Research Brief
Convergent and Discriminate Validity of the STRONG-Rof the Static Risk Offender Need Guide for Recidivism (STRONG-R)

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The Static Risk Offender Need Guide – Revised (STRONG-R) is a criminal justice assessment tool that is comprised of a variety of items designed to identify an individual's multitude of risks and needs. An assessment tool's ability to discern multiple issues within an individual is critical for managing offenders' risks and needs. The ability for a tool to achieve a high level of construct validity is an essential indicator of performance. The current analyses describe two essential components of the STRONG-R: convergent and discriminate validity. The intent of this research was to examine the relationship between the scales of the five constructs[1] within STRONG-R instrument. Using an Exploratory Factor Analysis (EFA) approach, supportive evidence is provided regarding the convergence of within-scale measures, and 2) the divergence of between-scale measures.

Methods

There are several approaches commonly used in the evaluation process. These common approaches are (1) the Kaiser-Guttman rule; (2) scree test; (3) parallel analysis; (4) goodness of fit; (5) model comparison tests (e.g. Chi-Square difference tests); and (6) theory as foundation to facilitate the model evaluation process (Brown, 2014). For the current analysis, an EFA was conducted by using the scales of the five higher order constructs: *Anti-social History, Education & Employment, Anti-Social Propensity, Substance Abuse Propensity,* and *Reintegration Needs.* These five constructs were previously identified and confirmed as part of the STRONG-R's internal structure study (see Mei & Hamilton, 2016).

Results

The results of the EFA analyses are presented in Table 1. When examining the factor solution, the Kaiser-Guttman rule, the scree test (see Figure 1) and parallel analysis suggests a 4-factor solution. However, according to the results of model fit indices, a 6-factor solution is optimal, as the TLI reached an optimal value.

Table 1 EFA on All Scales of the Five Constructs of STONG-R

| Model	*df*	CFI	TLI	RMSEA [90% C.I.]	*SRMR*	*Eigenvalues*
1 Factor	77	.659	.597	.101 [.101 - .102]	.075	3.769
2 Factors	64	.797	.712	.086 [.085 - .087]	.050	1.593
3 Factors	52	.904	.831	.066 [.065 - .067]	.034	1.209
4 Factors	41	.926	.836	.065 [.063 - .066]	.024	1.117
5 Factors	31	.942	.830	.066 [.064 - .067]	.017	.941
6 Factors	22	.992	.968	.029 [.027 - .030]	.008	.824

Seven and eight-factor model did not converge

Although these are the common approaches to assist in determining a factor structure solution, unfortunately, our result did not reach a consensus solution. The 4-factor solution model may be under-determined because of its poor determinacy, and the 6-factor model may be

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[1] For the internal structure of the STRONG-R, see (Mei & Hamilton, 2016)

over-determined by discovering a trivial but meaningless factor (Brown, 2014). Therefore, both theoretical foundation and conceptualization of constructs based on the test content were used to facilitate the evaluation process. Taking all psychometric analyses results and content validation evidence into consideration (see Mei, Routh & Hamilton, 2016), we retained a 5-factor solution model.

