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Stability of psychological resilience of police officers: a three-wave latent class analysis

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ABSTRACT

Psychological resilience is considered a capacity to handle severe stressors. However, little is known about the stability of psychological resilience and to what extent changes in resilience are associated with confrontations potentially traumatic events among police officers. To determine classes of psychological resilience trajectories over a 9-month period among officers (n = 305; m^{age} = 51.0; 72.8% male) and investigate associations with potentially traumatic events (PTE's). Two psychological resilience scales (Resilience Scale-nl and Mental Toughness Questionairre-48; RS-nl and MTQ-48) were administered at baseline (T1), at 3-months (T2) and 9-month (T3) follow-up. Latent-class growth analysis determined classes of psychological resilience trajectories. Mixed-effects modelling with a time*class interaction examined stability. Chi^2 between class-membership and PTE experience were assessed. For both scales a five-class solution yielded the best fit. These trajectories mainly differed on levels of psychological resilience. In the RS-nl one class (*n* = 11; 4%) was identified that slightly declined, then increased. Other classes did not change over time. Class membership was not associated with PTE experience prior to T1 and PTE experience between T1 and T3. Psychological resilience is a stable capacity of police officers across a 9-month period. PTE experience is not associated with changes in psychological resilience.

KEYWORDS: psychological resilience; police officers; latent-class analysis; stability; longitudinal

1. Introduction

Psychological resilience is a concept that has raised considerable scientific attention in the last three decades. Especially in studies among occupations that are exposed frequently to potentially traumatic experiences (PTE's) such as the police (Yuan et al., 2011).

With respect to the conceptualization of psychological resilience there are two opposing viewpoints: psychological resilience as an outcome (e.g. Bonanno, 2012) or as a personal capacity (e.g. Britt, Shen, Sinclair, Grossman & Klieger, 2016; Liu, Reed & Girard, 2017; Nelson, Shacham & Ben-ari, 2016). The latter describes characteristics or capacities (Britt et al., 2016) that are hypothesized to enable individuals to handle (severe) stressors that protect against possible negative effects of these events on mental health and the performance of officers (Janssens, van der Velden, Taris & van Veldhoven, 2018; Marchand, Nadeau, Beaulieu-Prévost, Boyer & Martin, 2015; van der Meulen, van der Velden, Setti & van Veldhoven, 2018). However, results of current longitudinal studies among police officers do not support the assumption that resilience is an important protective factor for the development of mental health problems among officers (Janssens et al., 2018; Marchand et al., 2015; van der Meulen et al., 2018).

One possible explanation for the absence of evidence supporting the assumed protective influence of psychological resilience is that psychological resilience, when considered a personal capacity, is not (very) stable over time. If psychological resilience appeared to be a rather instable capacity then we may expect that it does not or only to a very limited extent predict the functioning and performance of officers at later stages.

1.1. Stability of psychological resilience

Throughout the last decades, psychological resilience as a capacity has shifted from being understood as a fairly stable trait toward a capacity or state-like characteristic (Luthans, Avolio, Avey & Norman, 2007) that is a malleable by either targeted intervention (Papazoglu

& Anderson, 2014) and/or by interaction with the individual's environment (Pangallo, Zibarras, Lewis & Flaxman, 2015). However, empirical studies assessing the stability of psychological resilience is scarce and limited to military samples.

The study by Hystad, Olsen, Espevik & Säfvenbom (2015) examined changes in hardiness (a concept akin to psychological resilience; January, 2016) scores of military officer cadets across three years of military college. The authors hypothesized that military college could enhance hardiness, despite not being specifically targeted at doing so. On a group level, this hypothesis was rejected. Sudom, Lee & Zamorski (2014) examined whether particular potential stressful circumstances, a deployment cycle, can alter psychological resilience levels of military personnel. Across an average follow-up time of 6.6 years among personnel (n = 34) both with and without deployment experience, tests of change in hardiness scores were not significant. In the next study, among marine recruits participating in a high stress exercise, correlations between baseline and 13 weeks follow-up measurements of hardiness from pre to post exercise were .57 for both men and women (Vogt, Rizvi, Shipherd & Resick, 2008). Another study (Arthur, Fitzwater, Hardy, Beattie & Bell, 2015), focused on the development of a new mental toughness questionnaire, and examined test-retest reliability among 104 infantry recruits. The correlation between baseline and a 3-week follow-up measurement was .72. Lastly, the study by Krauss, Russell, Kazman, Russell, Schuler & Deuster (2018) hypothesized and confirmed that hardiness would be resistant to deployment stressors. This was examined among 180 combat medics with deployment experience during a 2-year observation phase.

