MEDICAL UNIVERSITY OF SOUTH CAROLINA
VALUE INSTITUTE
Evidence-Based Practice Brief
Tactics to Increase Nursing Higher Education Attainment

Author(s): Amanda Davis, MPH, RD, CHES; Emily Brennan, MLIS

ASK THE QUESTION

Question: What tactics are most effective for increasing higher education attainment (i.e., BSN or higher) in hospital staff nurses?

SEARCH FOR EVIDENCE

CINAHL search strategy: (MH "Education, Nursing, Baccalaureate+" OR MH "Education, Post-RN") AND (MH "Educational Mobility" OR "academic progression" OR increase[ti] OR motivate[ti])

PubMed search strategy: ("Education, Nursing, Baccalaureate"[Mesh:NoExp] OR "Education, Nursing, Graduate"[Mesh]) AND ("educational mobility" OR "academic progression" OR increase[ti] OR motivate[ti])

Filters: English, Published in last 10 years

CRITICALLY ANALYZE THE EVIDENCE

There were nine research articles found addressing tactics for increasing higher education attainment in hospital staff nurses. Eight articles (Altmann, T., 2011; Byrne et al., 2014; Duffy et al., 2014; Landry et al., 2012; Munkvold et al., 2012; Orsolini-Hain, L., 2012; Schartz L. and Leibold, N. 2014; Warren, J and Mills, M., 2009; Winkour et al., 2016) evaluated registered nurses’ (RNs) attitudes and perceptions about returning to school to complete their bachelor’s degree (BSN). One article (Pittman et al., 2014) focused on the academic programming aspects of returning to school and examined the most promising practices in design and implementation of alternative pathways for academic progression in nursing. All were observational studies that involved the collection of qualitative data, quantitative data, or both.

Attitudes and perceptions
Altmann, T., (2011) was a systematic review of 28 observational studies that included survey data from RNs about their attitudes and perceptions about returning to school for their bachelor’s degree. While the survey tools varied, four main themes emerged:
- Personal Motivators – personal achievement and satisfaction and positive attitudes toward BSN education
- Personal Disincentives – family and competing responsibilities
- Professional Motivators – career advancement, recognition and job security, and improved clinical judgement
- Professional Disincentives – no differences in pay or work duties, lack of support or recognition at work, and work schedule conflicts/constraints

The authors of the remaining seven studies published after this systematic review reported similar themes.
Byrne et al. (2014) surveyed 27 RNs at a small community hospital in the northeastern US using Ajzen’s theory of planned behavior to address internal motivators for BSN education. They found that 25% felt they were already adequately educated, 40% were interested in returning to school with a colleague, 59% felt they could return to school with the support of someone important to them. However, only 33% felt that a higher nursing degree increased a nurse’s value in the organization. Similarly, Orsolini-Hain, L. (2012) performed 22 semi-structured interviews with RNs working in 3 hospitals in urban California to learn more about why they had not returned to school for their BSN. Three main themes emerged: 1) lack of distinctions in role, skill, and status in direct patient care after why they had not returned to school for their BSN.

Landry et al. (2012) conducted a needs assessment of 169 RNs at a single institution to identify supports necessary to facilitate their return to school. While the majority had considered going back to school for their BSN, only 59.5% were aware of educational opportunities in their area. Additionally, work commitments (70.7%), tuition costs (68%), family commitments (48.3%) and inconvenient class times (43.2%) were all barriers to school enrollment. Munkvold et al. (2012) evaluated factors that influence RNs’ decisions (n=87) to postpone or stop academic progression in the Oregon Consortium for Nursing Education (OCNE). While the OCNE was established to create a “seamless progression from community college to the BSN degree, barriers to academic progress included cost of tuition (41%), family income needs (39%) and concern with current debt load (17%). Only 28% of respondents reported any currently available financial support from their employer. Finally, Schartz L. and Leibold, N. (2014) conducted a survey of 81 BSN students enrolled at 2 universities to gain better understanding of the facilitators and barriers they experience when furthering their education. While personal desire to learn (93.8%), the ability to better serve patients (78.8%) and general career advancement (88.8%) all facilitated their enrollment, they also cited significant barriers such as family constraints (80.5%), cost (79%) and job constraints (65.8%).

