Systematic review of grounded theory studies in physiotherapy

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ABSTRACT

Aim: This systematic review aimed at appraising the methodological rigor of grounded theory research published in the field of physiotherapy to assess how the methodology is understood and applied. A secondary aim was to provide research implications drawn from the findings to guide future grounded theory methodology research. ***Methods:*** A systematic search was conducted in MEDLINE, CINHAL, SPORT Discus, Science Direct, PubMed, Scopus and Web of Science to identify studies in the field of physiotherapy that reported using grounded theory methodology and/or methods in the study title and/or abstract. The descriptive characteristics and methodological quality of eligible studies were examined using the assessment guidelines developed by Hutchison, Johnston and Breckon (2011). ***Findings:*** The review included sixty-eight studies conducted between 1998 and 2017. The findings showed that grounded theory methodology is becoming increasingly used by physiotherapy researchers. Thirty-six studies (53%) demonstrated a good understanding and appropriate application of grounded theory methodology. Thirty-two studies (47%) presented descriptive findings and were considered to be of poor methodological quality. ***Conclusions:*** There are several key tenets of grounded theory methodology that are integral to the iterative process of qualitative theorizing and need to be applied throughout all research practices including sampling, data collection and analysis.

KEYWORDS: Grounded theory methodology, physiotherapy, systematic review

BACKGROUND:

Grounded theory methodology is a qualitative methodology that is widely used in physiotherapy research (Mellion and Tovin, 2002). Grounded theory methodology (GTM) is one of the most rigorous methodologies because it provides systematic methods that enable qualitative theorizing about areas where limited or no knowledge exists (Charmaz, 2012). Grounded theory methods are the techniques used to gather and analyse data to generate theories (Bryant and Charmaz, 2007). Grounded theories are theoretical hypotheses rooted in empirical evidence, thus have the analytical ability to explain the phenomena under study.

There are various versions of GTM and each version employs relatively different methods based on its philosophical underpinnings (Morse et al. 2009). Glaserian GTM assumes an objectivist standpoint and an empiricist approach to data collection and analysis to allow the emergence of substantive theories directly from data (Glaser and Kaplan, 1996). Glaser (1998) advocates that researchers begin the inquiry as tabula rasa by suspending their preconceptions and postponing the synthesis of an exhaustive literature review until the analysis is finished; to avoid the development of predetermined rationally-deduced concepts. Glaserian GTM analyses data using substantive and theoretical coding techniques that are guided by many coding genera to produce formal, parsimonious theories with the power to explain similar situations (Glaser, 2003).

Straussian GTM draws on symbolic interactionism and is said to be more interpretative than Glaserian GTM because it recognizes the subjective nature of qualitative theorizing whereby researchers interpret data through their own worldview (Annells, 1996). Straussian GTM employs open, axial and selective coding to break-

up data before regrouping it into the building blocks of theory. Corbin and Strauss (2008) argue for adherence to the prescribed coding procedures to limit researcher bias; which might reflect a return to positivism or critical realism rather than interpretivism (Warburton, 2005). Still, Straussian GTM is criticized for forcing fractured data into categories that are distorted by researcher bias, while Glaserian GTM is critiqued for its inclination towards naïve realism which assumes that true theories can emerge separate from people's perceptions (Suddaby, 2006).

Constructivist GTM addresses the 'emergence vs forcing' debate by suggesting that grounded theories are neither emergent nor discovered (Charmaz, 2000). Charmaz (2006) explains that grounded theories are mutually developed between participants and researchers through interactions and negotiations that are always influenced by each person's experiences. Charmaz (2012) recommends fluid coding procedures (open and focused coding) to allow a progressive and reflective analysis where researchers are also participants and vice-versa. Theories developed using constructivist GTM cannot be generalized because people's views, experiences and ways of reflecting on these experiences tend to vary; although inferences can be critically drawn to provide insight into comparable research problems (Thornberg and Charmaz, 2014).

Hutchison, Johnston and Breckon (2011) argue that despite the philosophical departures between versions of GTM, there are multiple methodological consistencies. They reviewed the procedures described by Glaser and Strauss (1967), Glaser (1978), Strauss and Corbin (1998) and Charmaz (2006) and identified key grounded theory methods which are considered tenets of GTM, thus integral to valid theory development. These tenets are: 1) synchronous data collection and analysis, 2) systematic coding procedures 3) the constant comparative method, 4)

memo-writing, 5) theoretical sampling and 6) integration of the generated theoretical framework within pre-existing literature.

Synchronous data collection and analysis is a main tenet of GTM (Glaser, 1998). Data collection can begin with exploring sensitising constructs developed from previous literature or areas of interest specific to the research objectives (McCann and Clark, 2003). Data analysis is conducted early in the research to identify new concepts from the data that become the focus of subsequent data collection (Bryant, 2002). Systematic coding procedures of at least two steps of preliminary and higher-order coding are the link between collecting data and building a theory to interpret the data (Charmaz, 2008). The progressive development of abstract theories is facilitated by the constant comparative method which involves cycles of comparing data with data, data with codes and categories and categories with categories (Clarke, 2005). Memos are analytical notes used to question and clarify different aspects of the data to inform theoretical sampling (Corbin and Strauss, 2008).

Theoretical sampling ensures that data collection is aimed at theory generation by utilizing the ideas developed during the initial phases of analysis to determine the characteristics of subsequent participants and the focus of data collection (Charmaz, 2008).Thus, sampling, data collection and analysis are a cycle in GTM which continues until no new dimensions of the categories emerge (Breckenridge and Jones, 2009). This is known as theoretical saturation and the point at which sampling and data collection end (Bowen, 2008). The final analytical step is to review pertinent literature to identify how and where the developed theory compares with pre-existing knowledge (Strauss and Corbin, 1998).

Hutchison, Johnston and Breckon (2011) developed a list of questions reflecting the tenets/key methods of GTM which they used to evaluate the methodological quality of different GTM research in exercise psychology. The results of their review supported previous concerns reported by Annells (1996) which suggested that the variations between its versions caused GTM to be misunderstood and applied in multiple ways that are inconsistent with the fundamental tenets of the methodology. Consequently, the degree to which many GTM research offered informative grounded theories has been questioned (Stern, 1994). Within physiotherapy research, Mellion and Tovin (2002) raised similar concerns and called for greater adherence to the fundamental tenets of GTM to aid qualitative theorizing and improve research rigor. The aim of this systematic review was to critically appraise GTM research in physiotherapy, to understand how the methodology was used and to produce recommendations for future GTM applications.

METHODS:

A systematic search was conducted in MEDLINE, CINHAL, SPORT Discus, Science Direct, PubMed, Scopus and Web of Science. Databases were searched from their commencement until November 2017 without restrictions. The search used citation pearl-growing technique (Booth, 2008). Initially, the terms (Physical therap* OR physiotherap*) AND (grounded theory) were used to retrieve relevant studies. The index terms and free text terms of relevant studies were examined to continuously identify and include additional search terms to expand subsequent search processes.

The final search used the following terms linked through Boolean logic: (Physical therap* OR physiotherap*) AND (rehabilitation OR management OR education OR

perceptions OR experiences) AND (Grounded theory). The search was conducted by one researcher (NA) and peer-reviewed by another (KG).

Retrieved articles were screened on title and abstract to exclude duplicates and were checked for eligibility by NA. The inclusion criteria were 1) Peer-reviewed qualitative or mixed methods studies that reported using grounded theory methodology and/or methods in the title and/or abstract. 2) Studies conducted in the field of physiotherapy where at least one author is a physiotherapist or study participants included physiotherapists or physiotherapy students, educators or researchers, or patients or carers of patients receiving physiotherapy. Grounded theory methodology studies conducted in other health disciplines were excluded. The bibliographies of eligible articles were hand-searched to identify additional studies. Figure 1 shows the study filtration processes to summarize how a total of 68 studies were included in this review.

The descriptive characteristics of all 68 studies were extracted using a data extraction form adapted by NA from pertinent literature (Chiovitti and Piran, 2003; Dixon-woods et al. 2006, Urqhart, Lehmann and Myers, 2010) and reviewed by SM and KG. The form and the extracted descriptive characteristics of studies are presented in Table 2.

The methodological strategies followed by each study were extracted and appraised using the quality assessment guideline for GTM developed by Hutchison, Johnston and Breckon (2011). The full guideline is in table 1. This guideline was considered most suitable for the aim of this systematic review because it was specific to GTM

and included questions about study aims, theoretical framework, methodological procedures and findings, thus was deemed thorough.

The methodological appraisal of the studies included in this review was independently conducted by NA and KG to reduce potential bias. For each study, all the tenets of GTM included in the assessment guideline were rated as (Yes= 1 or No= 0) and an overall score was calculated by adding positive scores. Cohen's Kappa was used to measure the inter-rater agreement between the two authors; NA and KG (Fleiss and Cohen, 1973). High levels of inter-rater agreement were calculated resulting in a Cohen's Kappa of 0.89, $p< 0.0001$ which is excellent agreement (Landis and Koch, 1977).