1.2. Current study

In sum, existing research among military personnel does not provide conclusive evidence on the stability of resilience among officers on a group or individual level. The studies discussed above mostly rely on correlational analysis for determining stability. High

correlations are, however, not sufficient evidence for this purpose. The aim of the present 3-wave study is to fill this gap of scientific knowledge by assessing latent classes of trajectories of psychological across a 9-month period. These analyses are sensitive to both group level and individual change patterns by grouping police officers based on psychological resilience levels and change over time. Based on earlier mentioned studies we hypothesize that psychological resilience is predominantly stable. We furthermore assessed the associations between the identified classes of trajectories on the one hand, confrontations with PTE's on the other hand. Considering that psychological resilience is hypothesized to change by experience (Luthans, Avolio, Avey & Norman, 2007).

2. Methods

2.1. Participants

Data from a recent study on the effectiveness of 'Mental Strength Training' (MST; van der Meulen, Bosmans, Lens, Lahlah & van der Velden, 2017) was used for the current study. For this study 138 police officers who followed MST were compared to 167 non-trained control police officers. Officers were enrolled throughout The Netherlands, and covered all ranks and functions. Sampling methods were described elsewhere (van der Meulen et al., 2017). This three-wave study consisted of pre-training (T1), and 3 months (T2) and 9 months (T3) post-training assessments. The main conclusion of the original study was that MST did not significantly change mean group scores on psychological resilience over time among trained police officers as compared with non-trained police officers. Therefore, it was feasible for us to combine both conditions to create the dataset for the current study. Control condition participants indicating to have participated in MST were excluded, resulting in a total sample size of 305 respondents. The mean age of the total sample was 51.0 (SD = 11.31, n = 299). Most respondents were male (72.8%). In total, 6.0% had a low

education level, 80.1% a medium and 13.9% a high education level (based on categorization by Statistics Netherlands; Centraal Bureau voor de Statistiek, 2016).

Non-response in the original study was 59.4% (experimental condition) and 46.5% (control condition) between T1 and T2, and 47.7% (experimental condition) and 26.1% (control condition) between T2 and T3. T1 non-respondents were only slightly younger of age, had less years of service and were of a higher rank. A full overview can be found in the article reporting on the original study (van der Meulen et al., 2017).

2.2. Measures

2.2.1. Psychological resilience

The current study used two measures to assess psychological resilience: the Resilience Scale-nl (RS-nl; Wagnild & Young, 1993) and the Mental Toughness Questionairre-48 (MTQ-48; Clough, Merchant & Earle, 2007).

The 25-item RS-nl is a widely used psychological resilience measure with good psychometric properties (Portzky, Wagnild, de Bacquer & Audenaert, 2010). Items include statements on psychological resilience such as ‘I am determined’ (Wagnild & Young, 1993). Respondents are asked to rate applicability of these statements on their own situation on a five-point scale ranging from ‘totally agree’ to ‘totally disagree’. Cronbach’s alpha for the RS-nl across all time-points are respectively: .94, .91 and .92 (n = 305).

The 48-item MTQ-48 measures mental toughness a construct rooted in hardiness theory and similar to psychological resilience (Clough, Marchant & earle, 2007; January, 2016). Items on the MTQ-48 include ‘I often wish my life would be more predictable'. Answering options range from ‘totally disagree’ to ‘totally agree’. MTQ-48 Cronbach’s alpha’s across all time-points are respectively: .91 (n = 284), .91 (n = 282) and .92 (n = 288).

Both scales were transformed to yield scores with a possible range from 1 to 5, by dividing the summed total score by the number of items of the respective scales. Higher scores on both scales indicate increased psychological resilience.