Warren, J. and Mills, M. (2009) randomly selected 297 associate degree nurses, all < 50 years old working 20+ hours/week in an acute care hospital, to complete a survey regarding the organizational incentives and rewards that might motivate them to return for an advanced nursing degree. They found that organizational incentives (i.e., tuition reimbursement, being paid to attend class, having classes at work, having ability to coordinate work and class hours) significantly increased the odds of returning to school (OR 1.64, 95% CI 1.34-2.01, p<0.001). Career satisfaction (OR 1.78, 95% CI 1.21-2.61, p<0.05) and professional commitment (OR 1.35, 95% CI 1.05-1.74, p<0.05) also significantly predicted a nurse’s decision to return for a BSN. Ultimately, nurses’ motivation to enroll in a BSN program if the right combination of rewards and incentives was offered was predictive of nurses’ planning to enroll in an additional nursing degree program, nurses’ planning to continue a career in nursing, and nurses’ willingness to return for a BSN degree if it were a job requirement (Pearson chi square = 87.12, p = .000).

Winkour et al. (2016) explored the factors that motivate and obstacles that impede nurses (n=191) from pursuing a BSN at a southern California Magnet-designated hospital. These influencing factors were divided into three main categories: individual nurse, employment organization and academic program (see Appendix A). The majority of respondents had already completed their BSN or were currently enrolled; however, of those who had not gone back (n=32) financial concerns (47%) and no effect on competence (38%) were the most common reasons cited. A BSN program “designed for working nurses” (37%) was the most helpful factor in returning to school, and common cues to action were knowledge of the “goal of Magnet-designated organizations to have 80% RNs with a BSN by 2020” (24%) and “finally deciding to advance my nursing career” (40%). Similarly, Duffy et al. (2014) completed focus group with 41 RNs with and without their BSN, and identified six primary themes: 1) sacrifices due to multiple demands, 2) barriers: mostly financial, 3) incentives: employer financial support and encouragement, 4) value: balancing an increased understanding of EBP and research against being “too old” or “no benefits”, 5) assistance with navigating education system, and 6) pressures from employer and profession without BSN.

Alternative academic programming
Pittman et al. (2014) interviewed 31 stakeholders for RN academic progression across the US (13 community college leaders, 9 university education leaders, 2 health system leaders, and 7 nursing education association leaders) to explore the decisions involved in designing alternative pathways for academic progression in nursing. They reported their findings in the form of four case studies that focused on key findings related to: 1) shared statewide or regional curricula, 2)
strong employer incentives; 3) community college conferral of BSN degrees and 4) coordinated competency-based education among various institutions (stackable credentials, dual enrollment and automatic admission)

While these studies primarily focused on motivators and barriers for pursuing a BSN degree, the findings provide valuable insight into the tactics that would effectively promote increased higher education attainment in hospital staff nurses from an individual nurse, employer and academic programming perspective. Thorough examination of this evidence, in context of what is plausible organizationally, will be instrumental in determining next steps for our organization.

### PICO Question

What tactics are most effective for increasing higher education attainment (i.e., BSN or higher) in hospital staff nurses?

