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Abstract

The interest to conduct research studies is increasing; both qualitative and quantitative approaches are being utilized by investigators in the field of health sciences. Research requires organized, structured, and controlled methods for planning, conducting, analyzing, and representing the findings. However, establishing rigor is still not consistently highlighted in the qualitative phenomenon. Rigor is a way to establish trust, quality, and confidence in the findings and is considered a critical aspect of research. Rigor assists to establish certain criteria and standards through which the qualitative research is being judged, analyzed, and critiqued. Lincoln and Guba (1985) have outlined the unique components of the qualitative research rigor i.e. credibility (trust value), transferability (applicability), dependability (consistency), and authenticity (neutrality). The intent of this framework is the evaluation of research.

Keywords: *rigor; trustworthiness; qualitative research.*

Introduction

Research is a diligent, systematic inquiry that uses disciplined ways to answer research questions and solve problems. The research validates and refines the existing facts and generates new knowledge (Newton and Burgess 2008). Both qualitative and quantitative approaches are being utilized in the research for careful examination and development of knowledge (Abdalla et al. 2018). During the entire process of research, investigators are required to make various methodological commitments related to the collection of data, analysis, interpretation, and presentation (Busetto, Wick, and Gumbinger 2020). In addition, the research requires an organized, controlled, and structured approach for preparation, conduct, and analyses that need to be followed to make sure that the research is rigorous (Busetto, Wick, and Gumbinger 2020).

Regardless of the approach taken, the worth of any research endeavor is always evaluated by researchers, peers, reviewers, journal editors, and readers, and rigor is considered an important component in this regard (Maher et al. 2018). Rigor is termed as the degree to which the research methods are meticulously and scrupulously carried out to recognize important influences in the process of conducting research (Grodal, Anteby, and Holm 2020). Conscientious and efficient inquiry indicates planning, organization, and persistence. The rigor is the process of attachment to certain constraints, or the practice of maintaining strict consistency with certain predefined parameters which is necessary to make the study reliable, valid, authentic, and generalized (Morse 2015).

Rigor is concerned with the quality of research that is planned, designed, and conducted. It also reflects the excellence of the research process used in capturing, analyzing, and managing the findings (Ghafouri and Ofoghi 2017). Rigor assists to establish certain criteria and standards through which the research is being judged, analyzed, and critiqued. Furthermore, researchers utilize the parameters of rigor to evaluate the research value, and trustworthiness (Henry 2015).

Comparison of rigor in qualitative and quantitative approaches

Rigor is striving for excellence in research (Polit and Beck 2003). It is being a component of the qualitative phenomenon; however, quantitative studies also consider rigor.

Rigor in a quantitative research

Rigor (methodological) in the quantitative approach refers to the precision and soundness of the study in terms of planning, data collection, analysis, and reporting (Marquart 2017). The control that the investigator requires in the quantitative approach is significantly different from the qualitative phenomenon. Quantitative research requires strict accuracy, precision, designed format, and adherence (Nimon and Astakhova 2015). The strictness, discipline, and predetermined design tighten the research and the investigator has to follow the plans (Maula and Stam 2019). Furthermore, critically appraising the rigor of the study involves examining the reasoning and precision in conducting the research (Morse et al. 2002). The quantitative phenomenon is also objective in nature, therefore, reducing the chance of subjectivity and bias and yielding research that is rigorous and controlled (Cypress 2017).

Rigor in qualitative research

Qualitative research is a systematic approach used to describe experiences and situations from the perspective of a person in a specific situation (Castleberry and Nolen 2018). The concept of rigor in qualitative research is taken unique compared to quantitative studies (Anderson 2017). It is due to nature

and type as the qualitative aim is to gather an in-depth understanding of human behavior and the reason that governs behavior (Bush and Amechi 2019). Understanding the concept of qualitative rigor is a challenging, yet critical aspect of research. The rigor is assessed in relation to the elements put together in the design of the study, alertness of collection of the data, and perfectionism of the analysis (Ghafouri and Ofoghi 2017).

In qualitative research, rigor is a method to establish trust or confidence in the findings of the research study and is viewed as a quality of exact and imprecise. The notion of rigor is viewed as a necessary marker of quality (Cypress 2017). The qualitative phenomenon is intended to provide adequate information so that the reader can critically appraise the study's truth value, applicability, consistency, and neutrality (Maula and Stam 2019). The literature documents that the research which has these properties is said to be valued, correct, and accurate (Hussein, Jakubec, and Osuji 2016).