Although the overall agreement was excellent, moderate agreement (Cohen's Kappa 0.507 $p< 0.001$) was calculated for only one item which is whether integration of the theoretical framework within pre-exiting literature was conducted or not. Details on the application of this tenet of GTM was often limited in many of the reviewed studies, perhaps due to word-count restrictions on journal articles, which hindered the authors' ability to agree on whether this tenet were overlooked or under-reported. To resolve disagreements, the authors re-visited the literature on GTM to identify and agree on the minimal amount of information needed as evidence to support the application of this methodological tenet. Presentation of literature within the analysis was considered evidence of integrating the theoretical framework within pre-exiting literature. After several meetings the authors agreed on the methodological quality of all studies, despite the problem of inadequate reporting.

To ensure that the overall quality of each study was captured, the authors also discussed the methodological procedures reported by each study in relation to

debates around the criticality required to assess the trustworthiness of qualitative research (Atkinson, 1995). It is debated that adherence to a prescriptive checklist can be misleading because it can overlook or oversimplify the reflexivity and artistry involved in the production of situated and perspectival knowledge using qualitative research (Emden and Sandelowski, 1999). Therefore, the authors used the questions proposed by Hutchison, Johnston and Breckon (2011) as a flexible guideline to facilitate the extraction and synthesis of information from studies and to encourage discussions between the authors. The methodology of each study was discussed in relation to the philosophical lens through which the study was conducted and the extent to which the researchers' role was reported on; in order to capture the reflexivity involved in qualitative research.

FINDINGS:

Descriptive Characteristics of the studies:

There were 68 studies included in this systematic review. Table 2 summarises the descriptive characteristics of the studies. The studies were conducted in 14 countries between 1998 and 2017. Twenty-seven studies (40%) gave no justification for selecting GTM. Forty-one studies (60%) justified using GTM because it enabled for systematic analysis. Twenty-nine studies (43%) reported that GTM was used only to analyse data. Thirty-nine studies (57%) stated that GTM was the methodology followed throughout data collection and analysis to generate hypotheses.

Thirteen studies (19%) mentioned several types of GTM without specifying which version was followed. Nine studies (13%) did not provide any citations on GTM. Four studies (6%) used their own modified approach of GTM that did not include synchronous data collection and analysis and/or theoretical sampling.

The number of participants included in the studies ranged between 2 and 129 participants. Forty-seven studies (69%) employed one method of data collection. Seventeen studies (25%) combined two data collection methods and four studies (6%) used three methods to gather information. Individual semi-structured interviews were the most commonly used method of data collection employed by 54 studies (79%) whether alone or with other methods.

Nineteen studies (28%) reported on their philosophical framework and epistemological underpinnings; while fifteen studies (22%) discussed the impact of the researchers' subjectivity on the quality of the study.

Methodological quality of the studies:

The extent to which different tenets of GTM were applied varied between studies. Five studies (7%) were adherent to all six tenets of GTM, ten studies (15%) reported using five tenets and twenty studies (29%) followed four tenets of GTM. Fourteen studies (21%) applied three tenets of GTM, nine studies (13%) followed two tenets, and four studies (6%) applied one tenet of GTM, while six studies (9%) did not provide evidence to suggest that any aspect of GTM was used.

Moderate to good quality studies (n=35, 51%) reported on applying six to four tenets of GTM and discussed how the resultant theories were developed. Poor quality studies (n=33, 49%) employed three to none of the tenets of GTM and gave limited evidence to show that abstract theorization was conducted and/or core categories were identified; instead their findings were mostly synthesized using descriptive themes. The methodological quality of the reviewed studies is detailed below and summarized in tables 3 and 4.

Did sampling follow the strategies of GTM?

Forty-seven studies (69%) reported that data collection and analysis occurred synchronously. Twelve studies (18%) did not report on the initial sampling methods used to recruit participants. Fifty-six studies (82%) initially used convenience, purposive or maximum variation sampling techniques. In fifty-two (76%) studies sampling progressed using purposive, maximum variation and snow-ball sampling, while sixteen studies (24%) reported that recruitment continued using theoretical sampling. Out of the fifty-two studies (76%) that did not use theoretical sampling, one study (1%) explained that theoretical sampling could not be used due to time constraints.

How were the initial concepts developed?

Eighteen studies (26%) did not discuss coding procedures at all. Fifty studies (74%) reported formulating initial concepts using open or initial coding. The amount of details provided about initial codes differed between studies, whereas most studies (n= 34, 50%) did describe the nature, number and relevance of preliminary codes and concepts. Sixteen studies (24%) reported some or all of the initial codes which were identified through line by line coding of related ideas, actions or processes and were compared to one another and new data to form initial concepts. Twenty-four studies (35%) used qualitative data analysis software in addition to manual coding. The most commonly used software was Nvivo (n= 12, 18%), followed by ethnograph (n= 3, 4%), OpenCode (n= 2, 3%), MAX Qda2 (n= 2, 3%) and QRS-NUDist (n= 2, 3%) and Microsoft excel (n= 2, 3%), while ATCAS was used by one study (1%).

How did theoretical development continue after the identification of initial concepts?

Fifty-three studies (78%) reported that theoretical development was advanced using the constant comparison method to compare different aspects of data and group similar codes together into categories. Fifty studies (74%) stated to have used systematic coding procedures, including focused, axial, substantive, selective or theoretical coding, to generate higher-order codes and abstract categories. Seventeen studies (25%) presented elaborate tables to explain how open codes were developed into focused codes, subcategories and categories. Twenty-nine studies (43%) reported writing analytical memos throughout the analysis to explore dimensions of the constructed categories. Twelve studies (18%) used reflective memos to identify possible biases and reflect on the researchers' interpretations of data.

What was the outcome of the research and how was it finally constructed?

Thirty-eight studies (56%) reported reaching saturation. Four studies (6%) stated that saturation might not have been achieved in all categories and the decision to stop collecting and analysing data was unjustified. Twenty-six studies (38%) did not report on saturation.

Forty-seven studies (69%) reported on the final analytical processes which included refinement of the analysis through respondent validation, peer reviewing and consulting relevant literature. Eighteen studies (26%) used peer reviewing where the authors analysed data independently and then discussed the coding schemes until consensus was reached. Two studies (3%) employed respondent validation to ensure that participants found the findings meaningful and comprehensive. Twenty-

seven studies (40%) used both peer reviewing and respondent validation to fine-tune the constructed categories. Thirty studies (44%) reviewed the literature to consider how their findings related to existing knowledge and integrated literature into the analysis presentation.

Forty-five studies (66%) provided diagrams of their main findings. The findings of thirty-three studies (49%) were presented using descriptive narratives or themes and none of these studies justified how the final themes were chosen. Twelve such studies (18%) used diagrams to summarize some of their findings, but the diagrams reflected simple, linear or incomplete analyses hence the relations between major themes were not sufficiently discussed. Six studies (9%) acknowledged that the outcome of their research cannot be considered a theory but rather a thick description of data.

The findings of thirty-five studies (51%) were conceptualised in the form of theoretical hypotheses consisting of sub-categories, categories and abstract core categories. Core categories were selected on basis of data frequency and analytic power which referred to the ability of a category to explain central processes and concepts in data whilst linking to other categories. Thirty-three such studies (49%) supplemented their findings with diagrams that illustrated the complex relationships between different levels of the analysis. Two studies (3%) did not use diagrams; but the findings and discussion sections of these studies provided evidence of abstract theorization whereby the complexities, similarities and differences within data were made explicate.

DISCUSSION:

This systematic review evaluated the methodological quality of GTM research in physiotherapy. The findings showed that GTM is a useful methodology that is often utilized to study a wide range of topics relevant to the education, organization and practice of physiotherapy. The findings of this review suggested that whenever multiple tenets/methods of GTM were not present, the capacity of the inquiry to move from description to abstract theorizing was limited. This argument agrees with previous findings by Huchison, Johnston and Breckon (2011) who conducted a critical review of GTM research in exercise psychology. Their findings and ours showed that the iterative collection and systematic coding of data as guided by theoretical sampling were integral to the process of meaningful theorization and were usually underutilized and/or underreported.

Most GTM research in physiotherapy and exercise psychology reported to have collected and analysed data simultaneously. However, most studies used predetermined purposive or convenience sampling where sources of data, participants' characteristics and interview questions were mostly pre-set. Only sixteen studies (24%) in this review and nine studies (43%) in Huchison, Johnston and Breckon's (2011) review reported using theoretical sampling. Theoretical sampling requires researchers to ask increasingly focused questions about how and why certain actions are taking place and to seek the most appropriate sources and methods of subsequent data collection to answer these questions (Morse et al. 2009). Thus, it is one of the techniques needed to uncover the underlying structural conditions that shape observed actions (Clarke, 2003).

The absence of theoretical sampling weakens the link between data collection and analysis because the inquiry becomes inadequately informed by knowledge generated from data itself (McCann and Clark, 2003). Therefore, data collection and analysis in many GTM research in both reviews were judged as linear and inconsistent with the synchronous and in-depth exploration of unfolding concepts through theoretical sampling (Draucker, Martsolf, Ross and Rusk, 2007). Consequently, many studies could not advance the analysis beyond describing immediate patterns of action and events appearing repetitively in data.

Systematic coding procedures, writing memos, the constant comparative method and diagramming are analytical techniques of GTM used to identify information gaps that can be theoretically sampled (Corbin, 1986). Most studies in this review (n= 62, 91%) reported using at least one of these techniques. Yet, only thirty-five studies (51%) studies presented cyclic analytical processes that continued to identify and include new concepts after open coding.

