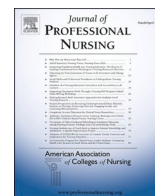




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NCLEX-RN readiness: HESI Exit Exam validity and nursing program policies

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ABSTRACT

Background: The HESI® Exit Exam (E2) has been used to assess student readiness for the NCLEX-RN® examination for over two decades.**Purpose:** In this study, we examined the relationship between students' average E2 scores and their first time NCLEX-RN pass or fail outcomes to understand the validity of the E2 as a predictor of NCLEX-RN readiness. In addition, we examined the relationship between policies governing E2 use in programs and success on the NCLEX-RN.**Methods:** Over 40 programs across the United States participated in the study, providing NCLEX-RN outcome information for 3686 students that took the E2 in 2018–2019 and information about policies.**Results:** Students who achieved an average E2 score of 850 and above had a NCLEX-RN first-time pass rate (FTPR) of 96.33%. The NCLEX-RN FTPR was 97.29% for students whose average E2 score was 900 and above. Policies such as test preparation requirements and remediation for the E2 were associated with statistically significantly higher student NCLEX-RN FTPR.**Conclusion:** This study builds upon past evidence about the validity of the E2 and extends research in new directions by demonstrating the role of specific E2 policies in supporting students' success on the NCLEX-RN.

Introduction

The National Council on Measurement in Education (2012) defines standardized high-stakes examinations as a test or series of tests with results that have critical consequences for the test-takers and the institutions that cultivate the knowledge and skills being assessed on the exam. In the United States (U.S.), undergraduate nursing education helps prepare candidates for the National Council Licensure Examination for Registered Nurses (NCLEX-RN®), a high-stakes test that they must pass to become licensed to practice as a registered nurse. Hence, supporting students' readiness to take the NCLEX-RN is a high-priority programmatic goal in nursing education. Many nursing programs use standardized exams, such as the Health Education Systems Incorporated (HESI®) Exit Exam (E2) for Registered Nurses (RN) to assist in identifying students who are ready to take the NCLEX-RN and students who

need additional preparation for the NCLEX-RN (Nibert & Morrison, 2013).

A long history of evidence suggests that performance on the E2 is a highly accurate predictor of NCLEX-RN success (Nibert & Morrison, 2013; Riley & Gouveia, 2022). However, tests of this nature need to be continually re-checked for predictive validity. As such, the first objective of this study is to determine the extent to which the E2 can predict nursing students' first-time pass rates (FTPR) on the NCLEX-RN. According to the National League of Nursing (NLN), tests with evidence of reliability and predictive validity can be used to support student learning, improve teaching, and guide program improvements (NLN, 2012, 2020). For instance, over the years, many nursing programs have adopted a policy of requiring a minimum E2 score of 850 or 900 to determine student readiness for the NCLEX-RN (Langford & Young, 2013). Scholars have also inquired about how the policies governing the

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use of the E2 impact NCLEX-RN readiness (Barton et al., 2014). However, there is a dearth of evidence on which E2 program policies increase the likelihood of student success on the NCLEX-RN. As such, the second objective of this study is to determine the extent to which specific program policies correlate with first time success on the NCLEX-RN.

In this paper, we therefore address the following research questions:

“How much more likely are students to pass the NCLEX-RN on their first attempt, if they achieve an average E2 score of 850 or 900?”

“Which E2 program policies increase the likelihood of students passing the NCLEX-RN on their first attempt?”

Background research: E2

The E2 is a computerized, comprehensive exam that is typically administered during the last semester or term of a nursing program to help determine students' readiness to take the NCLEX-RN. The content in the E2 aligns with the current NCLEX-RN test plan (National Council of State Boards of Nursing [NCSBN], 2019). The E2 consists of 160 items, including 10 pilot items. Students are not aware of which items on the exam are pilot items and these items do not contribute to students' scores. The question types include multiple-choice, multiple-response, ranking, hot spot, and fill-in-the-blank. Each E2 item type can include supplemental information such as a table, audio, or video. Most items are developed at or above the application level of the Bloom's taxonomy cognitive domains (Bloom, 1956). All items are reviewed in a quality control process to ensure that they meet standards in areas such as grammar, gender bias, cultural bias, and stereotyping.

E2 scores typically range from 300 to 1500, although it is possible to get higher or lower scores depending on the difficulties of the items included. Standard descriptive statistics such as item difficulty, reliability, and discrimination are obtained on each item every time an item is used in the E2. To be included in the E2, a test item must have a level of difficulty where it is answered correctly by 40% to 95% of all test takers. The reliability of each E2 item administered is calculated using the Kuder-Richardson Formula 20 (KR-20). The average KR-20 for the E2 is 0.90 or higher, indicating satisfactory reliability (Vesey & Brunert, 2018).

Prior research on the E2

Considerable research conducted over the past 20 years has provided extensive knowledge regarding the predictive accuracy of the E2 (Adamson & Britt, 2009; Barton et al., 2014; Langford & Young, 2013; Lauchner et al., 1999; Lewis, 2005; Newman et al., 2000; Nibert et al., 2002; Nibert & Young, 2001; Riley & Gouveia, 2022; Young & Willson, 2012; Zweighaft, 2013, 2017). Twelve large-scale studies indicated that recommended E2 scores were highly predictive of success on the NCLEX-RN, with students who achieved a score of 900 or higher passing the NCLEX-RN from 96.4% to 99.2% of the time (Riley & Gouveia, 2022).

Several early validity studies found a positive correlation between the first E2 score and NCLEX-RN success (Lauchner et al., 1999; Lewis, 2005; Newman et al., 2000; Nibert et al., 2002; Nibert & Young, 2001). Later studies confirmed these findings and expanded the focus of the previous papers by investigating the predictive accuracy of repeated testing with three successively administered parallel versions of the E2 (Adamson & Britt, 2009; Langford & Young, 2013; Young & Willson, 2012). Although the results differed among the three studies, the predictive accuracy for all versions of the E2 across all three studies was quite high, ranging from 92.94% to 99.16% for students scoring 900 and higher, except in the third version studied by Adamson and Britt (2009).

