Data Saturation:
The Mysterious Step in Grounded Theory Methodology

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The aim of this paper is to provide a discussion that is broad in both depth and breadth, about the concept of data saturation in Grounded Theory. It is expected that this knowledge will provide a helpful resource for (a) the novice researcher using a Grounded Theory approach, or for (b) graduate students currently enrolled in a qualitative research course, and for (c) instructors who teach or supervise qualitative research projects. The following topics are discussed in this paper: (1) definition of data saturation in Grounded Theory (GT); (2) factors pertaining to data saturation; (3) factors that hinder data saturation; (4) the relationship between theoretical sampling and data saturation; (5) the relationship between constant comparative and data saturation; and (6) illustrative examples of strategies used during data collection to maximize the components of rigor that Yonge and Stewin (1988) described as Credibility, Transferability or Fittingness, Dependability or Auditability, and Confirmability. Keywords: Grounded Theory, Novice Researchers, Strategies or Achieving Data / Theoretical Saturation, Indicators

Introduction

As a methodological framework, Grounded Theory is defined here as "the discovery of theory from data systematically obtained from social research" (Glaser & Strauss, 1967, p. 2). Since its development back in 1967 by Glaser and Strauss, several forms of this method have developed such as:

> Straussian Grounded Theory (Corbin & Strauss, 2008), Glaserian Grounded Theory (Glaser, 1978; Stern, 2009); dimensional analysis (Bowers & Schatzman, 2009; Schatzman, 1991); constructivist Grounded Theory (Charmaz, 2006, 2009) and situational analysis (Clarke, 2005, 2008). These variations and developments of Grounded Theory have a different purpose and different product, so that it is no longer adequate to mention Grounded Theory without further qualification. (Morse & Niehaus, 2009, p. 95)

However, as Morse and Niehaus (2009) noted, there are several commonalities among these different forms of Grounded Theory:

> All grounded theories consist of unstructured interviews, they use [specific] techniques to categorize data and to identify characteristics, and they are interested in interactions and process...They may use other data sources (observations, documents, and so forth). They usually have distinct strategies for data analysis, most commonly constant comparison. (p. 95)

Furthermore, as Glaser and Strauss (1971) have emphasized, the generated Grounded Theory, whether formal or substantive, is preferably reported as a psychosocial process that reflects the ever-changing complex reality, as opposed to stating a theory in propositional form. They maintain that the latter strategy would influence the depth, thickness, richness, and flexibility of generated Grounded Theory for further development.

Many novice qualitative researchers such as graduate students are challenged to find an appropriate qualitative research method that answers their research question (Evans, 2013). For those who have chosen a Grounded Theory method to discover the fundamental psychosocial process and subsequently generate theory from the data, they will need to address several challenges. Perhaps the most salient and often anxiety-provoking challenge that such researchers experience about the trustworthiness of their research findings pertains to the question of when data collection should cease (Francis et al., 2010). Very often the answer that is given is: *"When no new data are identified"*; that is, when new data do not add any further insights to the core categories and/or the discovery of additional properties for those categories (Charmaz, 2006; Glaser & Strauss, 1971, p. 189). However, the fact that the novice researcher no longer can identify new data may be due to a range of specific methodological issues that need to be addressed as opposed to simply continuing data collection for an extended period.

Although Grounded Theory is a very popular and varied qualitative research method (i.e., there are several different types of Grounded Theory, each one having different ontological, epistemological, and methodological assumptions) discussed in a vast range of published articles, books, chapters, reports, and forums, there is still a need to illustrate specific strategies to demonstrate the *trustworthiness* of the findings. This aspect requires a concise, yet precise description of the steps taken to ensure data saturation, or what in Grounded Theory would be referred to as *theoretical saturation* (Tay, 2014). However, for the purpose of this paper, the term "data saturation" will be used to indicate theoretical saturation. To reach data saturation, novice researchers who use a Grounded Theory approach need to be able to effectively use their subjectivity, wisdom, and intuition; and they need to realize that data saturation is an ongoing and gradual process, as opposed to a time-limited process that leads to "thin" (i.e., lean versus thick) description. Thus, they need guidance from other Grounded Theory experts regarding strategies that both facilitate and hinder the achievement of data saturation.

The aim of this paper is to provide an in-depth discussion of the data saturation concept that includes the following six topics:

(1) Definition of data saturation
(2) Factors that facilitate data saturation
(3) Factors that hinder data saturation
(4) The relationship between theoretical sampling and data saturation
(5) The relationship between constant comparative and data saturation; and
(6) Strategies to determine if data saturation has been achieved (including memo writing)

It is hoped that this discussion will be a helpful resource for the novice researchers and graduate students who are using a Grounded Theory approach, graduate students enrolled in qualitative research courses, and for instructors who teach or supervise qualitative research projects.

