# Evaluating Psychometric Properties of the Connor–Davidson Resilience Scale (10-Item CD-RISC) among University Students in Thailand*

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**Abstract**

**Purpose:** To test psychometric properties of the CD-RISC among Thai undergraduate university students.

**Design:** Methodological research.

**Method:** Participants were recruited via convenience sampling. Students who were enrolled in any undergraduate program at a university in Bangkok, Thailand were eligible. They would be excluded if they had chronic medical illness and/or mental disorders requiring hospitalization. Participants were asked to complete self-reported questionnaires, including the CD-RISC. Data were analyzed using exploratory and confirmatory factor analyses (EFA and CFA) to explore the construct validity of the scale. Reliability analyses were also carried out to test internal consistency reliability.

**Main findings:** Sample size was 966 for Time 1 and 695 for Time 2. Results from EFA showed that the 10-item CD-RISC displayed one-factor solution for both data assessment points. For Time 1, factor loadings ranged from 0.54 to 0.74 and for Time 2 those were in the range of 0.50 - 0.73. Results for CFA suggested that the one-factor structure fit well with the sample data for both Time 1 and Time 2. This evidence supported the construct validity of the scale. Cronbach's alpha were .86 for both Time 1 and for Time 2, indicating good reliability.

**Conclusion and recommendations:** Findings from this study revealed acceptable psychometric properties of the Thai version CD-RISC. Thus, this scale is suitable to capture the concept of resilience among Thai undergraduate students. Future research may test the Thai version CD-RISC on other Thai populations.

**Keywords:** Connor–Davidson Resilience Scale, construct validity, undergraduate students, Thailand

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# การทดสอบคุณภาพเครื่องมือแบบวัดความความแข็งแกร่งและยืดหยุ่นของชีวิต Connor-Davidson Resilience Scale (10-item CD-RISC) ในกลุ่มนักศึกษาไทย*

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**บทคัดย่อ**

**วัตถุประสงค์:** เพื่อทดสอบคุณภาพเครื่องมือแบบวัดความความแข็งแกร่งและยืดหยุ่นของชีวิต Connor–Davidson Resilience Scale (10-item CD-RISC) ในกลุ่มนักศึกษาไทย

**รูปแบบการวิจัย:** การวิจัยเครื่องมือวิจัย

**วิธีดำเนินการวิจัย:** กลุ่มตัวอย่างถูกคัดเลือกจากการสุ่มอย่างสะดวกจากนักศึกษาที่ลงทะเบียนเรียนในระดับปริญญาตรีในมหาวิทยาลัยในกรุงเทพฯ ประเทศไทย หากนักศึกษามีการเจ็บป่วยเรื้อรัง หรือมีการป่วยทางสุขภาพจิตที่ต้องเข้ารับการรักษาในโรงพยาบาลจะไม่ถูกคัดเลือกเข้าเป็นกลุ่มตัวอย่าง กลุ่มตัวอย่างทำการตอบแบบสอบถามซึ่งประกอบด้วย แบบวัดความแข็งแกร่งและยืดหยุ่นของชีวิต ฉบับภาษาไทย (10-CD-RISC-Thai version) วิเคราะห์ข้อมูลด้วยการวิเคราะห์องค์ประกอบแบบ การวิเคราะห์โครงสร้างเชิงสำรวจ และการวิเคราะห์โครงสร้างเชิงยืนยันเพื่อทดสอบความตรงเชิงโครงสร้างของเครื่องมือ และวิเคราะห์ความเที่ยงของเครื่องมือด้วยการทดสอบความคงที่ภายใน