Conducting an analysis that is open to possibilities is imperative to capture the evolving picture of the phenomena being studied (Birks and Mills, 2015). To achieve this goal, thirty-five studies (51%) described how initial and higher-order coding was used in combination with comparing data to codes and categories, to question the analysis at every stage of development. These studies were able to modify the data collection questions to gather specific information that would satisfy, test and/or refine the properties of emerging categories. A discussion of these methodological procedures was considered evidence of iterative theoretical development that was grounded in empirical data.

To facilitate theoretical development, researchers write memos about the emerging analysis. This review showed that memos were another underutilized tenet of GTM reported by twenty-nine studies (43%). Memos can explore the relationships between different concepts or identify constructs that can be further pursued (Bryant and Charmaz, 2007). Thus, analytical memos are rich in information that can direct theoretical sampling and provide a record of the analysis. Moreover, researchers are advised to write reflective memos on their biases and impact on the analysis (Clarke and Charmaz, 2014). Twelve studies (18%) reported using reflective memos and explained how and why researchers made different analytical decisions; which increased confidence in the credibility of their findings.

Overall, thirty-five studies (51%) demonstrated evidence of progressively refined approaches to theory building with examples of increasingly focused questions that targeted new information to explore different properties of categories. There also was evidence of systematically comparing categories against new data and the generated theories provided sufficient explanatory power. These studies were of good to moderate methodological quality and gave detailed accounts of the research procedures used to develop theoretically-dense conceptual frameworks.

Thirty-three studies (49%) showed limited understanding of GTM given that the synchronous data collection and analysis processes and theoretical sampling were usually overlooked. Additionally, it was not clear if systematic coding and comparisons were performed throughout the analysis and/or how these techniques were applied. These studies demonstrated little or no indication of theoretical development as evident through their findings which provided descriptive and under-theorized themes.

LIMITATIONS:

This systematic review adopted citation pearl-growing search strategy to identify studies that stated in the title and/or abstract that GTM or methods were used. The search term 'grounded theory' was not searched for throughout the full-text of studies which may be a limitation of the search strategy and inclusion criteria employed in this review. However, the authors piloted an alternative search where the term 'grounded theory' was applied to full-text, and found that most studies which mentioned GTM outside the abstract reported applying a different methodology, thus were not GTM-based studies. This increased confidence in the adopted search strategy hence the majority of relevant studies were retrieved and included.

Another possible limitation of the current review relates to publication bias because grey literature which refers to unpublished studies, dissertations and articles published in non-peer reviewed journals, were beyond the scope of this review. Dickersin (1990) suggested that studies with inconclusive findings or results that refute what is generally known about a certain topic are less likely to be published. Relying on published articles can be more consequential for reviews that draw clinical implications from existing findings, rather than reviews focusing on methodological quality assessment. Thus, publication bias was considered of limited effect on the quality of this review.

CONCLUSIONS:

The findings of this review can offer several implications for GTM research in physiotherapy and other disciplines. One of the main problems that undermined the rigor of some of the reviewed studies was that multiple versions of GTM were used. This problem manifested itself in a state of methodological incoherence whereby

methods seemed to be mixed and matched. For example, some studies collected data using interpretative methods (e.g. unstructured interviews) to effectively capture the experience of each participant, but analysed data through a positivist lens that normalized participants' experiences by describing contradictory views as negative cases. Such methodological incoherence might have prevented the analysis from progressing beyond the concrete level of describing information because the abstract level of exploring, explaining and theorizing variations within data was not present.

As some studies used multiple versions of GTM, the researchers' role was usually overlooked. This could be a factor of swaying between conflicting epistemological positions hence Glaserian GTM requires researchers to be neutral while Straussian and constructivist GTM demand more visibility to justify how the analysis was subjectively constructed (Hall and Callery, 2001). The tug between these epistemological positions may be difficult to resolve once researchers are immersed within data. It is recommended that researchers plan before fieldwork by considering their frame of reference and position in relation to the study before selecting a particular version of GTM. That is not to say that the researcher's perceptions and ways through which they negotiate their subjectivity should not change while interacting with participants and data. However, reflection cannot be effectively achieved without an initial critical realization of one's own stance.

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Appendix 1:

Table 1: Quality assessment guideline (cited in Hutchison, Johnston and Breckon, 2011)

Is grounded theory an appropriate methodology for this research? - Was a justification presented for adopting a grounded theory approach? If so what was it? - How was grounded theory defined? (e.g., as a research methodology or simply a data analysis tool?)
Was sampling conducted in accordance with the tenets of grounded theory? - What evidence is there to suggest that sampling was conducted to facilitate theory generation? - How was the initial sample selected? On what grounds? - Did theoretical formulations guide some of the data collection, if so how? - Based on the answers to the above two questions did theoretical sampling occur? - Is there evidence of concurrent involvement in data collection and analysis?
How were the initial concepts and categories developed? - What initial concepts and categories were presented? - What techniques were used to construct or develop these categories (coding, memo writing, comparisons, questioning, use of attributes, etc.)? - What evidence is there to suggest that these concepts or categories were generated from the data itself and not from pre-conceived logically deduced hypotheses? - Do the initial categories cover a wide range of empirical observations, was the initial focus broad?
How did theoretical development continue after the initial concept identification? - How did theory development advance during each step of data collection and analysis? - What major categories were presented? - What techniques were used to construct or develop these categories (e.g., axial or focused coding, systematic comparisons, questioning)? - What evidence is there to suggest that the constant comparison method was used? That is, were systematic comparisons made between observations and between categories? - Are the categories theoretically dense? Are there clear links between individual categories and subcategories as well as between individual categories and the larger core category? Have the dimensions of categories and subcategories been explored?
What was the end product of this research and how was it finally constructed? - How and why was the core category selected? On what grounds were the final analytical decisions made? - What evidence is there to suggest that the study achieved theoretical saturation? - What conclusions were drawn? - What evidence is there to suggest that the results offer new insight into the studied phenomenon?