1. Definition and Types of Data Saturation

Data saturation as a Grounded Theory concept was coined from what is known as *"theoretical saturation"* (Tay, 2014; see Morse, 2004). As described by Morse (2004), this concept refers to "the phase of qualitative data analysis in which the researcher has continued sampling and analyzing data until no new data appear and all concepts of the theory are well-developed….and their linkages to other concepts are clearly described" (p. 1123 in printed copy), and thus data collection could cease. This concept was put forth by Glaser and Strauss (1999) "as a specific element of the constant comparison [analysis method]" (Malterud, Siersma, & Guassora, 2016, p. 1753). Hence, it was assumed that given that no new similarities or differences could be identified, data collection need not continue.

Charmaz (2006) indicated that there is still disagreement about the definition of the data saturation concept. Both Glaser (2001) and later Charmaz (2006) emphasized that data saturation does not mean to stop prematurely gathering new data when a repetitive pattern of stories and incidents occurs, but to continue "conceptualization of comparisons of these incidents which yield different properties of the pattern, until no new properties of the pattern emerge" (Glaser, 2001, p. 191, as cited in Charmaz, 2006, p. 113; cf. also Glaser, 1969, p. 223).

Following our review of many Grounded Theory research reports and dissertations, the authors of this publication are convinced that the issue is not how to define the concept of data saturation theoretically, but how to clearly articulate it substantively. This conclusion was also reached by Francis et al. (2010). They conducted a literature review and found that the majority of authors of Grounded Theory studies did not provide thick description of methodological strategies used in their decision that theoretical (i.e., category) saturation had been reached. Morse (1995) warned of this risky case when researchers proclaim and think wrongfully that categories are saturated without being able to precisely indicate how they achieved it. Similarly, Phyllis Stern (in Morse, Stern, Corbin, Bowers, Charmaz, & Clarke, 2009) contended that the major problems with many Grounded Theory studies that she has reviewed are *inadequate data*, which may result from not only a lack of data saturation but also because of a very small sample size, not enough theoretical sampling, or poor application of the constant comparative approach (p. 244). The authors of this publication concur with both Morse (1995) and Stern, as well as Charmaz who contended that the "good Grounded Theory" studies are those characterized by rich, empirical, original, and trustworthy data that reflect in depth the psychosocial process; otherwise, these studies cannot be categorized as effective grounded theory studies (Kathy Charmaz as cited in Morse, Stern, Corbin, Bowers, Charmaz, & Clarke, 2009, p. 244).

There is no doubt that lack of full saturation -- or what we term *pseudo-saturation* -- of categories will not produce "good Grounded Theory [which] surprises and delights …, the grab that Glaser was talking about" (Stern as cited in Morse, Stern, Corbin, Bowers, Charmaz, & Clarke, 2009, p. 244) because of the following three reasons: it will not fully raise the categories to the theoretical level, and this in turn will influence its lack of trustworthiness; it will negatively influence fitting the new data into the categories that have already emerged (Bowen, 2008); and it will also influence replication in categories and its verification, its comprehension and completeness (Morse, Barnett, Mayan, Olson, & Spiers, 2002).

Many of the challenges that face novice researchers using a Grounded Theory method could be avoided if a set of general guidelines were made available, including a description of the data saturation concept (Bowen, 2008; Guest, Bunce, & Johnson, 2006; O'Reilly & Parker, 2012). Charmaz (2006) advised researchers not to use general guidelines like recipes, but rather to stay "open to what is happening in the field and be willing to grapple with it…use Grounded Theory guidelines to give you a handle on the material, not a machine that does the work for you" (p. 115). Although we agree with Charmaz that one size does not fit all to achieve

saturation in Grounded Theory research, general guidelines, or concrete examples on how to achieve saturation are needed for novice researchers using a Grounded Theory method.

1.1 Two Types of Data Saturation: Code and Meaning Saturation

Hennink, Kaiser, and Marconi (2016) differentiated between two types of data saturation: code saturation and meaning saturation. The authors suggested that *code saturation* in Grounded Theory could be reached at nine interviews, when researchers "heard it all," whereas *meaning saturation* could be reached between 16-24 interviews, when researchers "understand it all" (p. 1). Morse (2015a) insisted that qualitative researchers have to reach both of those types of saturation, by using both subjective and objective data, which thereby afford the best guarantee of rigor. Similarly, Hennink et al. (2016) concluded that the following parameters may enhance *meaning* saturation, and ultimately assist in determining an effective sample size: (a) the purpose of the study, (b) the nature of the study population, (c) the types and styles of coding, and the complexity and stability of the codebook used by the researcher. Morse (2015b) recommended that qualitative researchers, including Grounded Theorists, use the following strategies to achieve data saturation and rigor: "prolonged engagement, persistent observation, and thick, rich description; inter-rater reliability, negative case analysis; peer review or debriefing; clarifying researcher bias; member checking; external audits, and triangulation" (p. 1212).