Figure 1. Scree Test and Parallel Analysis for All STRONG-R Scales
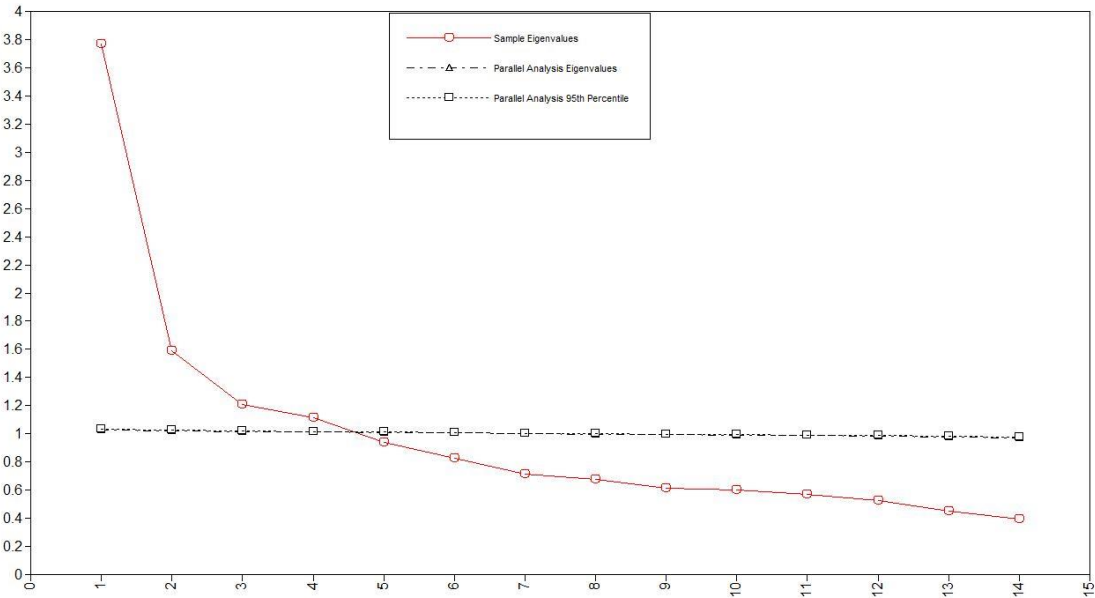
Factor Loadings

Next we examine the construct loadings. The advantage for using EFA model to examine the convergent validity of the scales ability to quantify the extent to which the scales share common variance. In order words, higher values (loadings) of the scales indicate a higher level of convergence. Fourteen scales of the STRONG-R are presented in Table 2 and were found to converge on their corresponding constructs.

To illustrate, the loadings of the two scales, Criminal History (.467) and Violence History (.789), under the construct Anti-Social History ranked as the first two strongest loadings. The loadings of the two scales, Income Source (.622) and Education & Working Experience (.574), under the construct Education/ Employment, were also found ranked as the first two strongest loadings. Also, the loading of the three scales, Use Hard Drug (.861), Drug Use & Barter & Share (.583), and Drug Related Crime (.436) under the construct Substance Abuse ranked as the first three strongest loadings. The loading of the three scales, Mental Health (.422), Reentry Needs (.257), and Employment Barrier (.202), under the construct Reintegration were also found ranked as the first three strongest loadings. Finally, the loadings of three out of four scales, Anti-social Personality (.770), Anti-social Cognition (.479), and Violence Propensity (.337), under the construct Anti-Social Propensity demonstrated three of the strongest loadings; Anti-social

Influence with a loading of .193 ranked at the fifth strongest loading under the construct of Anti-social Propensity. In short, the loadings of the scales demonstrated moderate to strong loadings under their corresponding constructs demonstrating convergent validity.

Table 2 Factor Structure of the STRONG-R

Scales	Anti-Social History	Education /Employment	Anti-Social Propensity	Substance Abuse	Reintegration Needs
Criminal History	**.467***	.062*	-.029*	**.337***	-.214*
Violence History	**.789***	-.045*	.042*	.029*	.021*
Income Source	-.042*	**.622***	-.043*	.072*	.001
Education & Working Experience	.121*	**.574***	-.005	-.058	-.081*
Anti-social Influence	-.046*	**.254***	**.193***	**.193***	-.013
Anti-social Personality	.004	-.016*	**.770***	.061*	-.149*
Anti-social Cognition	.054*	**.304***	**.479***	-.046*	.045*
Violence Propensity	**.380***	.003	**.337***	.088*	**.179***
Use Hard Drug	.045*	-.092	-.038*	**.861***	.058
Drug Use & Barter & Share	-.037*	.146*	.098*	**.583***	.028
Drug Related Crime	-.009	.200*	.075*	**.436***	-.183*
Mental Health	.011	.028*	.004	.101	**.422***
Reentry Needs	.096*	**.311***	.024*	.074	**.257***
Employment Barrier	-.018*	**.347***	**.286***	.058*	**.202***

Cross-Loadings

Cross-loadings in the EFA model demonstrate the extent to which the scales that measure different construct share common variance. Therefore, in order to claim discriminate validity, weaker cross-loadings are preferred. With regards to the first construct, Anti-Social History, the scale Violence Propensity (.380) demonstrate a weak cross-loading. Such cross-loading is understandable and intuitive, as one's violent criminal history foreseeably shares variance with and individual's violence propensity.