Discussion

Qualitative research relies on the data of limited subjects and requires deep interpretation (Castleberry and Nolen 2018). Therefore, the researchers must be vigilant and consistent throughout the research process, and in the representation of the findings so that the research is believable (Anderson 2017). The qualitative research methodology should provide enough information, explanations, transparency, and evidence that the findings can be confidential believed and can be achieved through trustworthiness (Henry 2015).

Trustworthiness is considered the most appropriate criterion for evaluating qualitative studies (Ghafouri and Ofoghi 2017). As Sandelowski (1986) documents compared to quantitative, qualitative research is a dissimilar method and imprecise. The approach has a different purpose and process therefore different ways are required for evaluating the trustworthiness (Tuval-Mashiach 2021). In the last two decades, the interest in qualitative research approaches has escalated in the fields of health sciences. However, the focus to establish its rigor is still rarely highlighted.

The assessment of rigor in qualitative research can be performed through different models such as proposed by Kirk and Miller (1986), Leninger (1985), and Lincoln and Guba (1985/1994). However, all the models are based upon Lincoln and Guba's model due to its in-depth presentation and well-designed structure conceptually. They have outlined the different four criteria for the evaluation of research. The identification of trustworthiness can be performed through the truth-value (credibility), applicability (transformability), consistency (dependability), and neutrality (confirmability). The fifth criterion was included by Lincoln and Guba (1994) which is authenticity.

Credibility (Truth Value)

Credibility is the standard by which qualitative research is expected to be believable. It is the "degree to which the researchers have established confidence in the truth of the findings for the subjects and the context in which the study was undertaken" (Lincoln and Guba 1985). The credibility always portrays the actual *Lebenswelt* (lived experience) of the participants. High credibility can be achieved by planning the research as non-intrusive as possible and by building a trustworthy environment that allows the participants to act in a way they usually would (Johnson, Adkins, and Chauvin 2020).

Credibility also allows the readers to recognize the experience contained within the study through the interpretation of the participant's experiences (Smith and McGannon 2017). For establishing credibility, the researcher must be vigilantly involved in all the research processes (Henry 2015). It establishes how the investigator is certain of the truth of the result based upon the context, informants,

and design. On the contrary, in a quantitative study, truth-value is assessed by internal validity (Sandelowski 1986).

In the qualitative approach, the truth value is participants oriented, not pre-defined, and achieved through the discovery of human experiences as they are perceived and lived by the informants (Trainor and Graue 2014). The qualitative study is said to be credible when it presents the exact picture and explanation of the human experiences in a way that the individual who contributes to the experience would recognize their description (Hussein, Jakubec, and Osuji 2016). The true value is the more significant criterion for the assessment of the qualitative study and several approaches are essential to guarantee high credibility.

Transferability (Applicability)

Transferability is the ability to transfer the research findings and methods to other groups, contexts, or other settings (Trainor and Graue 2014). It is the degree to which the findings of the study can be generalized to similar populations. The qualitative approach is specific to a particular context or setting therefore, it is essential to provide a thick description of the context in which the research is being conducted so that the reader can easily assess and judge whether it is transferable to a certain situation or not (Anderson 2017). On the contrary, from the perspective of the quantitative design, transferability is how well the threats manage the external validity (Tong and Dew 2016).

Qualitative studies are not designed to be generalized like quantitative approaches as findings never fit to be the ultimate and universal truth for all the settings and groups (Henry 2015). However, transferability is considered a standard approach by which the qualitative results are expected to be transferred and applicable to similar phenomena, settings, and peoples. Lincoln and Guba (1985) suggest that transferability is the responsibility of the individual who is interested to transfer the data to another group, setting, or population rather than of the researcher of the original study.

The transferability of the findings conducted in one situated context applied to another depends not only upon the researcher but on the readers and their ability to identify and compare the similarities and differences between the contexts or settings (Amankwaa 2016); the greater the similarity is higher will be the possibility of transferability (Tong and Dew 2016).