2.2.2. PTE experience

From a pre-defined list of 11 PTE's (van der Velden, Kleber, Grievink & Yzermans, 2010) respondents were asked to indicate, if applicable, what the most shocking experience was in the last 12 months and when this event occurred. PTE examples are: incidents involving children, and/or undergoing physical aggression. These data were used to create two dichotomous variables on PTE experience: PTE up to two months prior to baseline (yes/no) and PTE experience between T1 and T3 (yes/no).

2.3. Statistical analyses

We first conducted latent class growth analyses (LCGA) to determine classes of trajectories of psychological resilience according to the RS-nl and the MTQ-48. In LCGA the observed variables, in this study psychological resilience measured at different moments, are considered to be indicators of unobserved (i.e. latent) classes of trajectories, with a limited number of mutually exclusive classes (Magidson & Vermunt, 2002; van de Schoot, Sijbrandij, Winter, Depaoli & Vermunt, 2017). For both scales, a total of 10 models were assessed with an increasing number of classes. Age, gender and educational level were included as covariates. The psychological resilience scales and age were inserted as continuous variables. Categorical variables were gender (nominal) and educational level (ordinal). The main goodness-of-fit (GOF) statistic to determine model validity was the Bayesian Information Criterion (BIC). Reductions in BIC is associated with an increase in model fit, hence, the lowest BIC was considered to be the most valid model (Vermunt & Magidson, 2016). Additional GOF indices are presented to interpret the validity of models: classification error and entropy r^2. Classification error is the proportion of misclassification,

lower levels of misclassification are more favorable. Increased entropy r^2 expresses increased adequacy of class identification (Vermunt & Magidson, 2016). Classification tables were indicative of the level of correct specification for each class in the most appropriate model.

Cohen's d's were calculated on psychological resilience differences between classes across all measurement moments and both scales separately. We next assessed the stability of resilience over time across the RS-nl and MTQ-48 classes using mixed effects modelling, with an auto-regressive covariance structure for longitudinal data (Heck, Thomas & Tabata, 2013). Predictors in these models were time and psychological resilience class, and the interaction of time and classes.

We finally assessed the associations of RS-nl and MTQ-48 classes with age, gender, education, and PTE experience up to two months before T1 and PTE experience between T1 and T3.

Latent class-analyses were performed with LatentGold 5.1 (Vermunt & Magidson, 2016) and mixed effects modelling with SPSS version 24.

3. Results

3.1. Latent classes of trajectories of psychological resilience

- INSERT TABLE 1 HERE –

According to the criteria described above, 5-class models were the best fitting models for both the RS-nl, and the MTQ-48 (see Table 1). Classification tables (appendix 1) show that proportion of correct specification within each class were for the RS-nl and MTQ-48 ≥.87 and ≥.82 respectively. Table 2 shows that the sizes of each class differs strongly between the RS-nl and MTQ-48. For example, class 2 of the RSL-nl consisted of 143 officers while the largest class of MTQ-48 (class 2) consisted of 64 officers.

Cross-tabulating RS-nl trajectories with MTQ-48 trajectories yielded, as could be expected, strong associations between the two categorizations (χ^2 (16) = 192.60, $p < .001$).

Moreover, Spearman-rank correlations showed that the RS-nl and MTQ-48 were strongly associated ($r^{T1} = .733$, $r^{T2} = .669$ and $r^{T3} = .704$). Participants in a particular class based on the RS-nl were highly likely to be in a comparable MTQ-48 class. However, classes did not overlap completely indicating that both measures of resilience measure partly different aspects of resilience (see online appendix 2).

3.2. Stability of resilience over time across classes

- INSERT TABLE 2 HERE

Table 2 presents levels of psychological resilience over time by class for both the RS-nl and MTQ-48.

Cohen's d's on psychological resilience difference across classes and measurement moments, yielded for the RS-nl values ranging from of 0.39 to 6.74, and for the MTQ-48 from 1.04 to 7.39, with increasing adjacent classes showing decreasing effect sizes. For a full overview see online appendix 3 and 4.

Mixed effects regression models on the RS-nl revealed significant differences in resilience levels between classes (F (4, 428.93) = 439.60, p <.001). Additionally, change over time was significant (F (2, 650.66) = 12.21, p <.001) and differences in change over time between classes were significant (F (8, 650.66) = 4.85, p <.001) indicating that both change and stable patterns can be observed across a 9-month period. The smallest class (n = 11) first decreased, then slightly increased in levels of psychological resilience. This class was significantly different in change over time from all other classes. The remaining four classes (n = 280) all showed stability over time and, hence, no significant differences in change over time was found among these classes.