In addition to large-scale validity research, several single program studies to have also found significant correlations between E2 scores and FTTP on the NCLEX-RN (Cobbett et al., 2016; Czekanski et al., 2018; Havrilla et al., 2018; Homard, 2013; Johnson et al., 2017; Kim et al.,

2019; March & Ambrose, 2010). These studies have provided insight into how programs use the E2 to support students' success on NCLEX-RN. For instance, Czekanski et al. (2018) reported using the E2 and HESI Specialty Exams throughout the program. Exam data was used to help evaluate students' strengths and gaps in content areas and develop recommended strategies for improvement.

E2: nursing program policies

There is an increasing amount of literature regarding nursing program policies and the use of standardized testing. The majority of the articles focused on how nursing programs incorporated specific policies (Czekanski et al., 2018; Tagher & Robinson, 2016; March & Ambrose, 2010; March & Robinson, 2015; Schroeder, 2013). Randolph (2017) examined programs in the state of Arizona, and there were four articles using national data (Barton et al., 2014; Langford & Young, 2013; Lauer & Yoho, 2013; Stonecypher et al., 2015). There were three literature review articles that included information about standardized testing and program policies (Hunsicker & Chitwood, 2018; Mee & Schreiner, 2016; Sosa & Sethares, 2015).

Barton et al. (2014) reported that a variety of exam preparation activities were recommended in nursing programs such as faculty guided sessions, peer-mentoring or student designed plans for exam preparation, although specific policies for required activities were not identified. The policies regarding remediation strategies varied and included requirements for reviewing missed questions and associated study materials, NCLEX-RN test preparation text and/or a review course, review of the student's previous HESI Specialty Exam individualized remediation content, and HESI online case studies (Czekanski et al., 2018; Lauer & Yoho, 2013; Schroeder, 2013).

There are schools that have policies that recommend or require students reach benchmark scores on the E2 with the benchmark score of 850 or 900 being common. Some schools only used the benchmark score as a goal and encouraged students to use the information to guide their continued NCLEX-RN preparation (Barton et al., 2014; Randolph, 2017; Sosa & Sethares, 2015), while many others had policies that dictated consequences for failure to achieve the benchmark. These consequences most commonly involved remediation and retesting (Barton et al., 2014; Lauer & Yoho, 2013; March & Ambrose, 2010; Schroeder, 2013) but also had more serious consequences such as course failure, denied graduation, or denied NCLEX-RN candidacy (Barton et al., 2014; Czekanski et al., 2018; Tagher & Robinson, 2016; Langford & Young, 2013; March & Robinson, 2015; Randolph, 2017). Another common policy was the incorporation of the standardized exam score as a component of the course grade. Most commonly the E2 score comprised 5% to 20% of the course grade with some reports of more than 30% (Barton et al., 2014; Czekanski et al., 2018; Randolph, 2017).

Since there is a correlation between higher scores on standardized testing and success on the NCLEX-RN, program policies are intended to facilitate achievement of higher standardized testing scores to increase FTTP as reported to the regulatory agencies. Loftin et al. (2020) reported that a high percentage (94%) of schools used standardized exams and that the “FTTP is either the most influential or one of the top three most influential factors in program related” (p. 709) policy making. The variety of policies intended to have a positive impact on the FTTP are a result of the cyclical policy change process as described by Stonecypher et al. (2015).

Summary

Nursing programs use the E2 as a component of student evaluation to help determine individual students' readiness for the NCLEX-RN. Evidence from over two decades of work by over a dozen researchers has validated that students' performance on the E2 predicts how well they are positioned to succeed on the NCLEX-RN. It is also evident that administrators and faculty assign meaning to students' E2 scores;

programmatic decisions are made about how to motivate students, support them, and hold them accountable towards their preparation for the NCLEX-RN.

A review of extant literature suggests there is a need for updating research and providing nursing programs with success indicators (Riley & Gouveia, 2022). An examination of which E2 policies correlate with NCLEX-RN success merits further exploration. These directions underpin the design and potential contribution of the E2 validity study reported in this paper.

Method

This study used a correlational descriptive research design to examine how nursing programs use the E2 and the extent to which performance on the E2 predicted first-time success on the NCLEX-RN.

Sampling

We used convenience sampling to obtain E2 program policy and NCLEX-RN information from nursing schools across the United States. Administrators (deans, directors, chairs) of RN programs were invited to participate if they met the following criteria (a) active affiliation with an associate degree in nursing (ADN) or bachelor of science in nursing (BSN) degrees at a public or private institution, (b) administration of the E2 in the program from August 1, 2018 to July 31, 2019. We chose not to expand the sampling timeline to another academic year to prevent a potential confounding effect of COVID-19 on educational processes and outcomes in nursing programs.

Participants

Institutional Review Board (IRB) approval was obtained from the IRB at Teachers College, Columbia University. Administrators of 53 programs consented to participate in the E2 validity study. Of these, participants from 43 programs provided NCLEX-RN outcome information. Participants from 44 programs completed the E2 Program Policy Survey. The distribution for the 44 programs is as follows (Table 1):

Data sources

Participants were requested to complete the following data collection activities. First, participants provided NCLEX-RN outcome information for students who took the E2 between August 1, 2018 and July 31, 2019. For each student included in the list, participants were asked to indicate (a) if they passed/failed/did not take the NCLEX-RN, (b) the date when the NCLEX-RN was attempted, and (c) provide relevant notes, if any (e.g., student did not pass on first attempt but passed on a later attempt). Second, participants completed a 22-item survey indicating the program policies that guided their use of the E2. The second and fourth authors, who have deep familiarity with literature on E2 validity and policies, created this instrument by building upon the policy survey used by Barton et al. (2014). In this way, content and expert validity was established for the E2 policy survey. Table 2 lists the questions and the response options on the survey.