Dependability (Consistency)

Dependability is the ability or extent to which the data is consistent if an inquiry were repeated under similar conditions with a similar population. It reflects the consistency of the findings if the procedure is repeated (Tuval-Mashiach 2021). Dependability is the standard through which the methods, findings, logic, and reasoning are expected to be stable and consistent over time (Johnson, Adkins, and Chauvin 2020). The dependability requires detailed audit trails and the reader can evaluate the dependability through different measures such as measuring clarity or inaccuracy of data collection procedure, interpretation of the findings, and presentation of the results (Chowdhury 2015). The greater the investigator is consistent throughout the research process the more dependable research results will be (Tong and Dew 2016). On the other hand, reliability is the criterion for consistency or dependability in quantitative research.

In the qualitative approach, the instrument for assessing the dependability is both investigator and informants, and both vary within the research project(Smith and McGannon 2017). The variability is expected in qualitative research; however, the logic, accuracy, and proper planning throughout the research process can lead to consistency.

Conformability (Neutrality)

Conformability is the degree to which results are a sole function of the informants/subjects and emerge from the data, not a prior leaning or bias(Ghafouri and Ofoghi 2017). It is considered as freedom from bias in the research procedures and findings. In quantitative research, objectivity is the criterion of neutrality, and objectivity requires the distance between the investigators and participants to limit the bias through randomization and instrumentation (Nowell et al. 2017). However, the qualitative approach considers the increases in the work of finding by decreasing the distance between participants and researcher (Johnson, Adkins, and Chauvin 2020). Moreover, Lincoln and Guba (1985) emphasize that the focus of neutrality is on the data, rather than focusing on the researcher. Conformability occurs after credibility, transferability, and dependability have been established (Amankwaa 2016).

Lincoln and Guba Model

The model presented by Lincoln and Guba (1985) describes the disciplined inquiry in a form of four criteria for evaluating the research studies. The parameter of measurements is truth value, applicability, consistency, and neutrality. Lincoln and Guba (1981) also stated that both qualitative and quantitative research studies are dissimilar in nature and method. Therefore, the process through which both approaches are evaluated should also be different. Table 1 displays the comparison of criteria of both research methods.

Table No. 1: *Comparison of Criteria by Research Approach*

<i>Criterion</i>	Quantitative	Qualitative
<i>Truth Value</i>	Internal Validity	Credibility
<i>Applicability</i>	External Validity	Transferability
<i>Consistency</i>	Reliability	Dependability
<i>Neutrality</i>	Objectivity	Conformability

Strategies for acquiring trustworthiness in qualitative research

Throughout the qualitative research process, a diverse number of strategies can be utilized to increase the worth of the study. The strategies for establishing trustworthiness in qualitative research are displayed in Table 2. The application and address of these approaches can be implemented at each stage such as planning, data collection, analysis, and representation of the project.

Table No. 2: Strategies for establishing Trustworthiness

Criteria	Strategy
<i>Credibility</i>	<div><ul style="list-style-type: none">• Reflectivity• Member checking• Peer examination• Peer debriefing• Triangulation• Time sampling• Interview techniques<div>Structural coherence</div><div>Referential adequacy</div><div>Prolong time spent with subjects</div><div>Utilizing the informant's words in the final report</div></div>
<i>Transferability</i>	<div>Dense Description of context, setting, and subjects</div> <div>Time Sample</div> <div>Nominated Sample</div> <div>Comparison of sample in demographic data</div>
<i>Dependability</i>	<div>External audits</div> <div>Stepwise replication</div> <div>Dense description of research methods</div> <div>Triangulation</div> <div>Peer examination</div> <div>Reflective appraisal</div>
<i>Conformability</i>	<div>Triangulation</div> <div><ul style="list-style-type: none">• Reflectivity</div> <div>Audit trails</div>

Conclusion

The interest in qualitative investigations is growing and the structured criteria can help to maintain the rigor of the studies. Rigor in the qualitative approach belongs to the process and its trustworthiness. The model of trustworthiness is found to be useful for both researchers and readers in designing, conducting, and understanding the research. Moreover, it also aids to decide the value of work and the contribution of the research. Credibility, transferability, dependability, and conformability are considered essential for the evaluation of the worth of the study. The trustworthiness criteria can be achieved through invoking a range of strategies.

Acknowledgment

The authors would like to acknowledge the faculty of Aga Khan University- School of Nursing and Midwifery, Karachi Pakistan for their support, educational sessions, and valuable feedback. In addition, sincere thanks to all the facilitators of the advanced qualitative research course of the Ph.D. program for their teaching.

Conflict of Interest

All authors declare that there is no actual or potential conflict of interest concerning the write-up, authorship, and publication of the article.

Funding

These authors received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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