1.2 Information Power: A New Term for an Important Component of Data Saturation

To achieve data saturation in all types of qualitative research, it is important to address several aspects of the sampling process, including not only the number of participants, but also "the number of contacts with each participant and the length of each contact" (Onwuegbuzie & Leach, 2007, p.117). The latter authors indicated "*a call for qualitative power analyses*…which should be used to assess the appropriateness of the units sampled…units could be people, words, text, observations, events, incidents, activities, experiences, social processes, or any other object of study" (p. 117). This call was echoed by Malterud, Siersma, and Guassora (2016) who emphasized that sample size in qualitative studies should be guided by "information power," which might be defined as a form of power that is based on controlling the information needed by others in order to reach an important goal. In other words, "tools to guide sample size should not rely on procedures from a specific analysis method, but rest on shared methodological principles for estimating an adequate number of units, events, or participants (p. 1754). It is also important to remember that it is not only sample size that is important, but also the number of interviews held with each participant and the length of time of each of them.

According to these authors, studies with more information power need a smaller sample size because of the amount of information the sample hold. They assume that qualitative researcher can achieve higher information power if they address the following aspects that affect information power: (a) narrow the study aim, (b) include a sample specificity that is dense (i.e., the participants have a broad knowledge and experiential base), (c) apply theory (include the theoretical background of the study), strengthen dialogue (enhance the quality of the interview data), and vividly describe their analysis strategy.

Having discussed the meaning of the data saturation concept, let us now discuss the factors that novice researchers need to know in regard to how to enhance the saturation of their data.

2. Factors that Facilitate Data Saturation

In any Grounded Theory study, the primary goal for the researcher is to achieve data saturation (Charmaz, 2006), or what we prefer to call *theoretical saturation* (i.e., Given that no new incidents/ properties of a particular category have been discovered, coding for the categories can cease; Glaser, 1969, p. 223). In this way, the researchers using a Grounded Theory approach can demonstrate evidence regarding the trustworthiness of their findings. Outlined next are six salient factors that we have found throughout our research experience to facilitate the achievement of data (theoretical) saturation in Grounded Theory studies.

2.1 Simple vs Complex Research Question

The nature of the research question determines whether a Grounded Theory study project is simple or complex. For a simple Grounded Theory study (e.g., What are general concerns that confront Canadian psychiatric nurses?), data saturation may be achieved quickly because the researcher does not need to collect extensive amounts of data to answer the research question, nor spend extended time in the field. A more precise statement about this factor has been provided by Charmaz (2006), who indicated that the novelty and nature of the research question is one of factors that determines whether the researcher will achieve data saturation quickly or slowly. For example, involving gerontology nurses in euthanasia is a novel clinical topic that has been raised recently in Canada. This type of novel yet complex topic requires the researcher to collect extensive data using different data collection methods, and to spend a longer time collecting data, which means that data saturation may be achieved slowly.

2.2 The Researcher's Experience with Qualitative Methods

Unlike novice researchers, experts in using a Grounded Theory approach might be considered those who have extensive experience conducting qualitative research and skilled in decision making regarding which kind of data they have to collect, from whom, when, where to find it, and how much. Furthermore, they are likely knowledgeable in conducting open-ended, focused interviews through their use of neutral questions, which Wright and Leahey (2013) have often done in the past, as well as through the of various types of circular questions (e.g., difference, behavioral effect, and hypothetical/ future orientated questions, p. 156; see also www.familynursingresources.com). These and related factors have likely afforded experienced researchers in Grounded Theory in various communities of practice, to acquire the *tacit knowledge* (having "know-how" as opposed to" know-that" [facts]; cf. Ryle, 1949 as cited in Polanyi, 1966) regarding when data saturation has been reached, and thus ceasing data collection.

2.3 Using Triangulation of Data Collection Methods

There is no doubt that using mixed methods, as defined by Morse and Niehaus (2009) to collect data (e.g., interviews, observation, field notes…etc.) helps grounded theorists to enhance *thick* (versus thin) *description* of the data (Le Navenec, 1993, pp. 88-89) and reach data saturation faster than using only one qualitative data collection method. However, the number of data collection methods used depends on the complexity and novelty of the research topic and on the research question as discussed in the above-mentioned sections 2.1 and 2.2.

One last note about Triangulation. In her family caregiving study, Le Navenec (1993, 1996) indicated how Triangulation is not limited to data collection methods but also to sample selection (e.g., three types of family subsystems: marital, parent-child; and parent-extended

family) and to the use of initial guiding theoretical perspectives (e.g., symbolic interactionism and Calgary Family assessment model for categorizing the relationship patterns of the family).