<table>
<thead>
<tr>
<th>Author/Date/Journal</th>
<th>Purpose of Study</th>
<th>Study Design</th>
<th>Sample &amp; Setting</th>
<th>Outcomes</th>
<th>Design Limitations</th>
</tr>
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<tbody>
<tr>
<td>Altmann, T., 2011, Contemporary Nurse</td>
<td>To determine what is known about nurses’ attitudes and perceptions about returning to school</td>
<td>Systematic review</td>
<td>28 observational studies</td>
<td>Four main themes: 1) Personal Motivators - personal achievement or satisfaction (n=5) - Positive attitude toward BSN education (n=4) - Improved self-esteem (n=3) - Future career plans (n=3) 2) Personal Disincentives - Family (n=7) - Time away from family (n=4) - Multiple roles or other responsibilities (n=4) - Lack of confidence (n=2) 3) Professional Motivators - Pressure from employer and profession (n=1) - Career advancement (n=5) - Career mobility (n=2) - Professional enhancement (n=2) - Increased professional values (n=1) - Recognition and job security (n=3) - Need for BSN in life of career (n=1) - Improved clinical judgement (n=3) - Increased knowledge (n=1) 4) Professional Disincentives - No differences at work/change in pay (n=5) - Doesn’t enhance clinical skills</td>
<td>Study Limitations = None</td>
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<td>Systematic Review</td>
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<td>Review did not address focused clinical question</td>
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<td>Search was not detailed or exhaustive</td>
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<td>Quality of the studies was not appraised or studies were of low quality</td>
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<td>Methods and/or results were inconsistent across studies</td>
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<tr>
<th>GRADE CRITERIA (See Appendix B)</th>
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<tr>
<td>Lower Quality Rating if:</td>
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<tr>
<td>☐ High risk of bias (When design limitations for one or more criteria impact the quality of studies sufficiently enough to lower confidence in the estimate of effect)</td>
</tr>
<tr>
<td>☐ Studies inconsistent (When there are differences in the direction of the effect, populations, interventions or outcomes between studies)</td>
</tr>
<tr>
<td>☐ Studies are indirect (Your PICO question is quite different from the available evidence in regard to population, intervention, comparison, or outcome)</td>
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<tr>
<td>☐ Studies are imprecise (When studies include few patients and few events and thus have wide confidence intervals and the results are uncertain)</td>
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<tr>
<td>☐ Publication Bias (e.g. pharmaceutical company sponsors study)</td>
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<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Study Type</th>
<th>Study Details</th>
<th>Study Limitations</th>
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</thead>
<tbody>
<tr>
<td>Byrne et al., 2014, Nursing</td>
<td>To evaluate the internal motivators that prompt RNs to pursue a bachelor's degree</td>
<td>Descriptive (survey) - cross-sectional</td>
<td>Survey responses of 27 RNs at a small community hospital in the northeastern US. Survey based on Ajzen's theory of planned behavior (predictors: behavioral beliefs, normative beliefs, control beliefs). - Face validity review by nurse managers. - Distributed through nurse managers over 2 weeks. Behavioral beliefs: - 25% felt they were already adequately educated - Most did not think that returning to school would be a pleasant experience - Most believed that furthering their education would provide career opportunities. Normative beliefs: - 75% felt their jobs would be more secure with more education - 40% were interested in returning to school with a colleague. - 59% felt they could return to school with the support of someone important to them. - Only 33% felt that a higher nursing degree increased a nurse's value. Control beliefs: - 14% were confident they could do the work required even if academics were difficult. - 50% were afraid of failing if they returned to school. - 50% said they intended to return within 12 months.</td>
<td>Study Limitations = None. Non-Experimetal/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey) - Insufficient sample size - Sample not representative of patients in the population as a whole - Variables (confounders, exposures, predictors) were not described. - Outcome criteria not objective or were not applied in blind fashion. - Insufficient follow-up, if applicable. - For prognostic study, sample not defined at common point in course of disease/condition. - For diagnostic study, gold standard not applied to all patients. - For diagnostic study, no independent, blind comparison between index test and gold standard.</td>
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<tr>
<td>Duffy et al., 2014, Journal of Nursing Administration</td>
<td>To explore RN perceptions regarding barriers/challenges and incentives/supports for BSN completion</td>
<td>Descriptive (focus groups)</td>
<td>41 RNs participating in 6 focus groups based on BSN completion status (with and without). Six primary themes were identified: - Sacrifices: juggling commitments and multiple demands (family, school, work). - Barriers/challenges: financial reimbursement, discomfort navigating educational process, - Lack of reimbursement, - Timeliness of reimbursement, - Lack of salary increase.</td>
<td>Study Limitations = None. Non-Experimetal/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey) - Insufficient sample size - Sample not representative of patients in the population as a whole. - Variables (confounders, exposures, predictors) were not described.</td>
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<tr>
<td>Authors &amp; Year, Journal</td>
<td>Title</td>
<td>Research Design</td>
<td>Sample Size &amp; Description</td>
<td>Key Findings</td>
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<td>Landry et al., 2012, Nursing Education Perspectives</td>
<td>To determine barriers faced by nurses who wish to continue their formal education and to identify supports necessary to facilitate their return to school and academic success</td>
<td>Descriptive (needs assessment)</td>
<td>169 assessments by RNs, licensed vocational nurses (LVNs) at a single institution (inpatient only; 26.8% response rate) -LVN: n=11 -RN: n=158; 37 associate degrees, 89 BSN, 25 MSN</td>
<td>Incentives/supports: employer financial support, employer encouragement (study groups, book exchanges, flexible scheduling) Value: “too old,” “no benefit” for those not pursuing; increased understanding of EBP, research and critical thinking for those who did How to begin: designated person to answer questions (at school and hospital) to assist with navigating system Pressures: worry of punitive measures for those without BSN</td>
</tr>
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</table>
| Munkvold et al., 2012, Journal of Nursing Education | To explore the factors that influence | Descriptive (survey) -cross- | 87 students in the Oregon Consortium for Nursing Education | 85.5% had considered continuing their education -Only 59.5% were aware of educational opportunities in the area -74.5% were unaware of resources available at local universities -58.1% had no knowledge of prerequisites | None Non-Experimental/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey) Insufficient sample size Sample not representative of patients in the population as a whole Variables (confounders, exposures, predictors) were not described Outcome criteria not objective or were not applied in blind fashion Insufficient follow-up, if applicable For prognostic study, sample not defined at common point in course of disease/condition For diagnostic study, gold standard not applied to all patients For diagnostic study, no independent, blind comparison between index test and gold standard | Study Limitations = None Non-Experimental/Observational
To investigate what influences associate degree prepared nurses to refrain from pursuing additional education to obtain a baccalaureate or higher-level degree.