Several scales indicated cross-loadings with the Education/ Employment construct, including Anti-social Influence (.254), Anti-social Cognition (.304), Drug Related Crime (.200), Reentry Needs (.311) and Employment Barrier (.347)[2]. These cross-loadings under the construct Employment/Employment are weak and negligible, when compared to Employment/Employment's scales, Income Source (.622) and Education & Working Experience (.574). With that said, the identified cross-loadings are understandable, as each of these scales contains items that are relevant to one's education and employment barriers and achievement.

Next, Anti-social Influence has a weak loading under the construct of Anti-social Propensity, and cross-loaded on Education/Employment and Substance Abuse. However, such cross-loadings are relatively weak when compared to the corresponding loadings of the Education/Employment and Substance Abuse. According to Sutherland (1947), association with anti-social peers may jeopardize their pro-social values and nourish their anti-social attitude,

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[2] These cross-loadings are not atheoretical. To illustrate, from a life-course perspective, the lack of early education and disrupted life course, divert people from pro-social and law-biding lifestyles (Moffitt, 1993; Moffitt, 2006). The early engagement of the anti-social behavior, such as being expelled from school and drug use may result from anti-social influence from significant other, such as peers and family members as well as partners. The association process transforms one's pro-social attitudes to anti-social cognition, which may lead to further anti-social and criminal behaviors, such as drug abuse and commit drug related crimes. Once a pro-social life trajectory is interrupted and involvement with criminal justice system begins (such as, arrest, adjudication, trail, probation, jail, prison and parole), rehabilitation and reintegration becomes difficult as the social consequences and civil penalties associated with said criminal justice system involvement (Mele & Miller, 2005).

which eventually leads to anti-social behaviors[3]. Thus, Anti-Social Influence was retained as a scale of the construct Anti-social Propensity based on theoretical and statistical reasoning.

With a value of .337, Criminal History has a noticeable cross-loading with the Substance Abuse construct. This cross-loading is not illogical, due to the fact that a number of the offenders are drug users, and a strong criminal history predictor is prior felony and misdemeanor drug offenses. However, compared to the loadings of Substance Abuse' scales (.861, .583, and .436), said cross-loading was deemed inconsequential.

Finally, the scale Violence Propensity (.179) cross-loaded with the construct Reintegration Needs. This is likely due to fact that mental health and violence are theoretically intertwined (Gary et. at., 2003; Desai, Falzer, Chpman, Borum, 2012; Sabella, 2014). Moreover, each of the scales (Mental Health, Reentry needs and Employment Barrier) has items dealing with mental health problems[4]. Hence, such cross-loading is not unreasonable.

Conclusion

As discussed, the EFA of the STRONG-R's fourteen scales produced considerable empirical evidence, demonstrating the instrument's convergent and discriminate validity. The strong loadings presented a clear and identifiable latent structural pattern. Furthermore, most of the identified cross-loadings are weak and negligible, which further provides supportive evidence for discriminate validity. To date, the accumulated findings suggest that the measures and scales with the STRONG-R are capable of identifying a variety of distinguishable risk and needs factors.

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[3] While maintaining the underlying theoretical foundation of Differential Association Theory, the operationalization of the anti-social influence captures not only the anti-social influence from peers, but also from family members and partners. Furthermore, statistically, the concern of categorization of the scale Anti-social Influence is reduced when one examines the results of Confirmatory Factor Analysis (CFA) on Anti-social Propensity scales (see Mei & Hamilton, 2016).

[4] The Mental Health scale is a direct measure of suicidal propensity/problem; Reentry needs contains one item regarding mental health service needs. Furthermore, Employment Barrier contains one item identifying mental health issues as an obstacle for employment.

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