**ผลการวิจัย:** กลุ่มตัวอย่างจำนวน 966 คนในช่วงเวลาที่ 1 และจำนวน 695 ในช่วงเวลาที่ 2 ผลการวิเคราะห์โครงสร้างเชิงสำรวจแสดงว่าแบบวัดความแข็งแกร่งและยืดหยุ่นของชีวิต ฉบับภาษาไทยทั้ง 10 ข้อนี้มี 1 องค์ประกอบในทั้งสองช่วงเวลาโดย ในช่วงเวลาที่ 1 แสดงผลค่าน้ำหนักองค์ประกอบระหว่าง 0.54 ถึง 0.74 และในช่วงเวลาที่ 2 มีค่าน้ำหนักองค์ประกอบระหว่าง 0.50 ถึง 0.73 ผลจากการวิเคราะห์โครงสร้างเชิงยืนยัน แสดงให้เห็นว่าโครงสร้าง 1 องค์ประกอบมีความสอดคล้องกับข้อมูลจากกลุ่มตัวอย่างทั้งช่วงเวลาที่ 1 และช่วงเวลาที่ 2 ผลจากการศึกษาครั้งนี้สนับสนุนความตรงเชิงโครงสร้างของแบบวัด ค่าครอนบาคอัลฟ่ามีค่าเท่ากับ .86 ทั้งช่วงเวลาที่ 1 และช่วงเวลาที่ 2 แสดงว่าแบบวัดนี้มีค่าความเชื่อมั่นที่ดี

**สรุปและข้อเสนอแนะ:** ผลจากการศึกษาครั้งนี้แสดงค่าที่ยอมรับได้ของคุณภาพเครื่องมือแบบวัดความแข็งแกร่งและยืดหยุ่นของชีวิต ฉบับภาษาไทย ดังนั้นเครื่องมือนี้จึงเหมาะที่จะนำไปวัดตัวแปรความความแข็งแกร่งและยืดหยุ่นของชีวิตในกลุ่มนักศึกษาไทย การวิจัยในอนาคตอาจทำการทดสอบคุณภาพเครื่องมือนี้ในกลุ่มตัวอย่างอื่นต่อไป

**คำสำคัญ:** แบบวัดความความแข็งแกร่งและยืดหยุ่นของชีวิต ความตรงเชิงโครงสร้าง นักศึกษา ประเทศไทย

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**Background and significance**

Mental health problems are prevalent among adolescents and these problems may affect their psychological well-being. The problems include depression, anxiety, bipolar disorders, eating disorders, alcohol consumption, and marijuana use[1-3]. Adolescents are a high-risk group of developing mental disorder in comparison to other age groups. Schizophrenia is commonly first diagnosed during adolescents and early adulthood[4]. The World Health Organization World Mental Health Surveys across 21 countries reported that 20.3% of college students had 12-month DSM-IV/CIDI disorders[5].

Transitioning to college can be hard for many adolescents and emerging adults. Most adolescents pursue their education in schools, colleges and universities. Academic stress is a reported common stressor among adolescents in many countries[6], which may affect their psychological well-being. Thai students are often under substantial pressure from their parents and teachers to perform well in school and achieve excellent grades[7]. The academic pressure could be higher among university students as academic excellence plays a significant role in determining their outstanding careers.

Scientists and researchers from all over the world are focusing on how to improve adolescent's mental health and what helps them cope with transition and with stress in general. In order to do this, there is a need to identify possible risks for mental problems, strengthen protective factors, and develop necessary prevention interventions. However, research has shown that resilience plays a key role in the intervention program[8].

Resilience is defined as the psychological characteristics that promote positive adaptation in the face of stress and adversity[9,10]. According to such definition and its theoretical framework, several instruments have been developed to measure resilience[11,12], including the 25-item Conner-Davidson Resilience Scale (CD-RISC)[2]. Systematic reviews have shown that the CD-RISC has one of the highest quality assessment ratings[13,14].

The original CD-RISC is a self-administered scale of 25 items that exhibits good psychometric properties[9]. It was designed for both clinical and normal populations, and to assess the extent to which resilience scores can vary in response to treatment[9,15]. In addition, this instrument was not only have helped researchers further clarify the construct of resilience, but also have provided practical tools for practitioners to look for intervention to enhance the individual's resilience in the real-life situation[16,17].