2.4 Understanding the Philosophical Underpinnings of the Research Method

As qualitative researchers, we concur with Munhall (2001) who encouraged qualitative researchers to understand the philosophical underpinnings of their research tradition before using the research methods that arise from this tradition. Understanding the philosophical paradigm of a Grounded Theory method with its ontological and epistemological beliefs influences the researchers' orientation regarding the nature of reality, what can be known and how it can be known (Guba & Lincoln, 1994). The classical Grounded Theory methodology has been developed based on philosophical assumptions from Symbolic interactionism and Pragmatism philosophies (Aldiabat & Le Navenec, 2011a, 2011b). Although rooted in symbolic interactionism (SI), this philosophy is not part of the substantive theory that is generated by the Grounded Theory method. That is, the purpose of using a symbolic interactionism perspective in grounded theory research is to inform the researcher about the assumptions of Grounded Theory method, and to guide the researcher about how to use this method, particularly in terms of data collection (Aldiabat & Le Navenec, 2011a, 2011b).

A second philosophical underpinning of Grounded Theory methodology is pragmatism. According to this philosophy, human actions are continuous routines that can be affected by the context or situational conditions that cause humans to mentally review options and to select among choices (Aldiabat & Le Navenec, 2011a, 2011b). For more knowledge about how epistemological, ontological, and methodological assumptions of Grounded Theory root in symbolic interactionism and pragmatism, please refer to Aldiabat and Le Navenec (2011a, 2011b).

Understanding the philosophical underpinning of Grounded Theory, in turn, may facilitate the data saturation process. In this regard, Charmaz (1989) contended that clarification of the epistemological thoughts of the grounded theorist leads to enrichment of the analysis of Grounded Theory research. However, understanding the ontological beliefs of Grounded Theory, namely that the social and natural world have different realities that "are probabilistically apprehensible, albeit imperfectly" (Annells, 1996, p. 385) will motivate the researcher to collect more data and thereby, hopefully, saturate the categories more completely (Glaser, 1992).

2.5 Researcher's Familiarity with Using a Guiding Theoretical Framework

Grounded Theory has been considered to be a qualitative research method that aims to generate a theory from the data (Glaser & Strauss, 1967). However, this definition has generated a misconception among researchers regarding writing a theoretical framework that guides Grounded Theory studies (Chenitz, 1986). According to Blumer (1969), identifying the theoretical framework before conducting the study is critical because the entire research act is dependent on an imaginary picture of the empirical world of the participants. Moreover, Blumer contended that the imaginary picture of the empirical world of the participants "sets the selection and formulation of problems, the determination of what are the data, the means to be used in obtaining data, the kinds of relations sought between data and the forms in which propositions are cast" (p. 25). All those factors allegedly will foster reaching data saturation faster. Because of its flexibility, the Grounded Theory method allows the researcher to shape an unrelated theoretical framework at the beginning of the study, then to reshape the theoretical framework to fit the results of the study (Chenitz, 1986).

2.6 Use of Sensitizing Concepts in the Context of Grounded Theory Research

The notion of *sensitizing concepts* is not a new assumption in Grounded Theory (Glaser, 1978) and symbolic interactionism (Blumer, 1954). In regard to qualitative research in general, sensitizing concepts were viewed as "initial ways of focusing on and organizing data" (Wilson, 1985, p. 571). More recently, Bowen (2006) has shown the purpose and functions of sensitizing concepts in Grounded Theory, and how the latter differ from definitive concepts. He expressed it this way:

> A definitive concept refers precisely to what is common to a class of objects, by the aid of a clear definition in terms of attributes or fixed bench marks... A sensitizing concept lacks such specification of attributes or bench marks and consequently it does not enable the user to move directly to the instance and its relevant content. Instead, it gives the user a general sense of reference and guidance in approaching empirical instances. Whereas definitive concepts provide prescriptions of what to see, sensitizing concepts merely suggest directions along which to look. (Blumer, 1954, p. 7, as cited in Bowen, 2006)

However, few grounded theorists use such concepts in their studies. Bowen (2006) maintained that the use of sensitizing concepts by grounded theorists as a starting point "give the researcher a sense of how observed instances of a phenomenon might fit within conceptual categories….[and hence are] effective in providing a framework for analyzing empirical data and, ultimately, for developing a deep understanding of social phenomena" (pp. 7-8) Although we believe that as data collection and analysis in one's Grounded Theory study advances, one must move beyond the use of sensitizing concepts, we maintain that such concepts provide a helpful guide for researchers at the very beginning of data collection, followed by Grounded Theory research strategies to reshape, and/ or refine the concepts (Glaser & Strauss, 1967) until they reach data (theoretical) saturation.