Descriptive (semi-structured interviews) 22 AD-prepared nurses working in 3 hospitals in urban California -convenience sample -interpretive phenomenology techniques (the "why" behind the "what") -approximately 10 years in practice

Three major themes: 1) Lack of distinctions in role, skill and status in direct patient care -institutional culture and lack of public perception of skill/knowledge level; degrees not on badge -believed BSN to be an advanced degree; needed to pursue management opportunities -on the job training trumped institutional support for furthering academic education; exceptions for "years of experience" by both institution and nurses 2) Just in time learning practices "on the job learn and go" -continual pursuit of lifelong learning in a practice-based study

Study Limitations = None

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OCNE that did not transfer to BSN progression within 6 months of RN licensure (42% response rate)

OCNE: a coalition of community colleges and the Oregon Health & Sciences University (5 campuses) with a shared curriculum and academic standards established to facilitate "seamless progression from community college to the BSN degree.

Survey examined variables of employment status, intent and timing to continue academic nursing education, and other factors that influenced their decision regarding academic progression which is reduced somewhat from the 70% intent found in previous surveys of this cohort during their AD education - more than half reported their intent to return to academia within 1-2 years

Influencing factors: -cost of tuition (41%) -family income needs (39%) -concern with current debt load (17%)

Perceived support:
-88% said community college faculty were "somewhat supportive" to "highly supportive" of academic progression
-56% said their RN peers were supportive
-58% said their nurse managers were supportive

Only 28% reported any currently available financial support, with another 23% of employed graduates anticipating tuition assistance after a year of employment

Orsolini-Hain, L., 2012, Nursing Outlook

To investigate what influences associate degree prepared nurses to refrain from pursuing additional education to obtain a baccalaureate or higher-level degree.

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<table>
<thead>
<tr>
<th>Setting</th>
<th>Of disease/condition</th>
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<tbody>
<tr>
<td>Lack of distinction between academic degrees and hospital-based classes</td>
<td>For diagnostic study, gold standard not applied to all patients</td>
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<tr>
<td>Possibilities for advancement without formal education</td>
<td>For diagnostic study, no independent, blind comparison between index test and gold standard</td>
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Pittman et al., 2014, *Journal of Nursing Education*

To examine the most promising practices in design and implementation of alternative pathways for academic progression in nursing

Descriptive (semi-structured interviews) - 4 exemplar case studies presented

Interviews with 31 stakeholders for RN academic progression across the US
- 13 community college leaders
- 9 university education leaders
- 2 health system leaders
- 7 nursing education association leaders

Explored the decisions involved in designing alternative pathways for academic progression in nursing, described promising practices and identified types of performance measures that might help leaders monitor and assess their success