The CD-RISC was initially considered to be multidimensional scale, with five factors: 1) the notion of personal competence, high standards, and tenacity, 2) trust in one's instincts, tolerance of negative effect, and strengthening effects of stress, 3) the positive acceptance of change, and secure relationships, 4) control, and 5) spirituality[2]. Even though the 25-item CD-RISC was developed more than 10 years ago, but many studies across independent samples of different cultures and ages has revealed variability of the factor structure[18-21]. Because of this reason, a new 10-item version was developed, which resulted in a more stable scale[22]. This shortened form of the CD-RISC scale consisting of ten items has been shown to have good reliability, validity and significant correlation with the overall CD-RISC score[23-26]. However, the results from EFA showed that the 10-item version had different factor structures across two demographically equivalent samples[22]. Some studies reported a single structure across independent samples of different cultures[23-25] whereas another study explained by a two-factor construct[26]. This variation encouraged the need to test the psychometric properties and verify the dimension factor structures of this instrument. However, as far as the authors know, the psychometric properties of the Thai version of the 10-item CD-RISC have not been evaluated. Therefore, this study aimed to examine the

validity and reliability of the Thai-version 10-item CD-RISC in Thai undergraduate students, in addition to verifying the dimension factor structure.

**Objective**

The objective of this study was to test psychometric properties of the 10-item CD-RISC among Thai undergraduate university students.

**Methodology**

***Research Design***

A longitudinal non-experimental study was used to test the psychometric properties of the 10-item CD-RISC. The research design enabled assessments of the scale validity, the conceptual structure, and reliability[27].

***Ethical Consideration***

The study protocol was approved by the Research Ethics Committee of the study University (COA No.2014/059.0805). All students were asked to sign the informed consent to participate in the study after receiving verbal and written information about the study objectives and procedures. The investigators emphasized the issues of voluntary participation, confidentiality, and anonymity during the data collection. To protect the identity of the participants, they were advised not to write their personal information on the questionnaire. Furthermore, the signed consent forms were kept separately from the completed questionnaires and there were no links between the two documents. Therefore, it was not possible to access to participants' information.

***Population and Sample***

The target population included students who are enrolled in any undergraduate program at a university in Bangkok, Thailand. Both male and female students were eligible regardless of their academic year. Ten faculties were randomly selected to be research setting and the students were chosen from the 10 faculties, a convenience sampling was used to recruit participants. The voluntary students were requested to sign a consent form, complete a self-reported questionnaire, and then submit it to the investigators. The 966 students participated in Time 1 and 695 students in Time 2. They correctly completed the questionnaires. Students who refused to participate were not asked for the reason for their refusal due to compulsory indications in this sense of Research Ethics Committee.

***Inclusion and Exclusion Criteria***

Participants eligible for this study, if they were enrolled in any undergraduate programs in a University in Bangkok Thailand. Participants were excluded if they have been diagnosed with medical illnesses and mental disorders by physicians/psychiatrist.

***Instruments***

All participants were administered a battery of tests to determine, in addition to socio-demographic variables. The Resilience was evaluated using the 10-item Connor–Davidson Resilience Scale[9,22,28] (CD-RISC) a self-administered questionnaire with five response options (0 = never; 4 = almost always), which had a single dimension in the original version. The final score on the questionnaire was the sum of the responses obtained on each item (range 0-40) and the highest scores indicated the highest level of resilience. Cronbach's alpha was .95 on American undergraduate students[22] and .91 on Chinese teachers[28]. The researchers asked for the permission to use the instrument from the owner[9]. The back-translation using Brislin's[29] method was used to translate the 10-item CD-RISC into Thai language. A nurse educator specialized in mental health nursing translated the scale into Thai and another nurse educator back-translated the Thai version into English. Next, the two versions were examined for semantic and content equivalence by native English speakers who have never seen the original version of the instrument.