The above mentioned suggested strategies that foster data saturation are a two-edged weapon. That is, if grounded theorists carefully take them in consideration and deal with them in an appropriate manner, data saturation can be fostered and achieved quickly. By contrast, each of these factors and strategies may impede an outcome of data saturation. Three factors that hinder data saturation are discussed next.

3. Factors that Hinder Data Saturation

3.1 Conducting a Grounded Theory Study in a Very Short Time

It is well known that many novice grounded theorists are Master and Doctoral students who often have to conduct and defend their research within a defined timeline. This *limited time aspect* may create difficulties for these students because it is time consuming to collect and analyze the very high volume required.

In contrast to researchers using a positivism paradigm, qualitative researchers need to stay longer time in the field to conduct their studies for the following reasons related to the nature of interpretivism paradigm (Cobb & Forbes, 2002; Morse, 2015b). First, the reality is multiple and the qualitative researcher who functions as an instrument to collect the data needs a longer time to comprehend what is occurring and to build rapport with participants. Second, understanding the reality, meaning of the experience, and the psychosocial process from the emic and etic perspectives requires longer time to interview or observe the participants in their social context. For Grounded Theory researchers, discovering a theory from data using

theoretical sampling and constant comparative methods are time consuming because these strategies require the researcher to select participants carefully, and often require more than one interview, each being several hours in length to facilitate data saturation. In summary, spending a longer time in the field will enrich the data, give deep understanding of the phenomenon, and enhance data saturation.

3.2 Limited Budget for Conducting Research

Qualitative research that involves a Grounded Theory method is not only time consuming, but also financially expensive. Such costs for the Grounded Theory researcher stem from having to spend many hours in the field in order to do the required amount of theoretical sampling, and conduct the ongoing constant comparative analysis of vast amounts of data, as well as costs related to transcriptions, equipment, travel, and miscellaneous activities. Unless the Grounded Theory researcher has made a comprehensive plan in advance of the study to address the needed budget/resources (financial, secretarial support, a way to cover travel and living expenses), then he or she may not be able to complete the study in a satisfactory manner.

3.3 Limited Resources, Training, and Monitoring

Although use of a Grounded Theory method is one of the most popular/widely used qualitative method, not all novice grounded theorists around the world lucky enough to find all resources (e.g., books, internet resources, and other equipment) they need to enhance their understanding and skills to conduct a trustworthy Grounded Theory study. Grounded theorists need a long time of preparation and training before sending them to the field. Training includes but is not limited to: theoretical knowledge courses, interviews and observation skills, compiling field notes, writing memos, and accurately conducting ongoing analysis using the constant comparative method (Staller, 2012). However, Glaser (2009) disagreed with the training issue and argued that:

> Using Grounded Theory methodology carefully brought its own skill development and brought it faster and better without previous training in qualitative research. The novice need only have an ability to conceptualize, to organize, to tolerate confusion with some incident depression, to make abstract connections, to remain open, to be a bit visual, to thinking multi-varietally and most of all to trust to preconscious processing and to emergence. Many do have these abilities at the advanced degree level. For many novices these abilities come naturally. (para. 6)

With full respect to Glaser's belief, unfortunately, there is a huge gap between the theory and practice components of Grounded Theory method as indicated by many novice grounded theorists finding themselves overwhelmed beginning the field experience with only theoretical knowledge. Insufficient preparation for the novice grounded theorist will influence negatively his or her use of salient steps of the Grounded Theory research process, and thus rated and/or prevent the achievement of data saturation.

Monitoring those novice grounded theorists is another issue that can hinder reaching the data saturation. Although Grounded Theory is rooted in social and qualitative research, it still has its identity and characteristics that distinguish it from other methods that need highly qualified and well-prepared mentors to supervise those novice grounded theorists (Nagel, Burns, Tilley, & Aubin, 2015). Unfortunately, in many times the real situation is not the ideal one, such as, where many mentors are qualitative researchers who specialize in different

qualitative methods than Grounded Theory supervise/mentor novice grounded theorists (Glaser 2014). We do not criticize those mentors, but we are convinced that many of questions regarding Grounded Theory cannot be explained or clarified except from those specialized in Grounded Theory, particularly in teaching them about strategies to achieve data/theoretical saturation.

Expert mentors can play a significant direct and indirect role to help the novice Grounded Theory researcher avoid the challenges that may hinder him or her from achieving theoretical saturation. Nagel, Burns, Tilley, and Aubin (2015), discussed the following guidelines for expert mentors to help their mentees achieve the theoretical saturation. Expert mentors have to:

(1) Make sure that their mentees understand the philosophical underpinning of the Grounded Theory method they chose to answer their research question, and understand the similarities and differences in the epistemological, ontological, and methodological assumptions of different Grounded Theory approaches.
(2) Make sure that their mentees are trained enough to be skilled in data collection and coding methods before visiting the field for collecting data.
(3) Clarify for their mentees the different terminologies and blurring of methods between the different Grounded Theory approached.
(4) Help mentees to choose a supervisory committee with enough experience in the chosen Grounded Theory approach
(5) Help mentees to apply for and obtain research fund to avoid early leaving of the study field because financial restrictions.
(6) Stay close to mentees during the entire data analysis phase and provide them with constructive feedback until they reach to the theoretical saturation point.