Figure 1: Study filtration processes

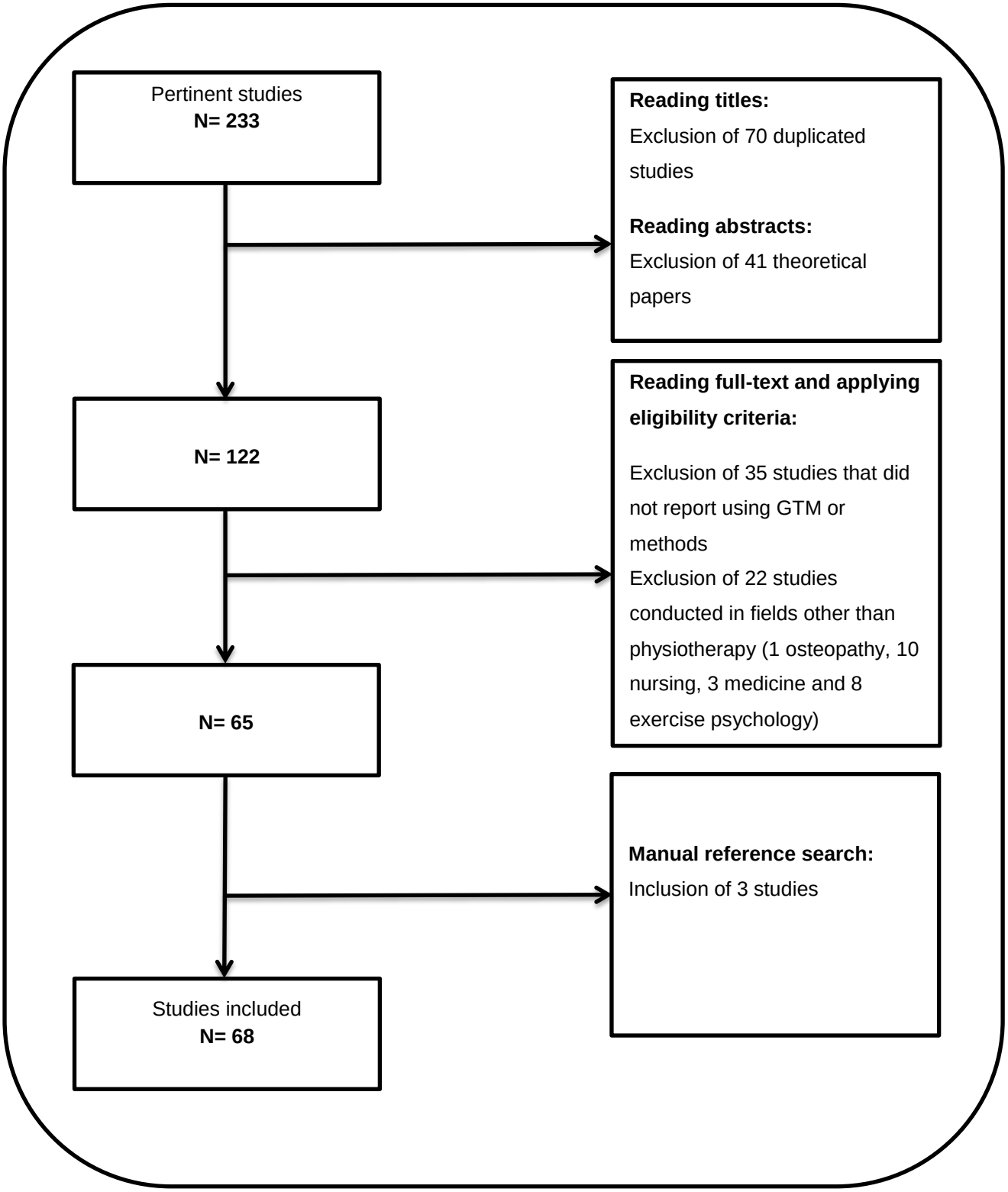

Table 2: Details of study descriptive characteristics

Author(s) & publication year	Country	Aims of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Ohman and Hagg (1998)	Sweden	Explore the attitudes of novice physiotherapists towards their professional role	Individual semi-structured interviews with 8 novice physiotherapists	Glaser and Strauss (1967)	No	'The analysis used grounded theory method of constant comparison'	Yes	No
Albert (1999)	Denmark	A mixed methods study design was used to evaluate group physiotherapy treatment for women with psychosomatic pelvic pain	53 women filled questionnaires to describe their experiences with physiotherapy for psychosomatic pelvic pain and therapy effectiveness. The questionnaire also included open-ended questions to facilitate the gathering of participants' perceptions.	Strauss and Corbin (1990)	No	'The women's descriptions of physiotherapy treatment were analysed according to the grounded theory method'.	No	No
Ohman, Hagg and Dahlgren (1999)	Sweden	Explore professional development and perceptions of the physiotherapy profession from the views of female physiotherapy educators	4 physiotherapists and 4 occupational therapists undertook individual semi-structured interviews	Glaser and Strauss (1967)	No	'The analysis was carried out through GT method of constant comparison'	Yes	Yes
Jensen, Gwyer Shepard and Hack (2000)	USA	Identify the dimensions of expert practice in physiotherapy	12 expert physiotherapists in the fields of geriatrics, neurology, orthopaedics and paediatrics were interviewed using semi-structured interviews. 36 treatment sessions were video recorded and analysed	Strauss and Corbin (1994)	Yes	Guided by a grounded theory approach, a multiple case study research design was used'	No	No
Mackey and Sparling (2000)	USA	A single case study design was used to understand the needs of older women with cancer in relation to physiotherapy as a form of palliative treatment	3 older women with different types of cancer participated in individual unstructured interviews	Strauss and Corbin (1990)	Yes	'The analysis was conducted by grounded theory techniques of coding'.	No	No
Stephenson and Wiles (2000)	UK	Explore patients' views and perceptions of a home-delivered therapy service.	Semi-structured interviews were undertaken with 10 men and 5 women who have had at least 3 sessions of home physiotherapy	Multiple Glaser and Strauss (1967) & Strauss and Corbin (1990)	No	'This study used a grounded theory approach in which a thematic analysis was conducted on transcripts' .	No	No
Stiller (2000)	USA	Describe the evolution of the physiotherapy profession in the USA and develop a conceptual framework to understand how professional ethos evolves.	Individual semi-structured interviews and focus groups were conducted with 13 physiotherapists and documents related to the history of physiotherapy in the USA were also analysed.	Glaser and Strauss (1967)	No	'A qualitative data analysis was conducted using the constant comparative method and grounded theory'	No	No
Trede (2000)	Australia	Explore physiotherapists approaches to educating patients with low back pain and identify what patients expect to learn	8 physiotherapists and 8 patients with low back pain were interviewed using individual semi-structured interviews	N/A	No	This qualitative study employed grounded theory and aimed to generate hypothesis'	No	No

GTM: Grounded theory methodology. N/A: Not Available. USA: United States of America. UK: United Kingdom

Author(s) & publication year	Country	Aims of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Jette, Grover and Keck (2003)	USA	Understand the decision making processes of physiotherapists and occupational therapists when recommending discharge destinations for patients after acute hospitalization.	Unstructured interviews with 7 physiotherapists and 2 occupational therapists	Glaser (1992)	Yes	To develop an explanatory theory	No	No
Milligan (2003)	UK	Explore how orthopaedic registrars perceive the role of extended scope physiotherapists	Semi-structured interviews were conducted with 10 orthopaedic registers within the NHS	Multiple (Glaser and Strauss, 1967; Strauss and Corbin, 1998)	Yes	To generate theory	No	No
Edwards et al. (2004)	Australia	Understand the clinical reasoning strategies of expert physiotherapists	12 expert physiotherapists were interviewed using semi-structured and unstructured interviews and their practice was observed over 79 treatment sessions	Strauss and Corbin (1994)	Yes	'Grounded theory was used within case study design'	No	No
Ekerholt and Bergland (2004)	Norway	Understand patients' perceptions of body assessment undertaken in psychomotor physiotherapy	10 patients (1 man and 9 women) who were receiving massage as a part of physiotherapy for different psychomotor problems, participated in semi-structured interviews	Corbin and Strauss (1996)	No	'The data were analysed with the aid of grounded theory'	No	No
Heine, Koch and Goldie (2004)	Australia	Explore the perceptions of discharge readiness of people who had undergone a total hip replacement.	In-depth unstructured interviews were conducted with 5 patients after undergoing total hip replacement	Strauss and Corbin (1990 and 1998)	No	Grounded theory methodology was used to analyse the data	No	No
Johansson and Fjellman-Wiklund (2005)	Sweden	Understand body awareness from the perspectives of patients who are on mechanical ventilation	15 individual semi-structured interviews with 7 persons on mechanical ventilation were conducted	Glaser and Strauss (1967)	Yes	'The analysis was conducted using grounded theory method of constant comparison'.	No	No
Miller, Solomon, Giacomini and Abelson (2005)	Canada	Understand the experiences of novice physiotherapists practicing in acute care settings	10 female, novice physiotherapists took part in semi-structured interviews and focus groups	Strauss and Corbin (1998)	Yes	'A grounded theory approach was used to systematically collect and analyse data'	No	No
Piegorsch et al. (2005)	USA	Understand how physiotherapists and industrial engineering make decisions regarding ergonomic interventions to prevent and control low back pain	Individual semi-structured interviews with 12 industrial engineering and 9 physiotherapists	Multiple (Glaser and Strauss, 1967; Strauss and Corbin, 1998; Strauss, 1987)	Yes	To generate a conceptual framework	No	No
Reynolds (2005)	USA	Explore the outcomes and benefits that students can develop through service learning education	85 physical therapy graduates provided their final year reflection papers to be analysed. Quantitative data was also collected from one class using the physical therapy clinical performance instrument	Glaser and Strauss (1967), Glaser (1978 and 1992). Strauss (1987), Strauss and Corbin (1990 and 1998)	Yes	'Grounded theory methodology was applied to the development and analysis of the study'	Yes	Yes
Solomon and Miller (2005)	Canada	Understand the experience of novice physiotherapists who practice in the private sector	10 novice physiotherapists took part in semi-structured telephone interviews	Strauss and Corbin (1998)	Yes	'The study used a grounded theory design'	No	No

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Author(s) & publication year	Country	Aims of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Solomon and Miller (2005)	Canada	Understand the experience of novice physiotherapists who practice in the private sector	10 novice physiotherapists took part in semi-structured telephone interviews	Strauss and Corbin (1998)	Yes	'The study used a grounded theory design'	No	No
Ekerholt and Bergland (2006)	Norway	Understand patients' experiences of massage in psychomotor physiotherapy	10 patients (1 man and 9 women) who were receiving massage as a part of physiotherapy for different psychomotor problems, participated in semi-structured interviews	Strauss and Corbin (1996)	No	'The data were analysed with the aid of grounded theory'.	Yes	No
Slingsby (2006)	Japan	Understand how Japanese healthcare providers approach stroke rehabilitation and explore the perceptions of service users	55 stroke professionals, 48 patients and 26 carers were interviewed using unstructured and semi-structured interviews	Glaser and Strauss (1967)	No	'This qualitative study was based on a grounded theory approach'.	No	No
Booth and Kendall (2007)	Australia	Explore the benefits and challenges in providing transitional care for patients with spinal cord injury	Analysis of policy documents and service records of 40 patients who participated in transitional care for spinal cord injuries and records of 29 patients who did not participate in the program	Multiple versions were referenced Glaser and Strauss (1967) and Strauss and Corbin (1998)	Yes	'Grounded theory methods were used to collect and analyse multiple data sources using theoretical sampling, simultaneous data collection and analysis and constant comparison.'	No	No
McGlynn and Cott (2007)	Canada	Explore the process by which neurological physiotherapists make clinical decisions	2 neurological physiotherapists participated in semi-structured interviews	Symbolic interactionist grounded theory (Strauss and Corbin, 1998)	Yes	'A qualitative methodology using a grounded theory approach'	Yes	No
Ekerholt and Bergland (2008)	Norway	Explore patients' experience of breathing during psychomotor physiotherapy treatment sessions	10 patients (1 man and 9 women) who were receiving massage as a part of physiotherapy for different psychomotor problems, participated in semi-structured interviews	Strauss and Corbin (1996)	No	'The data were analysed with the aid of grounded theory'.	No	No
Hall et al. (2008)	Canada	Explore the physical and psychological aspects of living in knee osteoarthritis and identify patients' opinions on total knee arthroplasty	15 patients waiting for knee arthroplasty were interviewed using in-depth semi-structured interviews	The authors' modified approach was guided by (Charmaz, 1990; Glaser, 1987; Strauss and Corbin, 1990)	No	A modified grounded theory approach was used to analyse the interview data'.	No	No
Lee et al. (2008)	China	Identify the factors that influence patient satisfaction with physiotherapy for nasopharyngeal carcinoma	32 patients receiving physiotherapy for nasopharyngeal carcinoma participated in individual semi-structured interviews	N/A	No	'Data collection and analysis used a grounded theory approach'.	No	No
Redmond and Parrish (2008)	UK	Identify the factors which influence adherence to physiotherapy amongst young adults with cerebral palsy	26 young adults with cerebral palsy were involved in the study. Data collection used focus groups and follow up interviews.	Multiple (Glaser 1992 and Strauss and Corbin 1990)	Yes	'The study utilized Glaser's and Strauss' approaches to generate a theory about adherence to physiotherapy'.	No	No