***Data collection***

The researchers seek permission from Deans of the selected faculties before

commencing data collection. Students were arranged for out-of-class meetings in the classrooms of the respective centers, where the study objectives and procedures were explained. After the presentation, all the students who signed the informed consent were given the questionnaire to complete which took about 30 minutes. At least one of the researchers was in the classroom while students completed the questionnaires to avoid contamination between the responses of each one. The data collection repeated on the sample one year later.

***Statistical analysis***

Univariate statistics (such as mean, standard deviation, and percentage) were computed to describe participants' personal information using computer statistical package of analysis. Then, exploratory factor analyses (EFA) were performed on data Time 1 and Time 2 separately. These analyses aimed to identify a factorial structure of the CS-RISC. Factor loadings greater than .40 would be sufficiently for the underlying factor[30-31]. Next, confirmatory factor analyses (CFA) were performed using AMOS version 23.0. The resulting factor structures from EFA were submitted to AMOS. The following fit indices were used to determine if the submitted structures fit well with the sample data: a) chi-square per degree of freedom ($\chi^2$/df) < 5[25], b)[32] the values of Normed Fit index (NFI) Comparative fit index (CFI) and Tucker-Lewis Index (TLI) > .90 (acceptable fit) and .95 (excellent fit); and c) RMSEA < .05 and .08 for close and reasonable fit, respectively[33].

**Results**

***Participants' Characteristics***

Totally, 966 and 695 students participated in Time 1 and Time 2 respectively (Table 1). For Time 1, students were predominantly female (67.30%, n = 650) and Buddhist (94.50%, n = 913). The largest group of students were from Faculty of Nursing (21.80%, n = 211), followed by Engineering (11.40%, n = 110), Liberal Arts (10.40%, n = 100), and Public Health (10.40%, n = 100). For Time 2, respondents were also mostly female (68.10%, n = 473) and Buddhist (93.40%, n = 649). The largest group were from Faculty of Dentistry (15.50%, n = 108), followed by Information Communication and Technology (15.10%, n = 105), and Engineering (14.70%, n = 102).

**Table 1:** Demographic characteristics of study participants

| | Time 1 (n = 966) | | Time 2 (n = 695) | |
|---|---|---|---|---|
| | n | % | n | % |
| Gender | | | | |
| - Male | 307 | 31.80 | 217 | 31.20 |
| - Female | 650 | 67.30 | 473 | 68.10 |
| - Missing | 9 | 0.90 | 5 | 0.70 |
| Religion | | | | |
| - Buddhism | 913 | 94.50 | 649 | 93.40 |
| - Christian | 20 | 2.10 | 18 | 2.60 |
| - Islam | 13 | 1.30 | 12 | 1.70 |
| - Others | - | - | 16 | 2.30 |
| - Missing | 20 | 2.10 | | |

**Table 1:** Demographic characteristics of study participants

| | Time 1 (n = 966) | | Time 2 (n = 695) | |
|---|---|---|---|---|
| | n | % | n | % |
| School/Faculty | | | | |
| - Liberal Arts | 100 | 10.40 | 44 | 6.30 |
| - Dentistry | 91 | 9.40 | 108 | 15.50 |
| - Engineering | 110 | 11.40 | 102 | 14.70 |
| - Medicine | 48 | 5.00 | - | - |
| - Nursing | 211 | 21.80 | 66 | 9.50 |
| - Science | 99 | 10.20 | 100 | 14.40 |
| - Pharmacy | 85 | 8.80 | 72 | 10.40 |
| - Public Health | 100 | 10.40 | 98 | 14.10 |
| - Information Communication and Technology | 70 | 7.20 | 105 | 15.10 |
| - Music | 43 | 4.50 | - | - |
| - Missing | 9 | 0.90 | - | - |
| Study Year | | | | |
| - Year 1 | 179 | 18.50 | 116 | 16.70 |
| - Year 2 | 250 | 25.90 | 222 | 31.90 |
| - Year 3 | 244 | 25.30 | 127 | 18.30 |
| - Year 4 | 242 | 25.10 | 167 | 24.60 |
| - Year 5 | 9 | 0.90 | 45 | 6.50 |
| - Year 6 | 27 | 2.80 | 1 | 0.10 |
| - Missing | 15 | 1.60 | 17 | 2.50 |
| Satisfaction with family income | | | | |
| - Not at all | 4 | 0.40 | - | - |
| - Little | 15 | 1.60 | 14 | 2.00 |
| - Moderate | 259 | 26.80 | 211 | 30.40 |
| - Much | 420 | 43.50 | 287 | 41.30 |
| - Very much | 257 | 26.60 | 177 | 25.50 |
| - Missing | 11 | 1.10 | 6 | 0.90 |
| | Mean | SD | Mean | SD |
| Age | 20.21 | 1.51 | 20.34 | 1.43 |
| Grade point average | 3.18 | .41 | 3.07 | .43 |