4. The Relationship between Theoretical Sampling and Data Saturation

One of Grounded Theory's strengths, is that it is a logical process to discover the theory in data where each step of this process depends and connects with other steps. That is, imperfect work in one step influences negatively the other upcoming steps. According to Bowen (2008), data saturation is influenced by the theoretical sampling. Theoretical sampling refers to "the process of data collection for generating theory whereby the analyst jointly collects codes and analyses his data and decides what data to collect next and where to find them, in order to develop his theory…" (Glaser & Strauss, 1967, p. 45). This approach helps the researcher to enrich and saturate the categories and eventually to connect these categories together to form the emergent theory (Glaser, 1978), and to direct the researcher to maintain control over the volume of data and its analysis (Glaser & Strauss, 1967).

The grounded theorists keep theoretical sampling to the point "that categories are fully accounted for, the variability between them are explained and the relationships between them are tested and validated and thus a theory can emerge" (Green & Thorogood, 2004, as cited in O'Reilly and Parker, 2012, p. 3) that is, the saturation point. By reaching this point of saturation, the sample is described as an adequate one (O'Reilly & Parker, 2012). In conclusion, the relationship between theoretical sampling and data saturation is a reciprocal one. While the theoretical sampling fosters data saturation, in turn, achieving the data saturation determines the sample size and when to stop recruiting more participants, and points to when to end the research.

As we mentioned before, Grounded Theory concepts are related to each other. Constant comparative is a distinguished concept in Grounded Theory plays a significant role in data analysis and saturation. The next section aims to clarify how it influences the data saturation.

5. The Relationship between the Constant Comparative Method and Data Saturation

The constant comparative method is the process for analyzing the data in Grounded Theory and one of its salient features (Glaser & Strauss, 1967). According to Bowen (2008), this feature of Grounded Theory is very salient to reaching data saturation. Conrad, Neumann, Haworth, & Scott (1993) discussed the importance of this feature to emerge the theory from data when it "combines systematic data collection, coding, and analysis with theoretical sampling in order to generate theory that is integrated, close to the data, and expressed in a form clear enough for further testing" (p. 280). The Grounded Theory will emerge, and the data will be saturated when the grounded theorist researcher follow the approach that Glaser and Strauss (1967) developed, which involves four essential steps for data analysis: "1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the theory, and 4) writing the theory" (p. 105). The constant comparative method compares the data throughout different levels/stages from empirical one to conceptual (Glaser, 1992). Bowen (2008) indicated that "the constant comparative method serves to test concepts and themes with a view to producing a theory grounded in the data" (p. 139). Thus, by continuously comparing data using four stages of constant comparative method and by going back and forth between data collection and analysis using theoretical sampling, the grounded theorists have the chance to test the data saturation at different levels/stages and to decide then whether they have to stop data collection or further data is still needed to achieve the data saturation. However, the question that we would like to discuss next is: how many data are enough to saturate your data?

5.1 How Much Data Is Enough to Saturate your Data?

We do not claim that we are the first qualitative researchers to ask this question. It has been asked in the literature in different forms: How many interviews are enough? What should be the length of the interview? How many participants are enough? How large/small of a sample size is appropriate for qualitative research? When do researchers have to stop data collection? How much data are enough data? All these forms of the question were asked to determine the point of data saturation. Bonde (2013) determined five factors that influence the researcher's decision to stop further data collection and reach data saturation:

(1) First, the scope of investigation including: the nature of the study and research question, complexity of the phenomena under study, and method of data collection (e.g., using focus group needs less interviews and fosters data saturation).

(2) Second, the homogeneity of sample and level of experience of participants in the research topic; that is, homogeneous and experienced participants in the research topic need fewer interviews and may reach saturation faster than a heterogeneous sample with less experienced participants.

(3) Expertise of the qualitative researcher is the third factor that influences data saturation. This aspect is important because these researchers are considered to be the data collection instrument (Denzin & Lincoln, 2003; see also Miles, Huberman, & Saldaña, 2014); then, the more experienced researcher in data collection and analyzing the less interviews are needed and the faster the data saturation could be reached.

(4) Fourth, resources for conducting qualitative research are considered a salient factor that influences data saturation. For example, limited budget, short time,

and unavailability of participants influence the researcher decision to recruit a smaller sample size with fewer interviews to reach data saturation.