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Author(s) & publication year	Country	Aims of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Galvin, Cusack and Stokes (2009)	Ireland	Explore the experience of inpatient post-stroke physiotherapy from the perspectives of patients and physiotherapists	10 people with stroke were individually interviewed and 10 physiotherapists participated in 1 focus group	N/A	No	Transcripts were analysed using the grounded theory approach'.	No	No
Hannes et al. (2009)	Belgium	Identify the obstacles that physiotherapists face upon applying evidence-based practice	43 physiotherapists participated in 5 focus groups	Strauss and Corbin (1997)	No	'Data collection and analysis were guided by a grounded theory approach'	No	No
McGinnis et al. (2009)	USA	Identify the factors that influence physiotherapists' choice of a balance assessment measure	11 physiotherapists from in and outpatient settings participated in individual semi-structured interviews	N/A	No	'A qualitative design using a grounded theory approach was chosen'.	No	No
Pechak and Thompson (2009)	USA	Develop a model of optimal international service learning in physiotherapy	Phone interviews with 14 faculty members and analysis of documents pertaining to the development and content of 5 ISL physiotherapy programs	Strauss and Corbin (1994)	Yes	'A descriptive study where data was analysed using grounded theory methods'	No	No
Rindflesch (2009)	USA	Delineate the practice of patient education from the perspectives of physiotherapists	9 physiotherapists working in outpatient, inpatient and acute care setting participated in a focus group. Data from the focus group was compared to observations of the practice of the same group of physiotherapists	Multiple (Charmaz 2000, Glaser and Strauss 1967, Strauss and Corbin 1990)	Yes	'A qualitative grounded theory methodology was used'	No	Yes
Slade, Molloy and Keating (2009)	Australia	Understand the experience of people receiving an exercise program for chronic low back pain	Three focus groups were conducted with 18 participants who participated in an exercise programs for chronic low back pain	Strauss and Corbin (1998)	No	To analyse data	No	No
Blaney et al. (2010)	UK	Explore the barriers to and facilitators of exercise among patients with cancer-related fatigue	Five focus groups were conducted with 26 patients who were diagnosed with cancer	Strauss and Corbin (1998)	No	To analyse data	No	No
Mok et al. (2010)	China	Explore phenomenon of existential distress in patients with advanced cancer from the perspectives of healthcare professionals.	Data was collected using focus groups with 23 healthcare professionals including physiotherapists, occupational therapists, nurses, physicians and social workers	Multiple versions of grounded theory methodology were cited (Charmaz; 2006, Strauss and Corbin, 1998)	Yes	To develop a theory that explains participants' understandings	No	No
Olofsson, Fjellman-Wiklund and Soderman (2010)	Sweden	Explore the experiences of anterior cruciate ligament injury, rehabilitation and recovery from the perceptions of athletes	7 athletes who underwent anterior cruciate ligament reconstruction surgery participated in semi-structured interviews	Multiple Glaser and Strauss (1967) and Strauss and Corbin (1990)	No	The study used a qualitative approach with grounded theory method of constant comparison to analyse the data'.	No	No
Pechak and Thompson (2010)	USA	Analyse the similarities between international service-learning programs in physiotherapy education	Semi-structured phone interviews with 14 faculty members and analysis of documents pertaining to the development and content of 5 physiotherapy programs	Strauss and Corbin (1994)	Yes	'A descriptive study where data was analysed using grounded theory methods'	No	No
Wainwright, Shepard, Harman and Stephens (2010)	USA	Compare novice and expert physiotherapists use of reflection to guide decision making	3 expert physiotherapists and 3 novice therapists participated in the study. Data was collected using semi-structured individual interviews, video recording of treatment sessions and analysis of participants' resume	N/A	No	'Qualitative methods using grounded theory, within the philosophy of phenomenology, were used'	No	Yes

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Author(s) & publication year	Country	Aim of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Buccieri, Pivko and Olzenak (2011)	USA	Pilot study to understand how physiotherapists develop the skills needed to become clinical educators	3 physiotherapy clinical educators were interviewed individually using semi-structured interviews	N/A	No	'The interviews were coded using a grounded theory approach'	Yes	No
Masley et al. (2011)	USA	Explore American physiotherapists' understanding of their professional role and the clinical reasoning processes they use in practice	18 physiotherapists working in 3 different academic centres participated in semi-structured interviews	N/A	Yes	Qualitative research methods with a grounded theory approach were used'.	No	No
Medina-Mirapeix et al. (2011)	Spain	Explore patients' experiences of outpatient rehabilitation of acute musculoskeletal injuries	57 adults involved in outpatient rehabilitation for various musculoskeletal injuries, participated in 9 focus groups	The authors' modified approach of Corbin and Strauss (2008)	No	"Data was analysed using a modified grounded theory including coding methods and constant comparison but without the theory building component'	No	No
Middle-Brook and Mackenzie (2011)	Australia	Describe the processes through which physiotherapists and occupational therapists select falls prevention interventions for older patients	4 physiotherapists and 4 occupational therapists undertook individual semi-structured interviews	Strauss and Corbin (1990)	Yes	'A qualitative study using a GTM approach'	No	No
Ohman, Astrom and Malgren-Olsson (2011)	Sweden	Describe the experience of people with neck and shoulder pain who participated in a FeldenKrais group therapy program	Data was collected from 13 women using reflective diaries and individual thematic interviews	Multiple (Glaser and Strauss, 1967, Corbin and Strauss, 1990; Charmaz, 2006; Clarke, 2005).	Yes	Data were analysed in accordance with the grounded theory method of constant comparisons.	Yes	Yes
Petty, Scholes and Ellis (2011)	UK	Explore the learning of physiotherapy master of science students	Twenty- six semi-structured interviews with 11 alumni of masters courses in the UK. The interviews were conducted either face to face or via phone	Dimensional analysis (Bowers and Schatzman, 2009; Schatzman, 2001)	Yes	To develop a substantive theory	Yes	Yes
Thomson and Hilton (2011)	UK	Evaluate students' perceptions on a physiotherapy college-based programme	37 physiotherapy students participated in 7 individual interviews and 3 focus groups	Strauss and Corbin (1998)	Yes	'Grounded theory methodology was selected to conduct this research and develop theory that is grounded in data'	No	No

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Wainwright, Shepard, Harman and Stephens (2011)	USA	Explore the factors that influence the clinical decision making of expert and novice physiotherapists	3 expert physiotherapists and 3 novice therapists participated in the study. Data was collected using semi-structured individual interviews, video recording of treatment sessions and analysis of participants' resume	N/A	No	'Qualitative methods using grounded theory, within the philosophy of phenomenology, were used'	No	No
Ahlqwist and Sallfors (2012)	Sweden	Generate a substantive theory that explained how young people with low back pain experience physiotherapy.	Semi-structured interviews with 14 young people who received physiotherapy for low back pain	Classical grounded theory methodology (Glaser, 2003)	Yes	To generate a substantive theory	No	Yes
Corrigan and McBurney (2012)	USA	Understand the skills that physiotherapists perceive as important for patients to walk post-stroke	11 physiotherapists were interviewed individually using a semi-structured interview guide	N/A	Yes	'Data was interpreted using GT methodology using coding'	No	No
Dunn, Smith, Whitehead and Keeling (2012)	New Zealand	To understand the decision making processes of people with tetraplegia regarding considering reconstructive upper-limb surgery	Semi-structured interviews were conducted with 22 individuals with tetraplegia	Constructivist GTM (Charmaz, 2006)	Yes	GTM was used to collect and analyse the data to construct an explanatory theory	Yes	Yes
Harding, Stewart and Knight (2012)	UK	Assess healthcare providers' perceptions on quality of life for patients with Huntington's disease	Individual semi-structured interviews with 8 healthcare providers including physiotherapists, occupational therapists, nurses, dieticians, psychology, speech and language therapists	Strauss and Corbin (1994)	Yes	'The data was analysed using grounded theory methodology'	No	No
Schmitt, Akroyd and Bruke (2012)	UK	Understand final year physiotherapy students' perceptions of person-centred care	12 final year physiotherapy students took part in 2 focus groups	Pragmatic GTM as described by Barbour (2007)	Yes	'Some elements of grounded theory were used'.	No	No
Stenberg, Fjellman-Wiklund and Ahlgren (2012)	USA	Explore the healthcare expectations of patients with neck and/or back pain, from a gendered perspective	12 patients (7 women and 5 men) participated. Each was interviewed twice using individual thematised interviews	Strauss and Corbin (1998)	No	'Thematised interviews were analysed according to grounded theory'.	Yes	No
Wedge et al. (2012)	USA	Identify the factors which affect physiotherapists' choice of outcome measures	21 physiotherapists who worked in nursing facilities, in and outpatient setting, were individually interviewed using semi-structured interviews	Strauss and Corbin (1998)	Yes	'A grounded theory approach was used for interviewing and data analysis'	No	No
Eriksson, Arne and Ahlgren (2013)	Sweden	Understand what exercise means to individuals with Parkinson's disease	Semi-structured interviews with 11 individuals who received exercise programs for Parkinson's disease	Constructivist GTM (Charmaz, 2006)	Yes	To construct an explanatory theory	Yes	Yes
Lindhal et al. (2013)	Denmark	Understand the elements that make good quality rehabilitation of fractures from patients, physiotherapists and occupational therapists perspectives	Semi-structured interviews and focus groups were conducted with 8 occupational therapists, 15 physiotherapists and 7 patients who sustained bone fractures	Corbin and Strauss (2008)	No	'Data were analysed using grounded theory method'	No	No
Medina-Mirapeix et al. (2013)	Spain	Find out the environmental elements important to patients in outpatient rehabilitation settings	Nine focus groups were conducted with 57 participants who received acute rehabilitation in outpatient settings.	The authors modified GTM (Corbin and Strauss, 2008)	No	Data analysis was undertaken using grounded theory	No	No
Thomson and Love (2013)	UK	Explore the negative social evaluation of patients by senior physiotherapists providing residential care	9 senior physiotherapists participated in 4 individual interviews and 1 focus group	Corbin and Strauss (2008)	Yes	Grounded theory methodology was used to generate theory through systematic data collection and analysis'	No	No