- Used purposive educational sampling based on: geographic location, ownership status and academic profile
- Used snowball sampling to identify additional individuals for interview

Demonstrated the most common and different challenges and design decisions that institutional leaders face when implementing progression pathways, as well as outcomes reported by leaders in the form of 4 case studies:

1) Shared statewide or regional curricula
2) Strong employer incentives
3) Community college conferral of BSN degrees
4) Coordinated competency-based education among various institutions (stackable credentials, dual enrollment and automatic admission)

Authors found that each institution mixes and matches the following components:

- Degrees offered, such as RN-to-BSN, RN-to-MSN, BA-to-BSN.
- Admission criteria, such as minimum overall GPA and minimum nursing course GPA.
- Enrollment of students in a BSN or MSN program before graduating from an AND program.
- Number of additional credits that should be required.
- Recognition of work experience in admission criteria.
- Degree of coordination of curriculum among schools.
- Location of face-to-face classes

Study Limitations = None

*Non-Experimental/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey)*

- Insufficient sample size
- Sample not representative of patients in the population as a whole
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To determine facilitators and barriers that associate degree-prepared RNs experience in progressing toward baccalaureate nursing education.

### Study Methodology

**Design:** Descriptive (survey)-cross-sectional

- **Participants:** 81 associate degree RNs surveyed about perceived facilitators and barriers to progression to BSN;
  - Convenience sample from BSN students enrolled at 2 universities; 1 public [online], 1 private [live and "hybrid"]

- **Perceived facilitators, barriers and demographics:**
  - Adapted survey from a validated tool for pharmacists’ perceptions of facilitator/barriers to lifelong learning
  - 67.9% enrolled for <12 credits/semester

- **Data Collection:**
  - Personal desire to learn/advance knowledge (93.8%)
  - Ability to better serve patients (78.8%)
  - Career advancement (88.8%)
  - Encouragement by family (50.6%)
  - Tuition reimbursement was cited as a facilitator in almost half (45.5%)

- **Barriers:**
  - Family constraints (80.5%)
  - Cost (79%)
  - Job constraints (65.8%)
  - Lack of increase in pay with BSN (54.9%)
  - Lack of financial assistance (45.5%)
  - Lack of differential treatment between BSN and associates (42%)

### Study Limitations

- None

- **Non-Experimental/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey):**
  - Insufficient sample size
  - Sample not representative of patients in the population as a whole
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| Warren, J. and Mills, M., 2009, *Journal of Continuing Education in Nursing* | To examine nurses’ preferences for organizational incentives and rewards that might motivate them to return for an advanced nursing degree | Descriptive (survey) -cross-sectional | 297 associate degree nurses randomly selected from the Maryland state board of nursing licensure database (16.5% response rate) -surveyed by mail (3 mailings, 3 weeks apart) -inclusion: younger than 50 yo, working 20+ hours/week in acute care hospital, not enrolled in BSN or higher degree program Survey included: -likelihood of returning for BSN if the right combination of rewards and incentives was offered (yes/no) -questions about 10 organizational rewards (favorable outcomes received from organization) and 10 incentives (items that might reduce barriers to returning to school); based on literature and interviews with nurse leaders -validated tools for: nurses individual characteristics; career satisfaction; “attractiveness and desirability of the BSN role”; “work-family and family-work conflict”; perceived barriers | Only 19.4% planned to enroll in a BSN program Motivation to enroll in a BSN if the right combination of rewards and incentives was offered was predictive of nurses’ planning to enroll in an additional nursing degree program, nurses’ planning to continue a career in nursing, and nurses’ willingness to return for a BSN degree if it were a job requirement (Pearson chi square = 87.12, p = .000) -suggests nurses that are undecided may be motivated by organizational incentives and rewards Logistic regression analysis found that organizational incentives significantly increased the odds of returning to school (OR 1.64, 95% CI 1.34-2.01, p<0.001) -Career satisfaction (OR 1.78, 95% CI 1.21-2.61, p<0.05) and professional commitment (OR 1.35, 95% CI 1.05-1.74, p<0.05) also significantly predicted returning for BSN Highest ranking organizational incentives were: -pay to attend class -classes at work -tuition reimbursement -match work and class hours Barriers: -Neither work-family conflict nor family-work conflict was a significant barrier | Study Limitations = None Non-Experimental/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey) | |