**Exploratory Factor Analyses (EFA) of the CD-RISC**

Results from EFA showed that the CD-RISC has a one-factorial structure for Time 1 and such structure was also confirmed by Time 2 (Table 2). Factor loadings for each item across two measurement points were comparable with the range of .63 - .78 for Time 1 and .61 - .73 for Time 2. All items loaded strongly and cleanly on their respective factors. This evidence supported the construct validity of the CD-RISC. The CD-RISC had good internal consistency reliability as evidenced by the Cronbach's alphas of .86 for both Time 1 and 2.

**Table 2:** Exploratory factor analyses of the CD-RISC

| Questionnaire Items | Factor Loadings | |
|---|---|---|
| | Time 1 | Time 2 |
| 1. Adapt to change | .73 | .70 |
| 2. Deal with things | .78 | .70 |
| 3. Look at a humorous side of things | .54 | .50 |
| 4. Stress strengthen me | .69 | .61 |
| 5. Bounce back after problems | .65 | .63 |
| 6. Achieve goals despite problems | .71 | .70 |
| 7. Concentrate despite problems | .63 | .66 |
| 8. Failures do not discourage me | .68 | .73 |
| 9. Being a strong person | .70 | .73 |
| 10. Handle negative emotions | .66 | .70 |
| **Cronbach's alpha** | .86 | .86 |

**Confirmatory Factor Analyses (CFA) of the CD-RISC**

Results from CFA (Figure 1) provided strong support for the construct validity of the CD-RISC across two assessment points. For Time 1, most of fit indices (excepted $\chi^2$/df) suggested that the one-factor structure fit with the sample data (CFI = .94, NFI = .93, TLI = .91, RMASEA = .08, 90% RMSEA = .07, .09) and thus the model was acceptable. Factor loadings were in the range of .57 - .81 and all of them achieved statistical significance. An analyses of Modification Indices (one of AMOS features) suggested that four pairs of error variances should be correlated. The first pair was item 6 (Achieve goals despite problems) and Item 7 (Concentrate despite problems). The second pair was item 7 (Concentrate despite problems) and 8 (Failures do not discourage me). The third pair was item 8 (Failures do not discourage me) and 9 (Being a strong person). Finally, the last item was item 9 (Being a strong person) and 10 (Handle negative emotions).

Similarly, most fit indices of Time 2 (excepted $\chi^2$/df) had an adequate fit with the sample data (CFI = .95, NFI = .94, TLI = .94, RMASEA = .07, 90% RMSEA = .06, .08). All factor loadings achieved statistical significance with the range from .41 to .72. Three pairs of error variances were allowed to be correlated given their similar contents. The first pair was item 1 (Adapt to change) and 2 (Deal with things). The second pair was item 3 (Look at a humorous side of things) and 4 (Stress strengthen me). Finally, the last item was item 9 (Being a strong person) and 10 (Handle negative emotions).