Table 1
E2 validity study participant distribution.

| Program type | Region | Institution type |
|--------------|------------------------|------------------|
| ADN = 25 | Midwest = 10 | Public = 43 |
| BSN = 19 | Northeast = 3 | Private = 1 |
| | South = 27 | |
| | West = 3 | |
| | Multiple locations = 1 | |

Table 2
E2 Program Policy Survey.

| Items | Response options |
|---|--|
| Name | Open-ended text field |
| Name of institution | Open-ended text field |
| RN-degree type | Select one: <ul style="list-style-type: none"> • BSN • ADN |
| Location (city, state) | Open-ended text field |
| Email address | Open-ended text field |
| When do your students take their first HESI Exit Exam? | Select one: <ul style="list-style-type: none"> • The term/semester prior to their final term/semester • At the beginning of their final term/semester • During their final term/semester • At the end of their final term/semester • Other (open-ended text field) |
| Which HESI Exit exam score do you use to indicate readiness for the NCLEX-RN? | Select one: <ul style="list-style-type: none"> • First HESI Exit Exam • Last HESI Exit Exam • Highest HESI Exit Exam • Average HESI Exit Exam |
| Do you require students to achieve a minimal HESI Exit Exam score? | Select one: <ul style="list-style-type: none"> • Yes • No |
| What is the minimal HESI Exit Exam score students are required to achieve? | Select one: <ul style="list-style-type: none"> • 950 • 900 • 850 • 800 • Other (open-ended text field) |
| If students do not achieve the minimal score, are they required to take the HESI Exit Exam more than once? | Select one: <ul style="list-style-type: none"> • Yes • No |
| How many times are students allowed to take the HESI Exit Exam? | Select one: <ul style="list-style-type: none"> • Two • Three • Four • More than four • As many times as needed |
| Is the HESI Exit Exam Score included in the course grade? | Select one: <ul style="list-style-type: none"> • Yes • No |
| What percent of the total course grade is used for the HESI Exit Exam score? | Select one: <ul style="list-style-type: none"> • 5% • 10% • 15% • 20% • Other (open-ended text field) |
| Do you have specific test preparation requirements for students for the HESI Exit Exams? | Select one: <ul style="list-style-type: none"> • Yes • No |
| Which of the following activities do you require for HESI Exit Exam test preparation? Please select all that apply. | For each, indicate yes or no: <ul style="list-style-type: none"> • Student driven learning plan • Faculty driven learning plan • Specified time in learning activities • Review remediation content from HESI specialty • Exams taken in previous courses • Practice test • HESI Case Studies • Elsevier Adaptive Quizzing (EAQ) • NCLEX review book • NCLEX review course |

(continued on next page)

Table 2 (continued)

| Items | Response options |
|--|---|
| If you checked 'yes' for any of HESI Exit Exam test preparation activities listed above, please provide more information | <ul style="list-style-type: none"> • Other exit exam preparation activity Open-ended text field |
| Do you require remediation? | Select one: <ul style="list-style-type: none"> • Yes • No |
| Which of the following activities do you require after HESI Exit Exams for remediation? Please select all that apply. | For each, indicate yes or no: <ul style="list-style-type: none"> • Student driven learning plan • Faculty driven learning plan • Specified time in learning activities • Plan based on student score (i.e. lower score requires more activities) • HESI Remediation • HESI Remediation Essential Packet • HESI Remediation Recommended Packet • HESI Case Studies • Elsevier Adaptive Quizzing (EAQ) • NCLEX review book • NCLEX review course • Other remediation activity Open-ended text field |
| If you checked 'yes' for any of HESI Exit Exam remediation activities listed above, please provide more information. | Open-ended text field |
| How much time do you allow for remediation between two HESI Exit Exam attempts? | Select one: <ul style="list-style-type: none"> • Less than 1 week • 1 week • 2 weeks • More than 2 weeks • Other (open-ended text field) |
| How were the HESI Exit Exams proctored during the Aug 1, 2018–July 31, 2019 period? Please select all that apply. | Select one: <ul style="list-style-type: none"> • Nursing staff/faculty proctored the exams at the school • Testing center staff proctored the exams • The exams were proctored online by a vendor/company • The exams were proctored online by nursing school staff/faculty • Other (open-ended text field) Select all that apply: |
| How do you obtain information about INDIVIDUAL students' NCLEX-RN results? (Please select all that apply) | Select all that apply: <ul style="list-style-type: none"> • State Board of Nursing Report • Student Reported (Not Validated Further) • Student Reported (Validated Further By Faculty) |

Data analysis

NCLEX-RN outcome information was obtained for 3686 students across the United States. To understand the validity of the E2 as a predictor of the NCLEX-RN, statistical analyses were conducted to test the relationship between students' average E2 scores and their first time NCLEX-RN pass or fail outcomes. Average E2 scores were chosen for analysis since this is the operationalization of E2 performance most reported in recent papers (Barton et al., 2014; Gouveia et al., 2021; Zweighaft, 2013, 2017). Chi-squared tests were conducted to evaluate whether students' NCLEX-RN FTPR were significantly higher when the E2 score was over the benchmark. Two E2 benchmark scores were considered – 850 and 900 – based on differing usage in different programs. In addition, independent samples *t*-tests were conducted to evaluate the differences in E2 scores between students who passed the NCLEX-RN on the first attempt and students who failed the NCLEX-RN on the first attempt. All these tests between E2 scores and NCLEX-RN outcomes were conducted across all students in the sample.

