Background: The purpose of this state-of-the-science article is to review the existing literature on the effect of anxiety on nursing students’ simulation experience and to identify gaps for future research. Method: A comprehensive literature review to determine the state of the science focused on anxiety, nursing students, and simulation in peer-reviewed journal articles and dissertations. The review led to a critical appraisal of 10 articles that met the inclusion criteria. Results: Three clear themes emerged from the review: (a) The Unknown, (b) Critique by Peers and Faculty, and (c) The Experience of Making Mistakes. In addition to these themes, knowledge gaps were identified. Conclusion: Research is needed to develop interventions to effectively decrease student anxiety during simulation and to develop best practices for student preparation.

By 2022, the United States will be in need of 1.13 million new RNs to overcome the nursing shortage. In 2015, 229,459 new graduates took the NCLEX-RN (McMinn, 2014; National Council for State Boards of Nursing [NCSBN], 2015). Of the U.S.-educated first-time test takers, 84.53% (133,457) passed. With the inclusion of repeat testers, as well as internationally educated testers, 68.95% (160,323) passed overall. To overcome the current nursing shortage, the need for increased student success in nursing programs is vital. Clinical sites are limited due to the nursing shortage and increased patient acuity (Neiderhauser, Schoessler, Gubrud-Howe, Magnusson, & Codier, 2012). In addition, simulation is becoming commonplace for its use as a clinical adjunct, as well as a means for active learning in the classroom (Hicks, Coke, & Li, 2009). Gaba (2004) defined simulation as a technique that replaces, or amplifies, real experiences with guided experiences to evoke, or replicate, substantial aspects of the real world in a fully interactive manner. Simulation uses varying levels of fidelity, or the degree to which a simulation experience imitates reality (Aebersold & Tschannen, 2003). In addition, it has been found to increase student comfort level in the hospital clinical setting (Hicks et al., 2009), as well as helping with retention of nursing knowledge (Lasater, 2007). With an increased emphasis on the use of simulation in nursing education, it is necessary to look at the student experience.

Exploration of the student experience and its effect on learning can assist nursing faculty during the development of the simulation. The discipline of psychology has documented the effect of anxiety on cognitive tasks. According to the American Psychological Association (2015), anxiety is an emotion characterized by a feeling of tension and worry. State anxiety is a form of anxiety that occurs as an immediate reaction when a specific experience works on the autonomic nervous system to produce worry (Spielberger & Reheiser, 2009). Esyneck, Derakshan, Santo, and Calvo (2007) developed the attentional control theory to describe the effect of anxiety on cognitive functioning. It attempts to explain how state anxiety inhibits the ability to complete cognitive tasks and use the working memory (Eysenck et al., 2007). Nursing student success and retention of knowledge are vital to passing the NCLEX-RN and overcoming the nursing shortage. The presence of anxiety during learning activities has the potential to
decrease the students’ ability to retain the knowledge provided, thus leading to increased errors and decreased success within the nursing program. The purpose of this state-of-the-science article is to review the existing literature on the effect of anxiety on nursing students’ simulation experience and to identify gaps for future research.

**METHOD**

A comprehensive literature review identified articles related to nursing student anxiety and simulation. Databases used included CINAHL®, ERIC®, PsycINFO®, and PubMed®. Keywords included anxiety, nursing students, and simulation, with follow-up using clinical simulation, stress, patient simulation, and performance. The search was limited to peer-reviewed journals and dissertations published from 2005 to 2015. Inclusion criteria consisted of articles focused on prelicensure nursing students in associate’s degree in nursing (ADN) and bachelors of science in nursing (BSN) programs and curricular use of low- through high-fidelity simulation.

The initial search results provided 54 articles from CINAHL. PsycINFO found no results. The ERIC and PubMed databases returned 9 and 37 articles, respectively. These articles included findings of student anxiety toward simulation, as well as how simulation decreases student anxiety in the clinical setting. Abstracts were reviewed using the inclusion criteria and narrowed down to 15 articles. Exclusion of secondary sources resulted in the identification of the final 10 articles for inclusion. These articles were consolidated into a matrix table to guide critical analysis and synthesis (Table).

**ANALYSIS**

The critical review and synthesis of literature identified common themes among the student experience with anxiety and simulation. The themes that emerged were (a) The Unknown, (b) Critique by Peers and Faculty, and (c) The Experience of Making Mistakes.