Outcomes of the MTQ-48 analyses also revealed significant differences in resilience levels between classes (F (4, 279.73) = 498.37, p <.001), but no significant change over time (F (2, 489.73) = 0.698, p = .498) and no significant differences over time between classes (F

(8, 489.73) = 1.36, p = .212), indicating that according to the MTQ-48 scale, psychological resilience is a stable capacity across the identified classes.

3.3. Associations between classes, demographics and trauma

Age and gender were equally distributed across classes (RS-nl: F (4) = 0.66, p = .622; MTQ-48: F (4) = 1.34, p = .257; RS-nl: χ^2 (4) = 8.35, p = .079; MTQ-48: χ^2 (4) = 6.06, p = .195). Respondents with a low educational level were more likely to be in a less favorable class, while respondents with a high educational level were in both the most and least favorable classes (RS-nl: χ^2 (8) = 18.24, p = .019; MTQ-48: χ^2 (8) = 15.70, p = .047).

Table 2 presents the distribution of PTE experience across classes. PTE experience up to two months prior to T1 was not associated with class membership (RS-nl: χ^2 (4) = 1.29, p = .863; MTQ-48: χ^2 (4) = 0.96, p = .916). PTE experience between T1 and T3 was equally distributed across classes of both scales (RS-nl: χ^2 (4) = 4.73, p = .316; MTQ-48: χ^2 (4) = 1.87, p = .760).

4. Discussion

We hypothesized that among police officers, different classes of trajectories of psychological resilience levels over time exist but that psychological resilience levels across these classes are rather stable. For this purpose, longitudinal data of two different questionnaires on psychological resilience were analyzed, i.e. the RS-nl and MTQ-48.

The results of our 3-wave study covering a 9-month period largely confirmed this hypothesis. Analyses revealed five classes of trajectories of resilience using the MTQ-48. Identified classed differed significantly in resilience levels (with almost consistently large mean differences according to Cohen's d) but levels were stable across the five classes during the 9-month study-period. Almost similar results were found for psychological resilience according to the RS-nl. Again, five classes of trajectories of resilience were found, but one very small class (3.7%) showed a temporal change in psychological resilience. In this class

psychological resilience slightly decreased and then increased, in contrast to the other classes where no significant change was observed. Results furthermore showed that PTE experience was not related to class membership and, thereby not related to level or change over time of psychological resilience. Based on these findings we conclude that the absence of strong associations among officers (Janssens et al., 2018; Marchand et al., 2015; van der Meulen et al., 2018) between resilience and their mental health at later stages cannot be explained by the instability of resilience, as psychological resilience is predominantly stable.

Although the main outcomes and conclusions based the RS-nl and MTQ-48 are largely the same they also convey some dissimilarities. The differences in mean scores between classes of trajectories with the highest and lowest resilience levels between the MTQ-48 and RS-nl are almost similar, but the class sizes of the RS-nl show large differences in size of classes compared to the MTQ-48. These discrepancies could be due to ceiling effects. Such ceiling effects might cause the over-representation of police officers in RS-nl classes with high psychological resilience scores, while in the MTQ-48 class-membership appears to be more dispersed.

Importantly, police officers consistently scored in the upper half of both psychological resilience scales and can be considered more or less psychologically resilient. Although evidence-based cut-off scores indicating the absence of psychological resilience or (population-based) norm scores are not available. Considering stringent selection processes and subsequent attrition among police academy enrollees in the Netherlands (van der Velden, Rademaker, Vermetten, Portenen, Yzermans & Grievink, 2013), this may not be a surprising finding. An important aspect of these selection processes is to select candidates with the ability to be mentally fit (or tough) and function well under stress. Findings of the current study suggest that, although we have no data on resilience during the schooling period of our

sample, beyond selection and schooling (all participants are sworn in police officers) levels of psychological resilience remain stable for most police officers.

