY, J. P., BAUMEISTER, R. F., & BOONE, A. L. (2004) High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72, 271-324.
- WANG, A. C., & CHENG, B. S. (2010) When does benevolent leadership lead to creativity? The moderating role of creative role identity and job autonomy. *Journal of Organizational Behavior*, 31, 106-121.
- WARD, W., PERRY, T., WOLTZ, J., & DOOLIN, E. (1989) Delay of gratification among black college student leaders. *Journal of Black Psychology*, 15, 111-128.
- WITT, L. A. (1990a) Delay of gratification and locus of control as predictors of organizational satisfaction and commitment: sex differences. *The Journal of General Psychology*, 117, 437-446.
- WITT, L. A. (1990b) Person-situation effects and gender differences in the prediction of social responsibility. *Journal of Social Psychology*, 130, 543-553.
- ZAUBERMAN, G., KIM, B. K., MALKOC, S. A., & BETTMAN, J. R. (2009) Discounting time and time discounting: subjective time perception and intertemporal preferences. *Journal of Marketing Research*, 46, 543-556.
- ZHOU, J., SHIN, S. J., BRASS, D. J., CHOI, J., & ZHANG, Z. X. (2009) Discounting time and time discounting: subjective time perception and intertemporal preferences. *Journal of Applied Psychology*, 94, 1544-1552.
- ZIMBARDO, P. G., & BOYD, J. N. (1999) Putting time in perspective: a valid, reliable individual-differences metric. *Journal of Personality and Social Psychology*, 77, 1271-1288.
- ZINBARG, R. E., REVELLE, W., YOVEL, I., & LI, W. (2005) Cronbach's α , Revelle's β , and McDonald's ω_n : their relations with each other and two alternative conceptualizations of reliability. *Psychometrika*, 70, 123-133.
- ZINBARG, R. E., YOVEL, I., REVELLE, W., & McDONALD, R. P. (2006) Estimating generalizability to a latent variable common to all of a scale's indicators: a comparison of estimators for ω_n . *Applied Psychological Measurement*, 30, 121-144.