| Winkour et al., 2016, *Journal of Professional Nursing* | To explore factors that motivate and obstacles that impede nurses from pursuing | Descriptive (survey) -cross-sectional | 191 nurse responses to a 15-item online survey at a southern California Magnet-designated hospital | 37% rated “the BSN program designed for working nurses” as the most helpful factor; support of other nurses was Facilitators: Study Limitations = None Non-Experimental/Observational Studies (case-control, cohort, cross sectional, longitudinal, descriptive, epidemiologic, case study/series, survey) | |
| baccalaureate education when employed by a Magnet® organization | (20% response rate) included all RNs regardless of degree status  
78% entered nursing as AD or diploma graduate  
84% already completed BSN/MSN or were currently enrolled  
14.7% had no intention of obtaining BSN  
New survey tool | least influential  
-7% directly indicated that the Magnet push for increased level of education at their hospital helped them decide to go back to school  
-15% cited worry over future employability without a BSN  
-16% reported pressure due to organization expectations for BSN  
Cues to return for BSN:  
-"I finally decided to advance my nursing career" (40%)  
-"I learned about the goal of Magnet-designated organizations to have 80% RNs with a BSN by 2020" (24%)  
-"I had a conversation with a nurse who already had a BSN" (21%)  
Barriers:  
Of those who had not gone back (n=32) financial concerns (47%) and no effect on competence (38%) were the most common reasons cited;  
16% had concerns about ability to succeed in a BSN program -perceived lack of value (lack of financial gain, time/energy investment, nurses who “did not want to be a nurse manager” didn’t need further education)  
See Appendix A below illustrating key concepts (individual nurse, employer, academic program) of the study’s findings | descriptive, epidemiologic, case study/series, survey | Insufficient sample size  
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☐ Outcome criteria not objective or were not applied in blind fashion  
☐ Insufficient follow-up, if applicable  
☐ For prognostic study, sample not defined at common point in course of disease/condition  
☐ For diagnostic study, gold standard not applied to all patients  
☐ For diagnostic study, no independent, blind comparison between index test and gold standard |

**REFERENCES**

5. Orsolini-Hain L. Mixed messages: Hospital practices that serve as disincentives for associate degree prepared nurses to return to school. *Nurs Outlook.* 2012;60(2):81-90.

Appendix A: Winokur et al. (2016): Factors Impacting BSN Education

**INFLUENCING FACTORS**

**Individual Nurse**
- Age, responsibilities, career identity, preservation, & progression; attitudes towards BSN

**Employing Organization**
- Incentives/expectations (e.g., tuition reimbursement, flexible schedules)
- Rewards (e.g., pay increase, clinical ladder)
- Positive culture regarding education

**Academic Programs**
- Program flexibility & fit, resources (e.g., adequate advising, supportive instructors)

**SUPPORTIVE FACTORS**

**NURSE MOTIVATION**

- Perceived personal effort
- How well positive facilitators ↓ individual nurse barriers
- RETURN TO SCHOOL
- STAY IN SCHOOL

**ACTION**

*Figure 1. Conceptual underpinnings.*
Appendix B: GRADE criteria for rating a body of evidence on an intervention
Developed by the GRADE Working Group

Grades and interpretations:
High: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low: Any estimate of effect is very uncertain.

Type of evidence and starting level
Randomized trial—high
Observational study—low
Any other evidence—very low

Criteria for increasing or decreasing level
Reductions
Study quality has serious (–1) or very serious (–2) problems
Important inconsistency in evidence (–1)
Directness is somewhat (–1) or seriously (–2) uncertain
Sparse or imprecise data (–1)
Reporting bias highly probable (–1)

Increases
Evidence of association† strong (+1) or very strong (+2)
Dose-response gradient evident (+1)
All plausible confounders would reduce the effect (+1)
†Strong association defined as significant relative risk (RR 2-5 or 0.5-0.2) based on consistent evidence from two or more studies with no plausible confounders;
Very strong association defined as significant relative risk (RR >5 or <0.2) based on direct evidence with no threats to validity