**The Unknown**

The theme of The Unknown describes the experience of students who indicated their anxiety was associated with a lack of knowledge. It included students who have a lack of experience in simulation (Beischel, 2013), as well as lack of preparation (Beischel, 2013; Cato, 2013; Paige & Morin, 2015) and minimal orientation to the simulation setting, including the manikin and the equipment (Cato, 2010). Lack of student-completed assignments, lack of faculty-provided preparation, and lack of adequate preparation could affect this theme. Cordeau (2010) identified that not knowing what to expect was the greatest cause of pre-simulation and beginning simulation anxiety, as well as not knowing what to expect in debrief. Contradictive findings related to the use of preparation to decrease anxiety showed that students who felt most prepared presented with high anxiety (Gantt, 2013; Najjar, Lyman, & Miehl, 2015).

**Critique by Peers and Faculty**

Performing in front of faculty and peers is found to produce anxiety, regardless of summative or formative assessment (Beischel, 2013; Cordeau, 2010; Paige & Morin, 2015; Teixeira et al., 2014), although one study found that formative assessment produced less anxiety (Duers & Brown, 2009).

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>No. of Participants</th>
<th>Instruments</th>
<th>Underlying Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lasater (2007)</td>
<td>Qualitative</td>
<td>15</td>
<td>NA-Focus group</td>
<td>Kolb’s experiential</td>
</tr>
<tr>
<td>Duers &amp; Brown (2009)</td>
<td>Qualitative</td>
<td>96</td>
<td>NA-Focus group</td>
<td>Not identified</td>
</tr>
<tr>
<td>Cordeau (2010)</td>
<td>Qualitative</td>
<td>19</td>
<td>NA-Hermeneutic</td>
<td>Not identified</td>
</tr>
<tr>
<td>Cheung &amp; Au (2011)</td>
<td>Quantitative</td>
<td>30</td>
<td>Anxiety visual analog scale, Mood induction video, Skill assessment</td>
<td>Not identified</td>
</tr>
<tr>
<td>Beischel (2013)</td>
<td>Mixed methods</td>
<td>124</td>
<td>State Anxiety Scale, Elsevier/Evolve pretests and posttests, Author-created lifestyle questionnaire</td>
<td>Not identified</td>
</tr>
<tr>
<td>Gantt (2013)</td>
<td>Quasi-experimental</td>
<td>39</td>
<td>State Trait Anxiety Index, Clark grading rubric</td>
<td>Not identified</td>
</tr>
<tr>
<td>Cato (2013)</td>
<td>Mixed methods</td>
<td>73 (survey) 9 (focus group)</td>
<td>Experience survey, NA-Focus group</td>
<td>Social constructivism</td>
</tr>
<tr>
<td>Teixeira et al. (2014)</td>
<td>Quantitative</td>
<td>20</td>
<td>Zung Self-Rating Anxiety Scale</td>
<td>Not identified</td>
</tr>
<tr>
<td>Najjar, Lyman, &amp; Miehl (2015)</td>
<td>Qualitative</td>
<td>26</td>
<td>Focus group</td>
<td>Grounded theory</td>
</tr>
<tr>
<td>Paige &amp; Morin (2015)</td>
<td>Q-methodological</td>
<td>45</td>
<td>Factor sort</td>
<td>Not identified</td>
</tr>
</tbody>
</table>

Note. NA = not applicable.
Cordeau (2010) found an association between debriefing and anxiety related to self-critique and a lack of debriefing experience. Anxiety due to criticism by the faculty also emerged. Criticism, even if constructive (Duers & Brown, 2009), was associated with an increase in anxiety (Cordeau, 2010; Paige & Morin, 2015). In addition, a fear of being criticized, or judged, emerged (Beischel, 2013; Cato, 2013; Cordeau, 2010; Teixeira et al., 2014). Feedback during the debriefing session led to perceived or experienced anxiety (Najjar et al., 2015). However, alleviation of the initial anxiety of peer and faculty evaluation occurred with validation of the feelings during the debriefing session when other students identified the same experience (Cordeau, 2010). Anxiety also increased when being observed by peers (Najjar et al., 2015).