The stability of psychological resilience, conform the current study, has consequences for studying associations with mental health and well-being. Psychological resilience is often understood as a characteristic that protects against the detrimental effects of policing. The review by Janssens and colleagues (2018) on the predictive values of psychological resilience among officers did not find any strong evidence to underpin the protective capacity of psychological resilience in this job context. Specifically, five studies examining the longitudinal associations between psychological resilience and several different outcomes, among others PTSD and absenteeism, found only small to trivial effects (Janssens et al., 2018). Also, a previous study (van der Meulen et al., 2017) based on the same sample as the current study, also found no predictive validity of psychological resilience on mental health problems (MHP's). As said, the stability of psychological resilience cannot account for the absence of predictive validity of psychological resilience for mental health problems among police officers, according to the results of the current study.

4.1. Strengths and limitations

To the best of our knowledge, this is the first empirical longitudinal study assessing the stability of psychological resilience among police officers. Moreover, this is the first study applying latent class-analysis to determine stability of psychological resilience. The current study corroborates the predominant notion of psychological resilience being stable in military personnel. Previous studies applied correlational analysis to determine stability, which is not irrefutable for these purposes. The results of the latent-class analyses expand on correlational analyses by showing that change over time is uncommon.

The current study spanned a 9-month observation period. Luthans et al., 2007 describe psychological resilience as a state-like characteristic: it is supposed to be 'relatively

malleable and open to development' (p. 544). Previous studies assessing stability of psychological resilience applied follow-up times varying from 3 weeks (Arthur et al., 2015) up to 6.6 years (Sudom et al., 2014). These studies and the current study do not show a trend towards less stability with an increase in time. Change is not only dependent on time, but also on experiences during a particular time-span. The current study explicitly compared classes of psychological resilience trajectories and PTE experience without finding significant associations. Therefore, the hypothesis that psychological resilience is a state-like characteristic is not supported by the current study. However, future studies longitudinal studies among the police covering several years are warranted to confirm or reject our conclusion.

Attrition occurred between measurement moments. However, the reported attrition is well within response rates observed in organizational psychology studies between 1994 and 2008 (Anseel, Lievens, Schollaert & Choragwicka, 2010). Moreover, respondents and non-respondents were comparable on variables relevant for the current study (van der Meulen et al., 2017).

4.2. Conclusions and practical implications

Our analyses revealed different classes of trajectories of psychological resilience among police officers and showed that almost all identified classes, presenting more than 95% of the total study sample, were stable across a 9-month period. Based on these findings we conclude that the absence of strong (longitudinal) associations between resilience and mental health problems, cannot be attributed to instability in resilience patterns. Our results show that resilience is more a trait-like than a state-like factor suggesting that interventions to create a stable increase of psychological resilience, for other reasons than to protect for mental health problems following adversity, require rather almost therapeutic interventions.

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Table 1.
Fit indices of latent class growth analyses.

	LL	BIC	N	Class. Err.	Entropy r^2	Class-size(s)[a]
Resilience Scale-nl (n = 291)						
1-Class Regression	-454.624	926.268	3	0.00	0.00	291
2-Class Regression	-364.064	784.862	10	0.10	0.50	175/116
3-Class Regression	-256.463	609.373	17	0.09	0.60	136/125/30
4-Class Regression	-222.056	580.271	24	0.10	0.63	115/127/37/12
5-Class Regression	***-189.437***	***554.748***	***31***	***0.09***	***0.66***	***143/66/37/34/11***
6-Class Regression	-175.389	566.364	38	0.18	0.67	92/71/60/34/23/11
7-Class Regression	-162.862	581.023	45	0.18	0.68	91/70/60/34/23/8/5
8-Class Regression	-155.525	606.062	52	0.18	0.69	92/70/59/34/23/6/5/2
9-Class Regression	-142.476	619.679	59	0.18	0.68	45/61/55/45/34/18/16/11/6
10-Class Regression	-134.906	644.251	66	0.17	0.71	53/59/41/47/34/19/15/10/8/5
Mental Toughness Questionnaire-48 (n = 242)						
1-Class Regression	-3033.833	6084.132	3	0.00	0.00	242
2-Class Regression	-2914.467	5883.823	10	0.07	0.58	146/96
3-Class Regression	-2804.196	5701.705	17	0.07	0.72	117/76/49
4-Class Regression	-2757.362	5646.458	24	0.10	0.79	89/73/61/19
5-Class Regression	***-2735.393***	***5640.942***	***31***	***0.11***	***0.80***	***64/57/57/49/15***
6-Class Regression	-2719.304	5647.188	38	0.12	0.82	63/58/49/41/27/4
7-Class Regression	-2710.659	5668.321	45	0.12	0.82	63/58/49/46/13/9/4
8-Class Regression	-2698.562	5682.549	52	0.13	0.84	73/46/34/32/31/13/9/4
9-Class Regression	-2689.208	5702.264	59	0.13	0.85	64/56/47/35/13/11/9/4/3
10-Class Regression	-2679.632	5721.533	66	0.13	0.85	71/47/32/34/29/13/6/4/3/3