GTM: Grounded theory methodology. N/A: Not Available. USA: United States of America. UK: United Kingdom

Author(s) & publication year	Country	Aim of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Dufour, Lucy and Brown (2014)	Canada	Explore Canadian physiotherapists' understanding of their professional role	12 physiotherapists participated in 18 semi-structured interviews	Pragmatic grounded theory (Corbin and Strauss 2008)	Yes	'Pragmatic grounded theory methodology was employed'	No	No
Ekerholt, Schau, Mathismoen and Bergland (2014)	Norway	Understand the perceptions and therapeutic processes involved in the collaborative practices of two strategically selected therapists	1 psychomotor physiotherapist and 1 clinical psychologist participated in a mini-focus group	Strauss and Corbin (1996)	No	This study was based on a GTM approach'	Yes	No
Lloyd, Roberts and Freeman (2014)	UK	Explore physiotherapists' experiences of collaborative goal setting in sub-acute stroke	Semi-structured individual interviews with 9 physiotherapists	Constructivist Charmaz (2006)	Yes	'Constructivist GTM was used to generate a theory of collaborative goal setting that is grounded in therapists' perspectives'	Yes	Yes
MacKay et al. (2014)	Canada	Explore the perceived consequences of living with Knee osteoarthritis	Fifty-one individuals with knee osteoarthritis were interviewed using individual semi-structured interviews and focus groups	Constructivist GTM (Charmaz, 2006; Morse et al. 2009)	Yes	To construct an explanatory theory	Yes	Yes
O'Brien, Clemson and Canning (2015)	Australia	Understand factors that influence the participation of people with parkinsonism in physiotherapy	Individual semi-structured interviews with 8 patients who undertook an arm exercise program to reduce the risk of falls for people with parkinsonism	Constructionist Charmaz (2006)	Yes	'Grounded theory methodology as described by Charmaz (2006) was followed'	Yes	No
Fjellman-Wiklund, Nordin, Skelton and Lundin-Olsson (2016)	Sweden	Explore physiotherapists' perceptions and experiences in facilitating high-intensity exercises for older people with dementia	Semi-structured interviews and focus groups with 5 physiotherapists	The authors' modified approach to GTM (Strauss and Corbin, 1998)	Yes	A modified grounded theory methodology was used to analyse the data	No	Yes
Gosling and Rushton (2016)	UK	Identify the symptom presentation of adult knee primary bone tumours from onset to consultant diagnosis	Semi-structured interviews with 8 patients and 6 health care professionals including physiotherapists, oncology surgeons and nurses	Post-positivist GTM (Glaser and Strauss, 1967)	Yes	Some methods of grounded theory methodology were used to analyse the data	Yes	Yes
Hinman et al. (2016)	Australia	Understand the experience of physiotherapists, coaches and patients who participate in a program of telephone supervised exercises for knee osteoarthritis	10 physiotherapists, 4 coaches and 6 patients with knee osteoarthritis undertook individual semi-structured interviews	Multiple Strauss (1987), Strauss ad Corbin (1998), Charmaz (2000 and 2011)	Yes	'The interviews were thematically analysed drawing on two key tenets of grounded theory which are systematic ways of engaging with the data and constant comparison'	Yes	No
Jachyra and Gibson (2016)	Canada	Explore the socio-behavioural mechanisms that motivate or dissuade boys' participation in physical activity as they transition to adolescence.	Unstructured, semi-structured and structured interviews with 15 boys were conducted	Glaserian GTM (Glaser, 2001)	Yes	Data was generated and analysed using techniques of grounded theory to develop a substantive theory	Yes	Yes

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Author(s) & publication year	Country	Aim of the study	How was the data collected?	What version of GTM was used?	Was the use of GTM justified?	What was the role of GTM?	Was the philosophical framework of the study discussed?	Was the role of the researcher discussed reflexively?
Timothy, Graham and Levack (2016)	New Zealand	Explore the experience of embodiment from the perceptions of stroke patients	7 people with stroke were interviewed twice using structured telephone interviews and semi-structured face-to-face individual interviews	Charmaz (2003)	Yes	'This study used Charmaz's constructivist approach to grounded theory	Yes	Yes
Clouder and Adefila (2017)	UK	Explore clinical educators' perspectives on giving student physiotherapists increasing levels of responsibility on clinical placement, and the factors considered when giving or withholding responsibility.	Twenty-six face-to-face, semi-structured interviews followed by completion of a Diamond Ranking Exercise.	Multiple versions of grounded theory methodology were cited (Charmaz, 2000; Strauss and Corbin, 1990, 2007)	Yes	Grounded theory methodology was used to collect and analyse the data	No	No
Giardini et al. (2017)	Italy	Describe the rehabilitation experience of Parkinson's inpatients taking part in a multidisciplinary intensive rehabilitation treatment	Semi-structured interviews were conducted with 27 patients face-to-face.	Multiple (Corbin and Strauss, 2008; Glaser and Strauss, 1967)	Yes	The interviews were analysed with grounded theory methodology	No	No

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Table 3: Details of study methodological quality