The Experience of Making Mistakes

The theme The Experience of Making Mistakes has the potential to be a positive or negative aspect of simulation. The fear of making mistakes can lead to increased student anxiety (Beischel, 2013; Cordeau, 2010; Cato, 2013, Najjar et al., 2015). However, students recognized that mistakes occur but can be learned from (Cordeau, 2010; Duers & Brown, 2009; Lasater, 2007; Paige & Morin, 2015). Cheung and Au (2011) identified that induced anxiety led to poor performance of clinical skills. Lasater (2007) found that the students identified that mistakes could easily occur in the simulation setting, yet they were of minimal consequence. Cordeau (2010) identified that student’s intermittent experienced anxiety occurred during the simulation, such as when administering a medication, after which a “sigh of relief” happened when correctly performing the skill. Feelings of inadequacy occurred when the students made mistakes given that they had prior knowledge of the expected objectives (Najjar et al., 2015). Cato (2013) identified that student anxiety was highest related to the possibility of making a mistake. Finally, Beischel (2013) found that a fear of failure in simulation was associated with increased anxiety.

SUMMARY

Students experience anxiety related to the use of simulation (Beischel, 2013; Cato, 2013; Cordeau, 2010; Gantt, 2013; Lasater, 2007; Najjar et al., 2015; Paige & Morin, 2015; Teixeira et al., 2014). Students feel anxiety with unknown experiences, such as lack of preparation or lack of simulation experience (Beischel, 2013; Cato, 2013; Gantt, 2013; Najjar et al., 2015; Paige & Morin, 2015). This can result from experiences when they are being critiqued, or perceive they are being critiqued, such as during debriefing or while performing in front of faculty and peers (Cordeau, 2010; Duers & Brown, 2009; Teixeira et al., 2014). Finally, anxiety is associated with making mistakes, such as medication errors or not meeting desired outcomes (Cheung & Au, 2011; Lasater, 2007). Nursing student success is vital to the achievement of meeting RN needs for the future. For nursing students to achieve the goal of successful completion of the NCLEX-RN, they must first have a successful completion of the nursing program that relies on the use of nursing knowledge for the provision of patient-centered, safe care. The limited availability of space within the clinical facilities makes it necessary to incorporate alternative forms of clinical learning (Neiderhauser et al., 2012). The increased use of simulation can assist in this change (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). To provide students with the most effective learning environment, it is necessary to look at their experience and incorporate measures to assist in their learning.

GAPS IN KNOWLEDGE

The theme of The Unknown seemed to be the most prominent, specifically the students experiencing and perceiving a lack of preparation. This represents a significant gap in the existing literature that warrants further research. Students indicated that a lack of preparation led to increased anxiety. The International Nursing Association for Clinical Simulation and Learning (INACSL) is actively working to define, and refine, best practices as they pertain to the use of clinical simulation (INACSL Board of Directors, 2013). INACSL Standards of Best Practice: SimulationSR help to organize, facilitate, assign objectives, debrief, and evaluate simulation. A piece that is missing from these best practices is preparation. Development of best practices for simulation preparation may achieve a common ground for the student experience. Whether the student is preparing for a formative or summative clinical simulation experience, the use of standard practice in regard to preparation may assist the student to achieve the best possible outcome.

The majority of findings indicate that anxiety is present during simulation (Beischel, 2013; Cato, 2013; Cordeau, 2010; Gantt, 2013; Lasater, 2007; Najjar et al., 2015; Paige & Morin, 2015; Teixeira et al., 2014), and that students perceive this anxiety to affect their performance (Cordeau, 2010; Beischel, 2013). Scant research is available to assist the simulation facilitator with interventions to decrease the anxiety. Cheung and Au (2011) determined that the use of comedic videos after the experimental group did in fact decrease the anxiety. However, this did not address neutralizing the anxiety during the simulation. More research is warranted to develop interventions to help students better manage or decrease anxiety during simulation activities.

Additional gaps in knowledge include the experience of students in simulation confounded with personality types, as well as experience with simulation over time. Do students who identify as extroverts react differently than introverts, and do they need different preparation or roles? Research designed to assess personality traits, as well as how these traits affect the simulation, can help to customize the experience. In addition, the use of longitudinal research studies has the opportunity to evaluate the student experience with anxiety in simulation over time to determine whether changes in patterns over time (or lack of changes) influence their program or NCLEX-RN success. A final finding of interest to nursing education research was the minimal use of underlying theory for the design of the quantitative studies (Table).

CONCLUSION

The NCSBN published study results in 2014 indicating that up to 50% of the clinical time spent in simulation did not affect
NCLEX-RN outcomes when used in place of traditional clinical experiences under specific guidelines (Hayden et al., 2014). These findings may lead to an increased replacement of traditional clinical experiences with simulation. Given the potential to initiate wide reaching change in nursing students’ clinical experience, ongoing research will help to prepare faculty to provide positive student experiences in simulation.

REFERENCES