(5) Fifth, is the audience influence on sample size and data saturation. Bonde (2013) emphasized that the opinion of those who read and judge the completed research work has an influence on sample size and data saturation. For example, qualitative researchers may increase their sample size, conduct more interviews, and reach data saturation to convince quantitative research audiences who are familiar with large samples. Bonde (2013) concluded there is no specific straightforward strategy that can be followed by researchers to achieve data saturation. However, it depends on combination of the above five factors to determine how much data is needed for any qualitative study to achieve data saturation.

Baker and Edwards (2012), in their unpublished discussion paper, asked numerous experts in qualitative and social research about when data saturation can be achieved in qualitative research. The experts provided a general response based on the notion "it depends," which includes most guidelines mentioned in this paper:

> These include epistemological and methodological questions about the nature and purpose of the research: whether the focus of the objectives and of analysis is on commonality or difference or uniqueness or complexity or comparison or instances, Practical issues to take into account include the level of degree, the time available, institutional committee requirements And both philosophically and pragmatically, the judgment of the epistemic community in which a student or researcher wishes to be or is located, is another key consideration. (p. 42)

The concept of data saturation has been operationalized by Guest, Bunce, and Johnson (2006) in their study titled: *How Many Interviews Are Enough? An Experiment with Data Saturation and Variability.* These authors indicated that data saturation can be reached with the first twelve interviews. However, because of the variability, complexity, and circular nature of qualitative research topics and data, we believe that this recommendation cannot be generalized to be a rule of thumb to be followed by qualitative researchers as a valid and reliable indicator of data saturation. Thus, we agree with Charmaz's (2006) recommendation that Grounded Theory researchers remain open and flexible to what is going on in the field, including their cognization that earlier and new data will help them to find solutions to achieve data saturation, and to "use Grounded Theory guidelines to give you a handle on the material, not a machine that does the work for [them]" (p. 115).

Because there is no specific rule to follow to achieve data saturation, in the following section we will discuss a concrete example on how to reach data saturation by providing a brief record of memos that the first author used to help him reach data saturation.

5.2 An Illustrative Example of the Use of Memos to Help to Reach Data Saturation

Reaching data saturation is a subjective, non-linear, gradual, and unfixed process. It is well known now that novice grounded theorists can reach data saturation based on their subjectivity, wisdom, intuition, seeking help and guidance from other expert grounded theorists, and taking in consideration the above-mentioned factors that facilitate data saturation and avoid factors that hinder it (Baker & Edwards, 2012; Bonde, 2013; Charmaz,2006). However, the most difficult question for the novice grounded theorists is when they are asked to provide a substantive example from their research work on how they had reached the data

saturation. In this section, a substantive example from a real Grounded Theory study that was conducted to understand smoking behavior among Jordanian mental health nurses will be used to elaborate how the author reached the data saturation. This research has been conducted as doctoral research for the first author of this paper. The theory emerged after the fifth interview with fifth participant. However, to make sure the data were saturated and avoid premature closure of data collection, the researcher continued collecting and analyzing data from another three participants. The researcher stopped collecting further data after he became convinced that the theory had emerged, and the categories were saturated, and new data would not add much to the emerged theory. For example, analyzing the sixth interview did not add any new information, the seventh interview added very little knowledge that was used to strengthen and support one of categories, however, the eighth interview added knowledge not related directly to the research topic.

Although the first author of this paper had strong subjective evidence that the data were saturated, stopping the collection of further data and leaving the research field was not an easy decision for him without supporting the subjective evidence with an objective one. From his experience in Grounded Theory research and related qualitative methods, the first author found that past practices of compiling different types of field notes is important to reach informed decisions about whether data saturation has been reached. Over two decades ago, Le Navenec (1993) recommended the use of five types of field notes: observational, contact, personal, methodological, and theoretical notes (see Le Navenec, 1993, pp. 76-77). A brief discussion of the type of field note most relevant for this paper --the theoretical notes (TNs), is provided next.

The theoretical notes (TNs) are viewed here as reflective memos, which can be defined as "a continuously flowing written record of ideas and hypotheses about the data" (Powers & Knapp, 1990, p. 63). We have found this strategy to be very useful in making decisions about whether data saturation had been reached. At the same time, memoing may provide additional evidence that can be used to raise the coding categories to a higher theoretical level. Speziale and Carpenter (2011) emphasized that writing memos helps the researcher to discover hypotheses and preserve the analytical format, intuitions, and abstraction of data. Similarly, Glaser (1978) indicated that memoing helps researchers to improve their abstract thinking by focusing on incidents, categories, properties of codes, and the relationship between them, all of which should assist researchers to determine how close or how far they are from achieving data saturation.