Author(s) & publication date	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Ohman and Hagg (1998)	Convenience sampling was used to identify an appropriate initial sample. The sampling frame was justified. Theoretical sampling was not used. The study reported that data collection and analysis occurred simultaneously.	Analysis was conducted over 3 stages. Initial concepts were identified through rounds of coding and comparing data. Initial concepts were not presented. It was reported that participants validated the initial themes.	Theoretical development progressed through the constant comparative method, diagramming and discussions between the authors and participants regarding the meaningfulness and robustness of the developing categories.	The third stage of the analysis involved building a theoretical model. There was no discussion of how final categories were selected in relation to lower order codes to build the model. Theoretical saturation was not referred to.
Albert (1999)	A suitable sample was recruited via convenience sampling, the sample was justified but theoretical sampling was not used. Data analysis occurred after data collection.	The analysis was conducted in a linear manner after data collection. Open coding was used to extract similar meanings from the data. Open codes were not discussed, no examples were given.	Four categories were developed to encompass the meaning of all open codes. There was no discussion of how the codes were compared or selected to form categories. It was reported that theoretical development progressed by exploring the relationship between categories but such relationships were not discussed.	No depth or evidence of theoretical density was provided as the qualitative findings which were reported were limited and descriptive. No core category was provided and no model or explanatory hypothesis was produced. Theoretical saturation was not reported on.
Ohman, Hagg and Dahlgren (1999)	Maximum variation sampling was used. The selected sample was justified as presenting with a wide range of experiences in physiotherapy education. Theoretical sampling was not used. Evidence was presented to explain how data collection and analysis occurred simultaneously.	Initial concepts were developed using open coding. A discussion was provided to describe how the open codes were developed from the data. Open codes were presented. Memos and field notes were used at every stage of the research.	Evidence was presented to show how the constant comparison method was used to formulate focused codes, sub-categories and categories from open codes. Detailed tables that described these processes were presented. The analysis occurred in a cyclic fashion hence the analysis was informed by new data. New concepts were discussed and included as the analysis progressed, suggesting evidence that the analysis remained open after the initial concepts were developed.	An explanatory model was presented through 3 core categories that included multiple sub-categories. The relationships between categories were discussed which provided theoretical density although theoretical saturation was not reported on.
Jensen et al. (2000)	Purposive sampling was used to recruit expert physiotherapists. The inclusion criteria set to identify potential experts were discussed and justified. Theoretical sampling was not used. A discussion was provided to describe the iterative process of data collection and analysis	Initial concepts were developed using open coding, but no examples of these codes were presented.	Axial coding was used to select the most appropriate higher order codes initial open codes. A revised coding scheme that enumerated and defined the selected focused codes was presented. Theory development was advanced by comparing codes to data, codes to codes and codes to sub-categories.	There was a clear discussion of how the final categories were selected. The study produced a model that explained 4 different aspects of expert practice. The model explained what, how and why expert physiotherapists practiced in such ways. Saturation was reported.
Mackey and Sparling (2000)	An appropriate convenience sample was identified and justified. Theoretical sampling was not used. There was not a discussion to suggest that data collection and analysis occurred simultaneously as guided by theoretical sampling.	Open coding was discussed to show how the data was labelled into initial codes. Examples of these codes were provided.	The analysis continued through axial and selective coding to group initial codes into higher order codes and sub-categories.	The output of the study was presented as 3 case studies. The findings were presented as descriptive narrative. Saturation was not reported on.
Stephenson and Wiles (2000)	Convenience sampling was used but the inclusion criteria were not justified, although the identified sample can be considered appropriate. Theoretical sampling was not referred to.	There was no reference to the coding procedures used. No codes were presented.	There was no discussion of coding procedures at any level of the analysis. No evidence to suggest that a theory was developed	The findings provided descriptive themes. Saturation was not reported.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Stiller (2000)	An appropriate purposive sample was recruited. No evidence of theoretical sampling or iterative data collection & analysis.	There was no reference to initial coding procedures used at all.	Limited discussion was provided to suggest that at some point during the analysis codes were compared. The process of developing categories from codes was not described.	The findings provided a framework that explains the development of the ethos of the physiotherapy profession in the USA. However, it was not clear how the final themes were selected. Saturation was not reported.
Trede (2000)	The initial sample was identified using purposive sampling. The sample seemed appropriate and the inclusion criteria were justified. Sampling continued used snowball sampling. Theoretical sampling was not referred to. No evidence suggests that data collection and analysis occurred as informed by one another.	No discussion of how the data was analysed. There was no reference to any of the analytical procedures used at all.	The analytical procedures undertaking were not reported, expect that participants validated the developed themes.	The results explained the characteristics of a patients centred versus a therapist centred approach and the process of transformation from the former to the latter approaches. No model was provided and no evidence was provided to suggest that the resultant themes were grounded in the data. Saturation was not reported on.
Jette, Grover and Keck (2003)	Convenience and purposive sampling were used to recruit the study participants. Theoretical sampling and saturation were not reported	Initial coding was used to generate preliminary concepts. The initial codes were not presented.	Although more advanced coding techniques were not reported, there is sufficient evidence to suggest that a systematic approach to coding the data was adopted which involved constant comparisons. The inquiry developed by using increasingly focused questions identified by comparing previously collected data to data and data to codes. Peer reviewing was used to discuss aspects of the developed categories.	A theoretical model was developed to explain therapists' decision making processes. The final categories forming the model were discussed with participants and consensus between the research team, the study participants and an independent reviewer was reached on the final categories.
Milligan (2003)	The sampling frame was specified and justified, but the sampling strategy used was not specified. Theoretical sampling and the simultaneous data collection and analysis processes were not referred to. Although, the aim of the study was changed in light of the collected data, no evidence was given to show how the data informed the analysis	There was no reference to the coding procedures used. No codes were presented.	There was no discussion of coding procedures or any analytical techniques at any level of the analysis.	The findings provided descriptive themes. No core category was presented. It was reported that saturation has been reached, but no evidence of iterative data collection and analysis was provided to support the claims of theoretical saturation.
Edwards et al. (2004)	A pre-determined sample size of 12 physiotherapists was set but not justified. Physiotherapists were selected randomly from a bigger list of physiotherapists nominated by the Australian Physiotherapy Association.	Initial codes were developed by making comparisons between participants' narratives. None of the initial concepts were presented either.	The analysis progressed using the constant comparison method but it is not clear if the analysis continued to identify new concepts after initial coding	The findings described the process of clinical reasoning in physical therapy. The literature was consulted to fine-tune the findings.
Ekerholt and Bergland (2004)	A sample of 9 women and 1 man was purposively selected but neither the sample size nor the sampling criteria were justified. Theoretical sampling was not used. It was mentioned that data collection & analysis occurred consecutively, but there was no discussion to show how the knowledge gained from each phase of data collection & analysis fed into the next phase.	Initial concepts were identified using open coding but the initial concepts were not reported.	The analysis progressed by comparing the initial concepts to identify similarities and differences. Then, axial coding was used to regroup the initial concepts in new groups by identifying new relationships between the concepts; to build categories. There was no evidence that new concepts were identified during axial coding. No evidence to suggest that the analysis remained open and continued to progress after the identification of the initial concepts.	The study presented several categories and sub-categories. The relationships between the categories were adequately discussed and the results were informative. Theoretical saturation of the developed categories was not mentioned.