**Discussion**

This study aimed to examine the psychometric properties of the Thai version of the 10-item CD-RISC on undergraduate students in Bangkok Thailand. A sample of 966 and 695 students were recruited in Time 1 and Time 2, respectively. Results indicated that the 10-item CD-RISC had acceptable construct validity and reliability across the time. CFA results

did not identify any different structure across Time 1 and Time 2. Therefore, it confirms the high level of consistency and can be used as a standard tool to measure resilience levels among undergraduate university students in Thailand.

The Thai version of the 10-item CD-RISC displayed good psychometric properties and a high level of reliability in Thai undergraduate students. Furthermore, the resulting single-factor structure is the same as that in the original 10-item CD-RISC version, confirming the unidimensional measure of resilience. Moreover, our findings showed that the questionnaire items captured the construct of the resilience among Thai undergraduate university students. Thus, the instrument can be used to measure resilience in this population. Our findings supported Notario-Pacheco, et al.'s[23] work concerning one factor structure of the 10-item CD-RISC.

The 10-item CD-RISC was the first translated in Thai version using a back translation procedure. The finding showed that the Thai version of CD-RISC had acceptable reliability supported and these findings agreed with previous studies[23-25]. The reliability of the Thai version of the 10-item CD-RISC was similar to that of the original version (Cronbach's a of the original version = .85 and of the Thai version = .86 for both Time 1 and for Time 2), and the weights in factor analysis were within the range For Time 1, from .63 to .78 and for Time 2, the range of .61 to .73 on our scale and within the range of .44 to .74 in the original. All the items loaded strongly and cleanly on their respective factors. This evidence supported the construct validity of the 10-item CD-RISC.

This study was strengthened by the use of CFA (with AMOS), which provided a sophisticated way to examine the construct validity of the 10-item CD-RISC using goodness-of-fit indices and enhance accuracy in estimating crucial parameters (i.e., factor loadings and correlation coefficients). Furthermore, the large sample size (966 and 695 students in Time 1 and Time 2, respectively) might increase the generalizability of research findings to undergraduate students in the university. In addition, among the strengths of our study it should be noted that this is a longitudinal study. Thus, the study can confirm that the results are stable across the time. These results reflect the stability of the instruments. Besides, this is the first validation study of the 10-item CD-RISC in Thai version and that this short and simple instrument requires little time to complete and is thus efficiently administered. For that reason, it may be a suitable instrument for clinical use and in community studies. Nonetheless, this result also has some limitations. The sample studied included only one university student, so our results undoubtedly cannot be generalized to youth in other settings or the general population.

Results from this study have implications for undergraduate educators. Given that undergraduate students experience various stressors, such stressors might be appraised as negative adaptation, then, they might develop depressive symptoms. This evidence supported by the current studies reporting that 20.3% of college students developed mental disorders[1]. Facing with academic stress and life transition may affect their psychological well-being. Thus, psychological characteristics, such as resilience, that promotes positive adaptation for the students when facing with stress and adversity is most important. Regarding with this matter, university educators may develop intervention to promote students' resiliency and may use 10-item CD-RISC to measure their resilience levels.

Nurse researchers may use the 10-item CD-RISC to assess the resilience construct in their future studies. Additional research is needed to further test the psychometric properties of the 10-item CD-RISC on Thai students and other populations. To strengthen external validity of research findings, multi-centered recruitment with large sample sizes and cross-cultural studies are also encouraged.

**Conclusion**

This study provided empirical evidence to support the psychometric properties of the 10-item CD-RISC scale on Thai undergraduate students in Bangkok Thailand. The Thai version of the 10-item CD-RISC is considered a short, simple, and easily-administered. It could be used as a standard tool to measure resilience levels among Thai undergraduate students. Future research could further test the psychometric properties of CD-RISC-10 on other Thai population (such as adults and elderly) or cross-validate the scale on people in other countries.