Four common E2 types of policies practiced by programs were

analyzed in relation to their students' NCLEX-RN outcomes – test preparation requirements, remediation activities required, the use of E2 scores within course grades, and minimal E2 score requirements. Chi-squared tests, with Benjamini and Hochberg (1995) post-hoc corrections, were conducted to analyze both the difference in NCLEX-RN FTPR when a program required a certain policy (where applicable), and the difference in NCLEX-RN FTPR when a program used a specific remediation practice or test preparation policy. All these tests between E2 policies and NCLEX-RN outcomes were performed across all students in the sample. Faculty were asked to de-identify students (i.e., remove students' first and last names) after they matched students' E2 scores with NCLEX-RN outcomes. They shared these de-identified data files through a password-protected platform. As an additional step, de-identified identifiers were also assigned to programs before students' NCLEX-RN outcome data and program policies were shared for analysis.

Results

In examining the NCLEX-RN FTPR and E2 scores, we investigated different score buckets of the average E2 scores. Our sample shows an increasing pass rate as E2 scores increase (Table 3). It is worth noting that students are 93.82% likely to pass the NCLEX-RN if their average E2 scores were between 850 and 899, and even more likely for students with scores above 900.

E2 validity

Overall, there was a higher NCLEX-RN pass rate for students with average E2 scores above the benchmark scores of 850 and 900, than students who got an E2 score below 850 and 900 (Fig. 1). Students who achieved an average E2 score of 850 and above (including students with scores 850–899 and students with scores above 900) had a NCLEX-RN pass rate of 96.33%, statistically significantly higher than the NCLEX-RN pass rate of 86.57% for students who got an average E2 score below 850 ($\chi^2(1) = 119.51, p < .001$). The same is true for the benchmark score of 900 – the NCLEX-RN pass rate was 97.29% for students whose average E2 score was 900 and above (including students with scores above 950), statistically significantly higher than the pass rate of 89.14% for those who got a score below 900 ($\chi^2(1) = 93.17, p < .001$). Across all the benchmark scores and the E2, there is at least a NCLEX-RN pass rate of 95% for students overall who achieved an E2 benchmark score of either 850 or 900, compared to a pass rate of below 90% for students who did not meet the E2 benchmark scores. Of note, the NCLEX-RN pass rate was statistically significantly higher for students with E2 benchmark scores over 900 than students with scores from 850 to 899, ($\chi^2(1) = 16.66, p < .001$).

Table 4 shows the average E2 scores for students who passed the NCLEX-RN and students who did not pass the NCLEX-RN, across all students and for students in each of the programs. Overall, students who passed the NCLEX-RN on the first attempt achieved statistically significantly higher E2 scores ($M = 898.56$) than students who did not pass the NCLEX-RN ($M = 793.70$), $t(289.4) = 13.39, p < .001$. Across all students, it is evident that students who passed the NCLEX-RN achieved

Table 3
NCLEX-RN pass rate.

| Average E2 score | Student NCLEX-RN outcome | | Pass rate % |
|------------------|--------------------------|--------|-------------|
| | Passed | Failed | |
| 950 and above | 1077 | 27 | 97.55 |
| 900–949 | 645 | 21 | 96.85 |
| 850–899 | 638 | 42 | 93.82 |
| 800–849 | 463 | 36 | 92.79 |
| 750–799 | 290 | 38 | 88.41 |
| 700–749 | 185 | 31 | 85.65 |
| 699 and below | 132 | 61 | 68.39 |
| Total | 3430 | 256 | 93.05 |

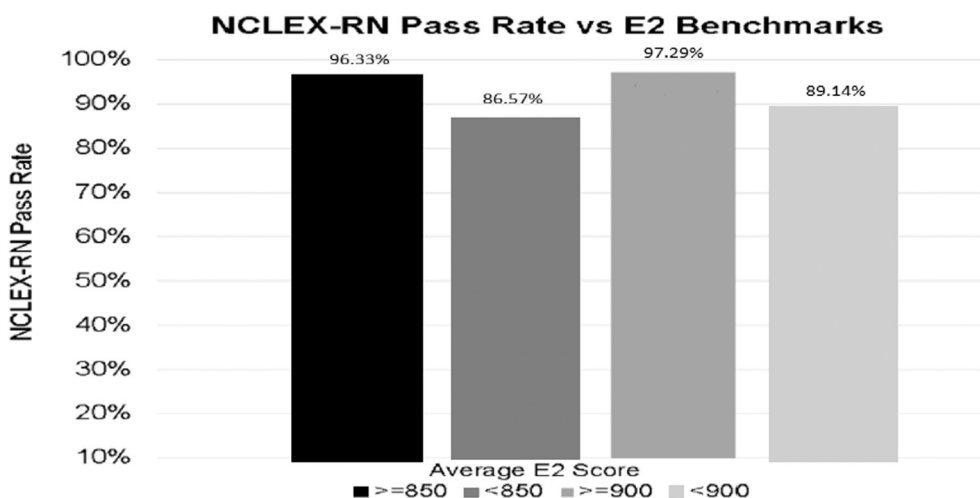


Fig. 1. NCLEX-RN pass rate at E2 benchmark scores of 850 and 900.

Table 4

Average E2 scores for students that passed and failed the NCLEX-RN.

| | M (SD) for pass students | M (SD) for fail students |
|----------------------------|--------------------------|--------------------------|
| Average E2 score (overall) | 898.56 (113.73) | 793.70 (121.38) |
| Average E2 score (ADN) | 919.64 (109.08) | 832.75 (116.60) |
| Average E2 score (BSN) | 883.22 (114.61) | 750.82 (112.11) |

average E2 scores above 850 or 900, the standard benchmark scores for the E2.