Note: Best fitting and chosen model in bold and italics. LL = Log Likelihood, BIC = Bayesian Information Criterion, Npar = Number of parameters, Class. Err. = Proportion of Classification Error.

[a] Based on most probable class-membership.

Table 2.
Means of psychological resilience and PTE experience of class members.

		Pre-T1 PTE[a]		PTE T1-T3[b]		Psychological resilience					
		Y	N	Y	N	T1		T2		T3	
	N	%	%	%	%	Mean (Sd)	95% CI[c]	Mean (Sd)	95% CI[c]	Mean (Sd)	95% CI[c]
Resilience Scale-nl											
1.	37	18.9	81.1	56.8	43.2	4.71 (0.16)	[4.65, 4.76]	4.72 (0.16)	[4.67, 4.78]	4.72 (0.19)	[4.66, 4.73]
2.	143	22.4	77.6	49.7	50.3	4.31 (0.27)	[4.26, 4.35]	4.28 (0.27)	[4.24, 4.33]	4.26 (0.27)	[4.21, 4.30]
3.	66	18.2	81.8	51.5	48.5	3.95 (0.10)	[3.93, 3.97]	3.98 (0.12)	[3.96, 4.01]	3.99 (0.10)	[3.96, 4.01]
4.	34	14.7	85.3	38.2	61.8	3.79 (0.19)	[3.73, 3.86]	3.72 (0.17)	[3.66, 3.78]	3.65 (0.19)	[3.59, 3.72]
5.	11	18.2	81.8	27.3	72.7	3.70 (0.35)	[3.46, 3.94]	3.07 (0.74)	[2.57, 3.57]	3.27 (0.78)	[3.27, 3.79]
Total	291	19.9	80.1	48.8	51.2	4.19 (0.36)	[4.05, 4.13]	4.16 (0.43)	[3.92, 4.00]	4.16 (0.43)	[3.94, 4.02]
Mental Toughness Questionnaire 48											
1.	49	18.4	81.6	46.9	53.1	4.21 (0.21)	[4.15, 4.27]	4.21 (0.25)	[4.14, 4.28]	4.24 (0.23)	[4.18, 4.31]
2.	64	23.4	76.6	49.6	53.1	3.89 (0.12)	[3.86, 3.92]	3.91 (0.13)	[3.88, 3.95]	3.92 (0.13)	[3.89, 3.96]
3.	57	22.8	77.2	49.1	50.9	3.73 (0.09)	[3.70, 3.75]	3.73 (0.07)	[3.71, 3.75]	3.73 (0.09)	[3.71, 3.75]
4.	57	17.5	82.5	52.6	47.4	3.57 (0.16)	[3.52, 3.61]	3.54 (0.13)	[3.51, 3.58]	3.50 (0.15)	[3.46, 3.54]
5.	15	20.0	80.0	33.3	66.7	3.18 (0.23)	[3.05, 3.31]	3.12 (0.19)	[3.01, 3.23]	3.10 (0.22)	[2.97, 3.21]
Total	242	20.7	79.3	47.9	52.1	3.80 (0.31)	[3.69, 3.74]	3.79 (0.33)	[3.68, 3.72]	3.79 (0.35)	[3.68, 3.72]

Note: PTE = Potentially Traumatic Event; T2 = 3 months post T1, T3 = 9 months post T1; Sd = Standard deviation; CI = Confidence Interval.