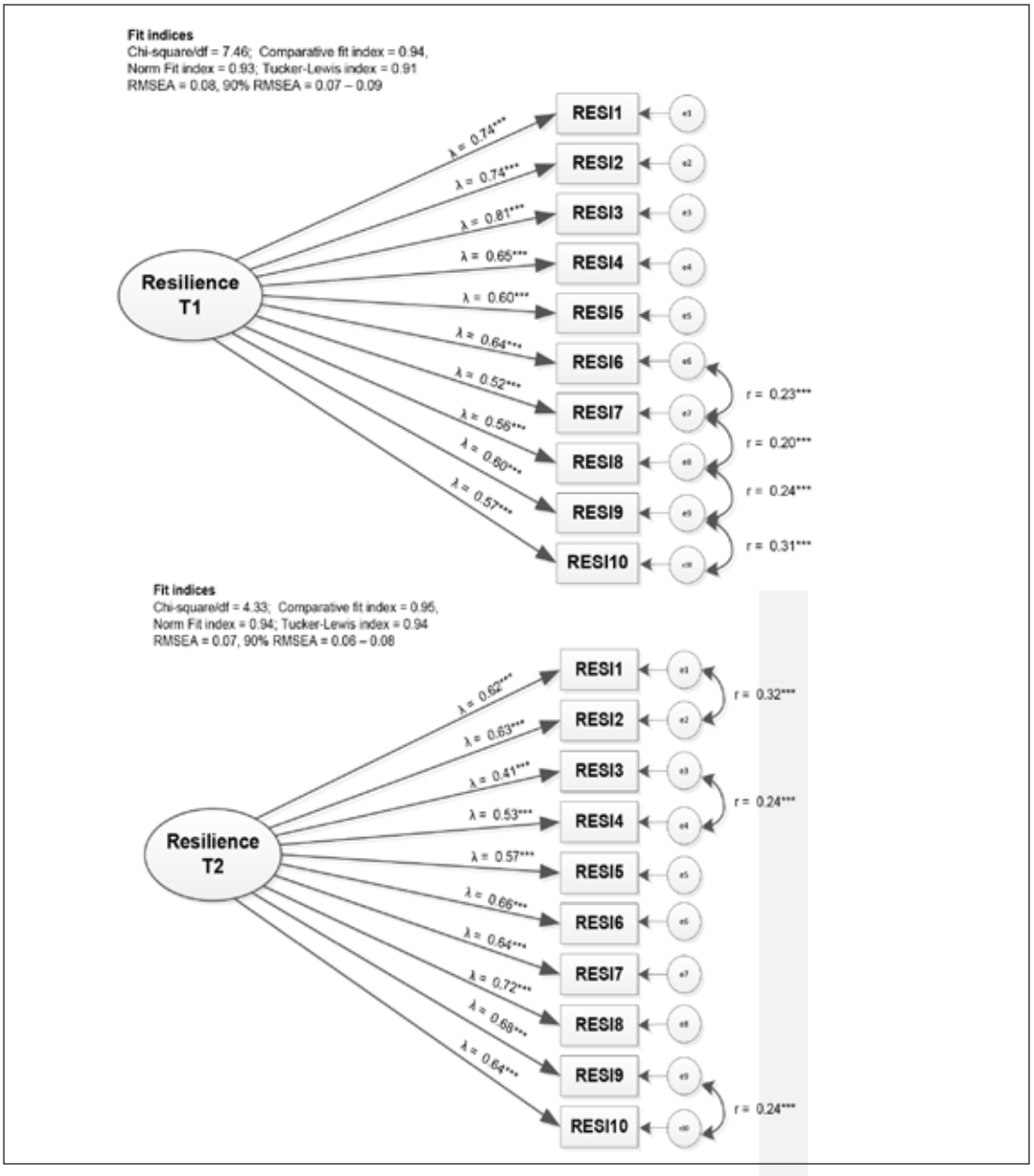


**Figure 1** Confirmatory factor analyses of the CD-RISC
**Note:** a) RMSEA = Root mean square error of approximation
b) 90% RMSEA = 90% confidence interval around RMSEA

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