E2 policies and NCLEX-RN outcomes

Out of 43 programs, 56% (24 programs) required students to achieve a specific minimal E2 score, while 44% (19 programs) did not require any specific minimal E2 score. Eighty-six percent of the programs (37 programs) included the E2 score in the students' course grades, while 14% (6 programs) did not include it in the course grade (with programs most frequently reporting that E2 scores were 10% of the student's course grade). Sixty-five percent of the programs (28 programs) have specific test preparation requirements for students, while 35% (15 programs) did not have any. Seventy-nine percent of the programs (34 programs) required students to complete remediation activities while 21% of the programs (9 programs) did not require any remediation.

Minimal E2 score

One practice followed by some programs, with particular relevance to the E2, is the practice of requiring students to achieve a specific E2 score before completing the program. Table 5 shows the results of this practice. Overall, 92.67% of the students in programs that required students to get a minimal E2 score passed the NCLEX-RN, which was not statistically significantly different than the 93.43% of students in programs that did not require a minimal E2 score ($\chi^2(1) = 0.70, p = .404$). Notably, 57% of programs required a minimal E2 score, and the most frequently used score was 900 (56% of programs with this requirement).

Table 5

Impact of minimal E2 score policy on NCLEX-RN success.

| Minimum E2 score | NCLEX-RN pass rate (minimum E2 required) | NCLEX-RN pass rate (minimum E2 not required) | $\chi^2(1)$ | p value | Adjusted α from B&H procedure |
|------------------|--|--|-------------|---------|--------------------------------------|
| 700 | 95.60% | 92.99% | 0.58 | 0.447 | 0.33 |
| 850 | 94.79% | 92.69% | 3.27 | 0.071 | 0.021 |
| 900 | 91.19% | 93.84% | 7.90 | 0.005 | 0.012 |

When we break this down by what score was required (700, 850, or 900), only the minimal score of 900 showed some interesting patterns. Overall, students in programs that did not require a minimum score of 900 had a NCLEX-RN pass rate of 93.84%, statistically significantly higher than the NCLEX-RN pass rate of 91.19% for students in programs that did require a minimum score of 900 ($\chi^2(1) = 7.90, p = .005$, adjusted $\alpha(BH) = 0.011$).

E2 score in course grades

Student NCLEX-RN FTPR were analyzed in relation to their programs' HESI policies of including E2 scores as a component of their course grades. Overall, 92.82% of the students in programs that reported including students' E2 scores in their course grade passed the NCLEX-RN, which was not significantly different than the 95.04% student NCLEX-RN pass rate in programs that did not include students' E2 scores in their course grade, $\chi^2(1) = 2.27, p = .132$ (Table 6).

Test preparation requirement

Student NCLEX-RN FTPR were analyzed in relation to their programs' HESI policies on test preparation requirements. Overall, programs that reported having specific test preparation requirements for the E2 had statistically significantly higher student NCLEX-RN FTPR (94.05%) than programs that did not have any specific test preparation requirements (91.14%), $\chi^2(1) = 10.5, p = .001$ (Table 6).

Remediation activities

Student NCLEX-RN FTPR were also analyzed in relation to their programs' HESI policies on remediation requirements. Overall, for programs that identified having specific remediation requirements for the E2, their students' NCLEX-RN FTPR were 93.21%, which was not statistically significantly higher than the NCLEX-RN pass rate of 92.51% of students in programs that did not have any specific remediation requirements, $\chi^2(1) = 0.37, p = .54$.

Table 6

Impact of course grade, test preparation, and remediation policies on NCLEX-RN success.

| Practice | Required? | NCLEX-RN pass rate | Statistical significance of difference |
|---------------------------------|-----------|--------------------|---|
| E2 Score in course grade | Yes | 92.82% | $\chi^2(1) = 2.27, p = .132$ Adjusted $\alpha(BH) = 0.024$ |
| | No | 95.04% | |
| Test prep requirement | Yes | 94.05% | $\chi^2(1) = 10.5, p = .001$ Adjusted $\alpha(BH) = 0.009$ |
| | No | 91.14% | |
| Required remediation activities | Yes | 93.21% | $\chi^2(1) = 0.37, p = .54$ Adjusted $\alpha(BH) = 0.037$ |
| | No | 92.51% | |

NCLEX-RN FTPR and E2 benchmark scores for students in programs with E2 test preparation and remediation requirements

Student NCLEX-RN FTPR were also analyzed in relation to meeting the E2 benchmark scores of 850 and 900 for cases where specific test preparation (Table 7) or remediation activities (Table 8) were required by programs. In other words, these analyses investigated whether the E2 remains predictive of the NCLEX-RN when specific test preparation or remediation activities were required. It is noteworthy that the 900 score was the most frequently used benchmark, with 56% of the programs using this threshold. Except for the test preparation activity ‘specified time in learning activities’, where FTPR were generally very high for all students, having an average E2 score over 850 (or over 900) was associated with statistically significantly higher NCLEX-RN FTPR, regardless of which individual test preparation or remediation activities were required. Across interventions, NCLEX-RN FTPR were at least 95% for students that got an average E2 score of either ‘850 or above’, or ‘900 or above’, while NCLEX-RN FTPR ranged from 83% to 92% for students that got an average E2 score of either ‘below 850’ or ‘below 900’.

Discussion

A very large percentage (94–97%) of nursing programs use standardized testing as part of preparing students for the high-stakes NCLEX-RN (Lofitin et al., 2020; Randolph, 2017). Findings from this study demonstrate the continued validity and reliability of the E2 in predicting success on the NCLEX-RN for first-time test takers. Students with a benchmark score of 850 or higher have a minimum 95% chance of passing the NCLEX-RN on their first attempt. Of note, students who achieve a score of 900 or greater have a statistically significant higher pass rate (97.29%) as compared to students who score between 850 and 899 (93.8%). Most importantly, students who passed the NCLEX-RN on their first attempt had significantly higher E2 average scores (898.6) than students who failed the NCLEX-RN (793.7) on their first attempt.