Therefore, he (first author of this paper) used memos and field notes to reflect on his experience in collecting and analyzing data, as well as having numerous consultations with expert grounded theorists to guide and support his decision (Aldiabat, 2010). The following are illustrative examples of some of the memos used:

The first memo related to the complexity of the researched topic, quality of collected data, and using triangulation of data collection methods:

> I conducted this study to answer a complicated health, social, psychological, professional, cultural, and economic topic. I spent three months in the field to collect and analyze huge amount of data using in-depth semi-structural interviews, not-participant observation, and socio-grams. Data were collected over three nursing work shifts, weekdays, and weekends. I obtained rich and thick data that helped and fostered the saturation. The rich thick data provided philosophical and contextual knowledge that formed the core category and explained the psychosocial process. I believe the nature of this phenomenon, the data collection method, and quality of the collected data contributed and

partially can be used as an objective evidence for how I reached the data saturation for this research (August 17th, 2009).

The second memo related to researcher's experience in Grounded Theory:

I have ambivalent feelings about the emerged theory and data saturation. I do not know whether I really saturated the data or not yet. What I am confident about it right now is that my good training in Grounded Theory guided me to know from whom, where, how, and when to collect the data. I used observational, personal, contact, methodological, and theoretical field notes while I was in the field to understand the smoking behavior of the participants. I think it is a good idea if I contact my supervisor as an expert in Grounded Theory and qualitative research to confirm with her my results and to seek her help regarding data saturation. I have also to discuss with her the memos I had written during the data analysis. Confirming the results with an expert will enhance the trustworthiness of the study and will guide me in regard to the data saturation (August 21st, 2009).

The third memo related to understanding the philosophical underpinning of Grounded Theory method:

This is my second month in the field and every day I learn something new about Grounded Theory. I have a good feeling that understanding the Grounded Theory, its epistemological, ontological, and methodological beliefs before I collect the data helps me now to decide how and what kind of data I have to collect to understand the reality. However, sometimes I feel confused regarding how to upgrade the second and the fourth categories to a theoretical level… in next interview I will collect extra rich data, I want to know more about how the contextual factors influence their [participants] smoking behavior and I have to focus more on using the constant comparative method wisely (July 11th, 2009).

The fourth two memos related to using a guiding theoretical framework:

Today, I referred to Blumer's book and read more about the advantages of using an imaginary theoretical framework for qualitative researcher, therefore I will keep a copy of this theoretical framework in my pocket. It [theoretical framework] will be helping in emerging the core category, defining other categories, and to save my time and efforts to collect high quality of data within shorter time. It also will help me to know what data I need to collect more and how to collect it. (This framework consists of different sensitizing concepts retrieved from Symbolic interactionism, and imaginary concepts developed by the researcher [speech between brackets is for clarification but it is not a part of memo]) (June 17th, 2009).

I could not imagine that analyzing the fourth interview would produce a pile of data where I found myself sometimes lost. Today, I finished the fourth interview, I feel like the categories are much better defined, and the relationships between the four categories and the core category "contextualizing" is understandable. After finishing analyzing every single interview, I used to take a look over a theoretical framework I had identified

before collecting the data. Using pre-identified theoretical framework helped and guided me in a very good manner for the first three interviews. However, today [after finishing the fourth interview analysis] I feel like the preliminary results of categories and properties started to take a different shape and focus than the theoretical framework and its sensitizing concepts… from now on data will be collected to fully saturate and refine some categories (August 19th, 2009).

Writing memos while conducting Grounded Theory research helped the first author of this paper to emerge a pure saturated and abstracted Grounded Theory that is not related to specific time, place, people, and leaves behind the data it emerged from (Glaser, 2012). Writing memos also helped him (first author) to focus data analysis toward the core category by saturating the categories and properties. It helped also in applying the constant comparative method to find the similarities and differences between categories and answered questions about theoretical saturation.

Conclusion

Reaching data saturation is a mysterious, subjective, non-linear, gradual, and unfixed process in Grounded Theory method. It is well known now that the novice grounded theorists can reach data saturation based on their subjectivity, wisdom, intuition, seeking help and guidance from other expert grounded theorists. In addition to theoretical sampling and constant comparison, there are other six factors facilitate novice grounded theorists to reach data saturation. These factors are: the nature of research question, researcher's experience in qualitative field, triangulation of data collection methods, understanding the philosophical underpinning of research method, using a guiding theoretical framework, and using sensitizing concepts. Sharing research experiences of expert qualitative theorists by providing substantive and concrete examples of their work (e.g., memos, data collection methods, data analysis, etc.) will likely be–helpful for novice grounded theorists. The three factors that hinder novice researchers to reaching data saturation are: conducting Grounded Theory research within a short time, limited budget for conducting the research work, and limited resources; training; and monitoring.

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