[a] PTE experience two months before T1: Y = did experience, N = did not experience.

[b] PTE experience between T1 and T3: Y = did experience, N = did not experience.

[c] Adjusted means.

Appendix 1.

Table 1.
Modal Classification Table of 5 RS-nl Classes.

	1	2	3	4	5
Class 1	**0.94**	0.08	0.13	0.01	0.00
Class 2	0.03	**0.88**	0.00	0.07	0.00
Class 3	0.02	0.00	**0.87**	0.00	0.00
Class 4	0.00	0.04	0.00	**0.89**	0.04
Class 5	0.00	0.00	0.00	0.02	**0.96**

Note: Columns represent analysis class grouping. Rows represent predicted class grouping.

Table 2.
Modal Classification Table of 5 MTQ-48 Classes.

	1	2	3	4	5
Class 1	**0.86**	0.00	0.08	0.05	0.00
Class 2	0.01	**0.92**	0.11	0.00	0.05
Class 3	0.07	0.05	**0.82**	0.00	0.00
Class 4	0.07	0.00	0.00	**0.95**	0.00
Class 5	0.00	0.03	0.00	0.00	**0.95**

Note: Columns represent analysis class grouping. Rows represent predicted class grouping.

Appendix 2.
Cross-tabulation and distribution of MTQ-48 classes across RS-nl classes (upper panel) and RS-nl classes across MTQ-48 classes.

			MTQ48 classes				
			1	2	3	4	5
RS-nl classes	1	n	48	19	25	26	1
		%	40.30%	16.00%	21.00%	21.80%	0.80%
	2	n	9	23	23	0	0
		%	16.40%	41.80%	41.80%	0.00%	0.00%
	3	n	5	0	2	23	0
		%	16.70%	0.00%	6.70%	76.70%	0.00%
	4	n	1	12	5	0	11
		%	3.40%	41.40%	17.20%	0.00%	37.90%
	5	n	1	1	1	0	3
		%	16.70%	16.70%	16.70%	0.00%	50.00%

			RS-nl classes				
			1	2	3	4	5
MTQ-48 classes	1	n	48	9	5	1	1
		%	75.00%	14.10%	7.80%	1.60%	1.60%
	2	n	19	23	0	12	1
		%	34.50%	41.80%	0.00%	21.80%	1.80%
	3	n	25	23	2	5	1
		%	44.60%	41.10%	3.60%	8.90%	1.80%
	4	n	26	0	23	0	0
		%	53.10%	0.00%	46.90%	0.00%	0.00%
	5	n	1	0	0	11	3
		%	6.70%	0.00%	0.00%	73.30%	20.00%
			119	55	30	29	6

Appendix 3.
Mean RS-nl Cohen's d among Classes by Measurement Moment.

	T1							T2							T3				
C	Mean	Sd	C	Mean	Sd	Cohen's d	C	Mean	Sd	C	Mean	Sd	Cohen's d	C	Mean	Sd	C	Mean	Sd	Cohen's d
1	4.71	0.16	2	4.31	0.27	1.78	1	4.72	0.16	2	4.28	0.27	1.97	1	4.72	0.19	2	4.26	0.27	2.01
			3	3.95	0.10	5.60				3	3.98	0.12	5.35				3	3.99	0.10	4.91
			4	3.79	0.19	5.14				4	3.72	0.17	6.17				4	3.65	0.19	5.77
			5	3.70	0.35	3.65				5	3.07	0.74	3.09				5	3.26	0.78	2.56
2	4.31	0.27	1	4.71	0.16	1.78	2	4.28	0.27	1	4.72	0.16	1.97	2	4.26	0.27	1	4.72	0.19	2.01
			3	3.95	0.10	1..75				3	3.98	0.12	1.43				3	3.99	0.10	1.34
			4	3.79	0.19	2.20				4	3.72	0.17	2.50				4	3.65	0.19	2.62
			5	3.70	0.35	1.93				5	3.07	0.74	2.18				5	3.26	0.78	1.69
3	3.95	0.10	1	4.71	0.16	5.60	3	3.98	0.12	1	4.72	0.16	5.35	3	3.99	0.10	1	4.72	0.19	2.99
			2	4.31	0.27	1.75				2	4.28	0.27	1.43				2	4.26	0.27	1.11
			4	3.79	0.19	1.04				4	3.72	0.17	1.86				4	3.65	0.19	1.35
			5	3.70	0.35	0.97				5	3.07	0.74	1.73				5	3.26	0.78	2.94
4	3.79	0.19	1	4.71	0.16	5.14	4	3.72	0.17	1	4.72	0.16	6.17	4	3.65	0.19	1	4.72	0.19	4.35
			2	4.31	0.27	2.20				2	4.26	0.27	2.50				2	4.26	0.27	2.46
			3	3.95	0.10	1.04				3	3.99	0.12	1.86				3	3.99	0.10	1.35
			5	3.70	0.35	0.33				5	3.26	0.74	1.21				5	3.26	0.78	1.58
5	3.70	0.35	1	4.71	0.16	3.65	5	3.07	0.74	1	4.72	0.16	3.09	5	3.26	0.78	1	4.72	0.19	5.93
			2	4.31	0.27	1.93				2	4.26	0.27	2.18				2	4.26	0.27	4.04
			3	3.95	0.10	0.97				3	3.99	0.12	1.73				3	3.99	0.10	2.94
			4	3.79	0.19	0.33				4	3.65	0.17	1.21				4	3.65	0.19	1.58