The benchmark score of 850 has been the most common benchmark noted in past studies (Barton et al., 2014; Langford & Young, 2013; Lauer & Yoho, 2013; Young & Willson, 2012), but in this study the most commonly used benchmark is the 900 score. Although a majority of nursing programs (56%) required or recommended a minimal

Table 7
Impact of test preparation activities on NCLEX-RN success based on 850 and 900 benchmark E2 scores.

| Test preparation activity required | Average E2 < 850 NCLEX-RN pass rate | Average E2 between 850 and 899 NCLEX-RN pass rate | Average E2 ≥ 900 NCLEX-RN pass rate |
|--|-------------------------------------|---|-------------------------------------|
| 1: <i>Student driven learning plan</i> | 88.30% | 94.65% | 97.21% |
| 2: <i>Faculty driven learning plan</i> | 85.44% | 95.14% | 97.19% |
| 3: <i>Specified time in learning activities</i> | 93.15% | 91.80% | 95.05% |
| 4: <i>Review remediation content from HESI Specialty Exams taken in previous courses</i> | 85.01% | 94.43% | 97.10% |
| 5: <i>Practice test</i> | 83.89% | 94.98% | 97.53% |
| 6: <i>HESI Case Studies</i> | 89.44% | 94.90% | 97.63% |
| 7: <i>Elsevier Adaptive Quizzing (EAQ)</i> | 89.05% | 95.22% | 97.77% |
| 8: <i>NCLEX review book</i> | 86.36% | 93.89% | 96.88% |
| 9: <i>NCLEX review course</i> | 84.44% | 92.96% | 96.82% |
| 10: <i>Other exit exam preparation activity</i> | 89.42% | 94.20% | 97.74% |

Note. Boldface indicates that students scoring 900 or better were statistically significantly more likely to pass the NCLEX-RN than students scoring under 900. Italics indicate that students scoring 850 or better were statistically significantly more likely to pass the NCLEX-RN than students scoring under 850. In all cases, a Chi-squared statistical test with Benjamini-Hochberg post-hoc correction was used. All statistically significant *p* values are *p* < .01.

Table 8
Impact of remediation activities on NCLEX-RN success based on 850 and 900 benchmark E2 scores.

| Remediation activity required | Average E2 < 850 NCLEX-RN pass rate | Average E2 between 850 and 899 NCLEX-RN pass rate | Average E2 ≥ 900 NCLEX-RN pass rate |
|--|-------------------------------------|---|-------------------------------------|
| 1: <i>Student driven learning plan</i> | 87.91% | 94.81% | 97.65% |
| 2: <i>Faculty driven learning plan</i> | 87.77% | 94.56% | 97.60% |
| 3: <i>Specified time in learning activities</i> | 92.16% | 93.33%* | 96.79% |
| 4: <i>Plan based on student score (i.e., lower score requires more activities)</i> | 86.79% | 93.39% | 97.28% |
| 5: <i>HESI Remediation</i> | 84.52% | 93.23% | 96.88% |
| 6: <i>HESI Remediation Essential Packet</i> | 82.78% | 93.97% | 98.27% |
| 7: <i>HESI Remediation Recommended Packet</i> | 88.42% | 92.39% | 97.16% |
| 8: <i>HESI Case Studies</i> | 88.72% | 95.28% | 97.29% |
| 9: <i>Elsevier Adaptive Quizzing (EAQ)</i> | 86.94% | 92.98% | 96.89% |
| 10: <i>NCLEX review book</i> | 86.44% | 94.87% | 97.45% |
| 11: <i>NCLEX review course</i> | 85.49% | 94.21% | 96.32% |
| 12: <i>Other remediation activity</i> | 87.23% | 92.05% | 96.75% |

Note: Boldface indicates that students scoring 900 or better were statistically significantly more likely to pass the NCLEX-RN than students scoring under 900. Italics indicate that students scoring 850 or better were statistically significantly more likely to pass the NCLEX-RN than students scoring under 850. In all cases, a Chi-squared statistical test with Benjamini-Hochberg post-hoc correction was used. All statistically significant *p* values are *p* < .01 (except one case, denoted *, where *p* < .02).

benchmark score for their students, this requirement did not lead to a higher NCLEX-RN first-time pass rate. In fact, the nursing programs (44%) that did not have a required or recommended benchmark score had a significantly higher NCLEX-RN first time pass rate, which indicates that having a requirement for a benchmark is (somewhat surprisingly) not related to students reaching the benchmark. Perhaps knowledge of the relationship between E2 scores and NCLEX-RN first time pass rates is sufficient and students are self-motivated to achieve these scores, so other policies may have a greater impact.

This study also demonstrated that there is a significant relationship between preparation for the E2 and FTPR on the NCLEX-RN. Students in the 65% of nursing programs that have specific policies related to E2 preparation had statistically significant higher student pass rates (94.05%) as compared with the 35% of programs that did not (91.14%). Clearly, placing a high importance on test preparation facilitates student readiness for both the E2 and the NCLEX-RN. Many test preparation areas had a statistically higher likelihood of resulting in higher E2 scores and first-time success on the NCLEX-RN (Table 7). Student and faculty-driven learning plans, EAQ, and HESI Case Studies yielded positive outcomes for students scoring between 850–899 and 900 and above. Similarly, students also benefited from reviewing remediation content from HESI Specialty Exams taken in previous courses. Since NCLEX-RN preparation is a continual process, preparing for the E2 by reviewing previous HESI Specialty Exams, which mirror the format and style of the NCLEX-RN, provides students with a better understanding of their areas of weakness and assists in an appropriate preparation plan.

Along with test preparation, requiring remediation is another common nursing program policy. Seventy-nine percent of the reporting programs required remediation for students who did not achieve the recommended benchmark score for the program. There are recommendations in the literature related to remediation (Barton et al., 2014; Czekanski et al., 2018; Mee & Schreiner, 2016) that are supported with our finding that required remediation is correlated with significantly higher first-time pass rates on the NCLEX-RN. None of the identified remediation strategies were specifically related to higher NCLEX-RN

first time pass rates. This finding could be related to the diffused use and variety of remediation strategies implemented in nursing programs.

The most common policy used by a large portion of nursing programs in this study (86%) was the inclusion of the E2 score as a component of the students' course grade in some manner. Ten percent was the most frequent percentage used, however, there were instances in some programs of the E2 serving as up to 75% of the course grade. Of note, there was not any significant difference in student first time passing of the NCLEX-RN exam based on whether or how much the E2 score was used in the course grade.

Limitations

Several limitations in this study warrant discussion. Although this study provided evidence from a relatively large number of BSN and ADN programs, there was an unequal distribution of public and private nursing institutions. In particular, the sample consisted primarily of public institutions located in the Southern region of the US. Only one private school was included in the study, so the results may not be generalizable to similar institutions.

Another limitation worth noting pertains to the uniqueness of the study sample. There are distinct attributes of nursing programs, faculty, and students that may affect the study findings. We were not able to collect demographic data or include student variables that have been shown to impact NCLEX-RN outcomes, such as students' language proficiency or ethnicity (Crow et al., 2004). An additional concern is the effect of a nursing program's history. It is not known whether the program policies identified by respondents in the survey were recent changes or had been in place for the entire course of study for the graduates who took the NCLEX-RN. These contextual and demographic factors are important considerations for clarifying differences in policy effectiveness, particularly for historically underrepresented groups.

Implications for nursing education and research

Using standardized testing such as the E2 to facilitate FTPR on the NCLEX-RN has become widespread in nursing education programs, and this study provided important information regarding the use of policies aimed at improving student success on the E2. Requiring a minimal benchmark score and including the E2 score in the course grade are common policies, but they are not clearly connected with first time success on the NCLEX-RN. However, developing and using appropriate policies that support individualized test preparation and remediation aligned with student learning needs is supported by these data. It is clear that replacing policies that have the potential to lower a student's grade or even deny progression to graduation with policies that encourage test preparation is an effective strategy to increase the FTPR for nursing programs using standardized testing. Faculty are encouraged to review current recommendations in the nursing education literature such as the NLN (2012, 2020) Fair Testing Imperative in Nursing Education and establish fair and balanced testing policies when using standardized tests in the curriculum. Nursing programs' unique qualities such as student and faculty characteristics, curricula, resources, and state regulations should be considered when evaluating the impact of these results on their programs.

There is a need for further research related to nursing program policies, test preparation, and remediation strategies that impact not only nursing program FTPR, but also overall nursing student success throughout the program. Although the validity of the E2 has been established with this and previous studies, ongoing research should be conducted to verify the validity of all standardized testing used in nursing programs in light of the continual evolution of healthcare, nursing education and the Next Generation NCLEX (NCSBN, 2021).

Conclusion

This study provides continuing evidence for the validity of predicting NCLEX-RN success with the E2. There has been a rise in the development and use of program and course policies related to the E2 compared to past years, and the current study found that 86% of programs have implemented specific policies related to the E2 for test preparation, benchmarks, consequences and remediation. Most importantly, this is the first study of its kind that links nursing program policies with student success on the NCLEX-RN. Consequently, as nursing programs continue to implement activities to sustain or increase their FTPR on the NCLEX-RN, it will be important to examine current policies and develop new evidence-based policies that facilitate student success.

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References

- Adamson, C., & Britt, R. (2009). Repeat testing with the HESI Exit Exam—Sixth validity study. *CIN: Computers, Informatics, Nursing*, 27, 393–397.
- Barton, L., Willson, P., Langford, R., & Schreiner, B. (2014). Standardized predictive testing: Practices, policies, and outcomes. *Administrative Issues Journal: Connecting Education, Practice, and Research*, 4(2), 68–76.
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society: Series B (Methodological)*, 57(1), 289–300.
- Bloom, B. S. (1956). Taxonomy of educational objectives. In *Handbook I: The cognitive domain. Handbook II: Affective domain*. New York: David McKay Co Inc.
- Cobbett, S. L., Nemeth, W. L., & MacDonald, J. (2016). Investigating the integration of student learning resources in preparation for the NCLEX-RN: Phase one of a Canadian two-phase multi-site study. *Quality Advancement in Nursing Education*, 2(2), 7.
- Crow, C. S., Handley, M., Morrison, R. S., & Shelton, M. M. (2004). Requirements and interventions used by BSN programs to promote and predict NCLEX-RN success: A national study. *Journal of Professional Nursing*, 20(3), 174–186.
- Czekanski, K., Hoerst, B. J., & Kurz, J. (2018). Instituting evidence-based changes to improve first-time NCLEX-RN® pass rates. *Journal of Nursing Regulation*, 9(1), 11–18. [https://doi.org/10.1016/s2155-8256\(18\)30049-8](https://doi.org/10.1016/s2155-8256(18)30049-8)
- Gouveia, C., Thielk, M., & Sportsman, S. (2021, July 21–23). The association between the number of HESI-RN Specialty Exams and improved performance on the HESI Exit Exam (E2) [Conference Presentation Abstract]. In *Thirty-Second Sigma Theta Tau International Nursing Research Congress*. online.
- Havrilla, E., Zbegner, D., & Victor, J. (2018). Exploring predictors of NCLEX-RN success: One school's search for excellence. *Journal of Nursing Education*, 57(9), 554–556.
- Homard, C. M. (2013). Impact of a standardized test package on exit examination scores and NCLEX-RN outcomes. *Journal of Nursing Education*, 52(3), 175–178.
- Hunsicker, J., & Chitwood, T. (2018). High-stakes testing in nursing education: A review of the literature. *Nurse Educator*, 43(4), 183–186.
- Johnson, T., Sanderson, B., Wang, C. H., & Parker, F. (2017). Factors associated with first-time NCLEX-RN success: A descriptive research study. *Journal of Nursing Education*, 56(9), 542–545.
- Kim, H. J., Nikstaitis, T. M., Park, H., Armstrong, L. J., & Mark, H. D. (2019). Predictors and students' perceptions of NCLEX-RN success in a BS program. *Journal of Nursing Education and Practice*, 9(6), 32–40.
- Langford, R., & Young, A. (2013). Predicting NCLEX-RN success with the HESI Exit Exam: Eighth validity study. *Journal of Professional Nursing*, 29, S5–S9.
- Lauchner, K. A., Newman, M., & Britt, R. B. (1999). Predicting licensure success with a computerized comprehensive nursing exam: The HESI Exit Exam. *CIN: Computers, Informatics, Nursing*, 24, 4S–9S.
- Lauer, M. E., & Yoho, M. J. (2013). HESI exams: Consequences and remediation. *Journal of Professional Nursing*, 29(2), S22–S27.
- Lewis, C. C. (2005). *Predictive accuracy of the HESI exit exam on NCLEX-RN pass rates and effects of progression policies on nursing student exit exam scores*. Texas Woman's University.