Note: C = Class; Sd = standard deviation.

Appendix 4.
Mean MTQ-48 Cohen's d among Classes by Measurement Moment.

	T1							T2							T3					
C	Mean	Sd	C	Mean	Sd	Cohen's d	C	Mean	Sd	C	Mean	Sd	Cohen's d	C	Mean	Sd	C	Mean	Sd	Cohen's d
1	4.21	0.21	2	3.89	0.12	1.82	1	4.20	0.25	2	3.91	0.13	1.48	1	4.24	0.23	2	3.92	0.13	1.72
			3	3.73	0.09	2.93				3	3.73	0.07	2.62				3	3.73	0.09	2.99
			4	3.57	0.16	3.36				4	3.54	0.13	3.37				4	3.50	0.15	3.90
			5	3.18	0.23	4.61				5	3.12	0.19	4.91				5	3.10	0.22	5.16
2	3.89	0.12	1	4.21	0.21	1.82	2	3.91	0.13	1	4.21	0.25	1.48	2	3.92	0.13	1	4.24	0.23	1.72
			3	3.73	0.09	1.55				3	3.73	0.07	1.75				3	3.73	0.09	1.73
			4	3.57	0.16	2.26				4	3.54	0.13	2.87				4	3.50	0.15	3.04
			5	3.18	0.23	3.86				5	3.12	0.19	4.84				5	3.10	0.22	4.59
3	3.73	0.09	1	4.21	0.21	2.93	3	3.73	0.07	1	4.21	0.25	2.62	3	3.73	0.09	1	4.24	0.23	2.99
			2	3.89	0.12	1.55				2	3.91	0.13	1.75				2	3.92	0.13	1.73
			4	3.57	0.16	1.21				4	3.54	0.13	1.76				4	3.50	0.15	1.93
			5	3.18	0.23	3.11				5	3.12	0.19	4.19				5	3.10	0.22	2.18
4	3.57	0.16	1	4.21	0.21	3.36	4	3.54	0.13	1	4.24	0.25	3.37	4	3.50	0.15	1	4.24	0.23	3.90
			2	3.89	0.12	2.26				2	3.92	0.13	2.87				2	3.92	0.13	3.04
			3	3.73	0.09	1.21				3	3.73	0.07	1.76				3	3.73	0.09	1.93
			5	3.18	0.23	1.92				5	3.10	0.19	2.60				5	3.10	0.22	2.18
5	3.18	0.23	1	4.21	0.21	4.61	5	3.12	0.19	1	4.24	0.25	4.91	5	3.10	0.22	1	4.24	0.23	5.16
			2	3.89	0.12	3.86				2	3.92	0.13	4.84				2	3.92	0.13	4.59
			3	3.73	0.09	3.11				3	3.73	0.07	4.19				3	3.73	0.09	3.83
			4	3.57	0.16	1.92				4	3.50	0.13	2.60				4	3.50	0.15	2.18

Note: C = Class; Sd = standard deviation.