- Loftin, C., Reyes, H., Hartin, V., & Rice, L. (2020). A closer look at first-time pass rates as the primary measure of program quality. *Journal of Professional Nursing*, 36(6), 707–711.
- March, K. S., & Ambrose, J. M. (2010). Rx for NCLEX-RN success: Reflections on development of an effective preparation process for senior baccalaureate students. *Nursing Education Perspectives*, 31(4), 230–232.
- March, A. L., & Robinson, C. (2015). Assessment of high-stakes testing, hopeful thinking, and goal orientation among baccalaureate nursing students. *International Journal of Nursing Education Scholarship*, 12(1), 123–129.
- Mee, C. L., & Schreiner, B. (2016). Remediation in nursing education today: Review of the literature and considerations for future research. *Journal of Nursing Regulation*, 7(1), 37–45.
- National Council of State Boards of Nursing. (2019). NCLEX-RN examination. Test plan for the National Council Licensure Examination for Registered Nurses. https://www.ncsbn.org/2019_RN_TestPlan-English.pdf.
- National Council of State Boards of Nursing [NCSBN]. (2021). Next Generation NCLEX Project. <https://www.ncsbn.org/next-generation-nclex.htm>.
- National Council on Measurement in Education. (2012). High-stakes testing. <http://ncme.org/resource-center/glossary/h/high-stakes-testing/>.
- National League for Nursing. (2012, 2020). The fair testing imperative in nursing education, a living document from the National League for Nursing. https://www.nursingcenter.com/journalarticle?Article_ID=5740376&Journal_ID=3332683&Issue_ID=5739828.
- Newman, M., Britt, R. B., & Lauchner, K. A. (2000). Predictive accuracy of the HESI exit exam: A follow-up study. *Nurse Educator*, 33(5), 16S–20S.
- Nibert, A., & Morrison, S. (2013). HESI testing—A history of evidence-based research. *Journal of Professional Nursing*, 29(2), S2–S4.
- Nibert, A. T., & Young, A. (2001). A third study on predicting NCLEX success with the HESI Exit Exam. *CIN:Computers in Nursing*, 19(4), 172–178.
- Nibert, A. T., Young, A., & Adamson, C. (2002). Predicting NCLEX success with the HESI exit exam: Fourth annual validity study. *CIN:Computers, Informatics, Nursing*, 20(6), 261–276.
- Randolph, P. K. (2017). Standardized testing practices: Effect on graduation and NCLEX® pass rates. *Journal of Professional Nursing*, 33(3), 224–228.
- Riley, T. A., & Gouveia, C. (2022). White Paper: 2022 Scientific Evidence for Elsevier HESI RN and APRN Exams. *Elsevier Education*.
- Schroeder, J. (2013). Improving NCLEX-RN pass rates by implementing a testing policy. *Journal of Professional Nursing*, 29(2), S43–S47.
- Sosa, M. E., & Sethares, K. A. (2015). An integrative review of the use and outcomes of HESI testing in baccalaureate nursing programs. *Nursing Education Perspectives*, 36(4), 237–243.
- Stoneypher, K., Young, A., Langford, R., Symes, L., & Willson, P. (2015). Faculty experiences developing and implementing policies for Exit Exam testing. *Nurse Educator*, 40(4), 189–193. <https://doi.org/10.1097/nne.0000000000000152>
- Tagher, C. G., & Robinson, E. M. (2016). Critical aspects of stress in a high-stakes testing environment: A phenomenographical approach. *Journal of Nursing Education*, 55(3), 160–163.
- Vesey, W. B., & Brunnert, K. (2018). Elsevier education white paper: HESI reliability scores (KR20) for the 2017–2018 school year. <https://pages.evolve.elsevier.com/2018-Scientific-Evidence-for-Elsevier-HESI-Exams-and-Products-White-Paper.html>.
- Young, A., & Willson, P. (2012). Predicting NCLEX-RN success: The seventh validity study HESI Exit Exam. *CIN:Computers, Informatics, Nursing*, 30(1), 55–60.
- Zweighthaft, E. L. (2013). Impact of HESI specialty exams: The ninth HESI Exit Exam validity study. *Journal of Professional Nursing*, 29(2), S10–S16.
- Zweighthaft, E. L. (2017). *HESI Specialty Exams; predicting success on the exit exams and NCLEX-RN: The eleventh HESI Exit Exam validity study*. Unpublished manuscript.