GTM: Grounded theory methodology, USA: United States of America

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Heine, Koch and Goldie (2004)	Purposive sampling was utilised to recruit participant. Theoretical sampling was not reported, but a discussion was provided to explain how subsequent interviews were used to seek more information about issues raised in previous interviews.	Open coding was used in the beginning of the analysis to identify initial concepts which were presented and thoroughly discussed.	Theory development continued using axial coding, discussions between the authors and the generation of more data to satisfy the properties of the developed categories. Constant comparisons between codes and categories were made to test the robustness and relevance of the generated categories.	The findings presented a hypothesis which explained participants' readiness to go home after total hip replacement surgery. The final categories were selected based on their abstract capacity to explain participants' experiences and map out their understandings.
Johansson and Fjellman-Wiklund (2005)	Maximum variation sampling was used to identify a suitable initial sample. Theoretical sampling was not reported on.	Open coding was used to break the data and identify similar units of information that were grouped together into open codes.	Focused coding was not discussed. It is not clear how theory development progressed; other than by grouping open codes together. There was no discussion to show that the analysis identified new concepts after open coding.	The results were presented around a core category that explained the experience of participants. The relationships between subcategories were thoroughly explained in relation to the core category to provide a theory that explained ventilated patients' experience of body awareness. The outcome of the study was consistent with the aim of GTM but the methods section was short and lacking. It is not clear how the categories were developed or whether theoretical saturation was reached or not.
Miller et al. (2005)	Purposive sampling was used to recruit 10 newly qualified physiotherapists. Theoretical sampling was not used but a brief discussion was provided to show that data collection & analysis occurred iteratively hence the questions were modified based on previously collected data.	Initial concepts were identified using line-by-line coding of the interview transcripts to identify codes that describe the experience of participants. Initial concepts were not presented.	Axial coding was reported as the method used to progress the analysis by regrouping the initial codes into sub-themes and themes. Constant comparison was used to define the relationships between the codes and themes. There was no discussion to show that the analysis identified new concepts using axial coding.	The output of the research was presented as 5 key themes, which were validated by participants. Although no core category was presented a model was provided to describe the stages that novice physiotherapists undergo to adapt to their new professional role in acute care settings. It was mentioned that saturation was achieved but no evidence was provided to support this claim.
Piegorsch et al. (2005)	Theoretical sampling was used to recruit participants based on the questions generated from the study.	Initial coding procedures were not reported.	Coding procedures were not reported, but it was reported that a coding framework was developed based on information from the transcripts and applied to the data. The analysis was facilitated using NUDIST software. It is not clear how theoretical development progressed.	The findings were not descried by the authors as a grounded theory but rather as a conceptual framework which was informative and theoretically dense.
Reynolds (2005)	The sampling strategy used was not defined but it seems that convenience sampling was used throughout the study. Theoretical sampling was not reported on.	Open coding was used to analyse the data. There was a detailed discussion that explained how open coding was applied to open the data to all possibilities of grouping ideas into different codes and sub-themes during the initial phases of the analysis.	Theoretical development progressed using axial coding to identify new codes from new data. Also, the constant comparative method was used to compares new and old codes, to delineate the relationships between the data and satisfy the dimensions of each category. Selective coding was then used to integrate and refine the developed theoretical model. Memos were used to explain codes and document the analysis.	The outcome of the study was presented in the form of a substantive theory that explained how service learning experiences benefit physiotherapy students' development. The results were presented around a central category and the relationships between major categories and subcategories were delineated using an explanatory diagram or matrix. Evidence for reaching theoretical saturation was provided
Solomon and Miller (2005)	It was mentioned that sampling, data collection and analysis occurred together over a period of 6 months until saturation was achieved. However, the type of sampling methods used was not defined. It was not possible to ascertain whether theoretical, purposive or convenience sampling was used.	Line-by-line open coding was used to generate initial concepts. A list was developed to define each code but this list was not provided.	The analysis progressed using axial and selective coding and constant comparison to identify new codes and formulate categories. Memos were used to define the links between the codes. A discussion was provided to show that the data gained from each phase of data collection shaped the next one and the subsequent analysis.	The outcome of the study was judged to be consistent with the aim of GTM; hence a theoretical model that explained the experience of novice physiotherapists in private practice was provided. Evidence for reaching theoretical saturation was given and thoroughly discussed.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Ekerholt and Bergland (2006)	The type of sampling methods used was not defined. It was not possible to ascertain whether theoretical, purposive or convenience sampling was used.	Open coding was used to identify discrete parts of the data which were compared to establish similarities and differences between the ideas, feelings and beliefs reported by the study participants.	Axial and selective coding and constant comparison were used to progress the analysis which was reported to have taken place at the same time as data collection. It was reported that axial coding was used to regroup the open codes in new ways but no evidence was provided to show that new codes were identified during axial or selective coding.	The study does not claim to have produced a theory but rather descriptive themes grouped around a core category or a main theme. The study reported that saturation was achieved but saturation was not defined and no information was given to explain how and why saturation was judged after interviewing 10 participants.
Slingsby (2006)	The authors did not specify the sampling technique they used to recruit the study participants. However, there was a sufficient discussion that explained how data collection and analysis guided one another.	A list of open codes was presented and a discussion was provided to explain how open coding was applied to the data.	The analysis progressed using axial and selective coding. Axial coding was used to identify new data and form categories, while selective coding was used to systematically map all the relationships between the developed categories through a process of constant comparison of codes to codes, codes to data and categories to categories. Tables were provided to show the development of the analysis from open to axial to selective coding and the construction of the final themes.	The study produced themes that explained how Japanese healthcare professionals manage stroke. The relationships between categories were made clear and the analysis provided showed theoretical depth and explanatory power. The study reported reaching theoretical saturation after 21 interviews.
Booth and Kendall (2007)	It was reported that simultaneous data collection and analysis were used, there is a discussion to describe how sampling & data collection were informed by previously gained knowledge, which may suggest that theoretical sampling was used.	Open coding was used to initially analyse the data line-by-line or by paragraph. It was reported that several open codes were identified and that the codes were not mutually exclusive at this stage. The number of open codes was not reported on and no examples of such codes were given	Axial and selective coding was used to collate similar open codes into categories that present similar meanings or ideas. There were no examples of the codes developed at any stage of the analysis. There was no evidence to suggest that the analysis remained open to identifying new concepts after the initial phase of open coding.	Themes were provided to explain the factors which affect people's participation in a rehabilitation program for spinal cord injury. Saturation was not mentioned.
McGlynn and Cott (2007)	Theoretical sampling was used to recruit a group of physiotherapists who can provide information on the concepts that emerging from the data. Some examples were provided to describe the process of theoretical sampling that focused the inquiry on concepts that were relevant to participants' experiences.	The analysis was described as iterative and inductive. The analysis began with open coding to break the data into initial concepts.	The next phase of the analysis was to group similar open codes into categories. This process was described as axial coding. The relationships between categories were explored using the constant comparative method, until the core category was developed. Then selective coding was to refine the developed categories in light of new data.	A theoretical matrix and theory were developed to explain how neurological physiotherapists apply evidence-based practice. The results revolved around a core category and the relationships between different levels of the analysis and the core category were made explicate It was reported that saturation was achieved when participants' responses appeared repetitive.
Ekreholt and Bergland (2008)	The type of sampling methods used was not defined. It was not possible to ascertain whether theoretical, purposive or convenience sampling was used. Moreover, a sample of 10 patients was considered sufficient but this decision seemed to be predetermined and was not justified based on the principles of theoretical saturation.	The process of open coding used to analyse initial interviews was described in details. Although, there were no examples to describe the content of the initial codes, it was mentioned that these codes described actions, experiences and beliefs reported by the study participants. At this stage, similar open codes were grouped together to form 3 categories that explained a distinct phenomenon that characterized participants' experience with Norwegian psychomotor physiotherapy.	During axial coding the data were put together in new ways to explore different analytical pathways and make the relationships between sub-categories and categories more explicate. Selective coding was then used to identify the core category based upon its repetitiveness, logical relationships with other categories, its level of abstraction and analytical usefulness in explaining the main concepts present within the data. The paper reported that the constant comparative method was used throughout the analysis.	The authors do not claim to have produced a theory; instead the findings were described as a set of inter-linked concepts that aligned around the axis of a core category. However, the results were informative and the inter-connectedness between the categories provided adequate theoretical density. Saturation was reported but not justified.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Hall et al. (2008)	The authors reported that the study used a modified grounded theory approach because purposive sampling was used instead of theoretical sampling and the data was analysed after data collection, rather than simultaneously.	The analysis began with labelling parts of the data. The labels were described as codes that reflect distinct ideas or feelings. A coding scheme was developed at this stage. The analysis appeared inconsistent with GTM.	The coding scheme developed during early stages of the analysis was applied to subsequent interviews. It was reported that the coding scheme was modified but there was no discussion of how and why the coding scheme was modified.	The outcome of the study was described as a thick description rather than a theory. Despite the presentation of a core category, the results were descriptive. It was reported that saturation was not achieved for all categories and the decision to cease data collection was not justified.
Lee et al. (2008)	A suitable purposive sample was identified and justified. It was reported that data collection and analysis occurred concurrently, but no evidence was provided to describe this process. Theoretical sampling was not used.	There was no information to describe how initial concepts were developed. It was reported that 'a code was applied to each transcript'. None such codes were described.	The analysis progressed by linearly by grouping similar codes into categories that were examined and compared to identify the links between categories. Then, a coding scheme was developed and applied to subsequent transcripts.	The results were presented under descriptive themes. It was not clear how and why these final themes were selected. Saturation was achieved and it was considered the point at which new participants did not provide new information.
Redmond and Parrish (2008)	A suitable purposive sample was identified and continued using theoretical sampling. Recruitment ceased when saturation was achieved; as no new information was identified with the collection of new data.	A manual sorting technique was utilized where similar sections of the transcripts were cut and grouped together. The initial concepts identified were reported.	The themes developed in earlier stages of the analysis were constantly compared to new data to progress the analysis. However, the type coding methods used were not specified.	The findings presented several themes explaining a range of variables which influence adherence to physiotherapy amongst patients with cerebral palsy. It was mentioned that the emerging themes were theoretically sampled until saturation was achieved but no evidence was provided to show how and why the final themes were decided on.
Galvin, Cusack and Stokes (2009)	A suitable convenience sample was recruited. Theoretical sampling was not used.	The transcripts were analysed line-by-line to identify patterns in the data. A coding system was developed to group similar patterns in the data into themes.	The suitability of the coding system was checked by identifying inconsistent codes which were discussed between authors until agreement on all codes within the coding system was reached.	Major themes were reported on in a descriptive narrative. Saturation was not reported on.
Hannes et al. (2009)	Purposive sampling was applied to recruit an appropriate sample. The sample was justified based on the study objectives but the sample size was not. It was reported that data collection and analysis occurred simultaneously. Theoretical sampling was not used.	Open coding was used to identify initial information by fragmenting the data.	Axial coding was then used to arrange open codes into a conceptual model. The relationships between codes were explored at this stage.	Three major categories were identified, the final categories were chosen after comparing the study findings to existing literature. The sub-categories and codes that formed these categories were presented. A conceptual diagram was provided to explain the relationship between categories, sub-categories and codes.
McGinnis et al. (2009)	Purposive sampling was used to identify a suitable sample. Recruitment and data collection stopped when saturation was achieved. Theoretical sampling was not used.	Each transcript was analysed line-by-line to identify open codes which were refined throughout data collection and analysis.	Axial coding was used to group open codes together into themes. Then, the analysis moved from concrete codes and themes to abstract categories. Open and axial codes were presented in a table under relevant categories.	The findings provided a theory of balance assessment decision making in physiotherapy.
Pechak and Thompson (2009)	Purposive and snowball sampling were used and the sample size was considered sufficient because saturation was reported. Data collection and analysis occurred simultaneously. Theoretical sampling was used until saturation was achieved.	Initial concepts were identified through line-by-line open coding.	Concepts were grouped into sub-categories and categories through axial coding to move the analysis from focusing on participants' words to the researcher's conceptualization of these words. Sampling focused on satisfying the properties of the categories and seeking negative cases. Examples of these sampling decisions were given to explain how theoretical sampling was used.	Major themes were presented to explain the developed conceptual model which explained the processes involved in establishing an optimal international service learning program.
Rindflesch (2009)	Purposive sampling was used to recruit participants who can answer the research question. However, the sample size was not justified whereas saturation was not discussed. Data collection and analysis occurred simultaneously but there was no discussion to explain how the data analysed in each phase influenced the next phase of data collection. Theoretical sampling was not used.	Initial coding processes were not reported.	Common themes were developed from the data. There was no evidence of theory development except that themes were compared, combined or excluded when necessary.	The final product of this study was a descriptive narrative interpretation of the data.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Slade, Molloy and Keating (2009)	Convenience sampling was used to recruit people with low back pain using an advertisement in a local newspaper.	The coding procedures used were not reported on	Three rounds of coding were used to analyse data however the coding procedures used were not reported on	The findings were presented using two themes, no core category was identified. The final themes were agreed upon between authors
Blaney et al. (2010)	Convenience sampling was used to recruit patients who were diagnosed with cancer. The eligibility criteria were made clear and justified.	Transcripts were coded using line by line open coding which allowed the data to be fractured and enabled identifying emerging lower-level concepts.	Axial and selective coding techniques were used to re-assemble open codes into sub-categories.	Main categories were presented but it is not clear how the final categories were decided on.
Mok et al. (2010)	Purposive sampling was used to recruit the study participants who can answer the research questions.	Open coding was used to identify preliminary concepts. Preliminary concepts were not presented.	Conceptual development was advanced using axial and selective coding and constant comparisons.	The story-line technique was used to identify the final themes.
Olofsson, Fjellman-Wiklund and Soderman (2010)	A maximum variation sample was selected based upon pre-determined criteria; which negates the concept of following an emerging study design. It was stated that data collection and analysis occurred simultaneously. It was reported that the study design emerged during the study period, but it was not made clear how.	Open codes and initial concepts were presented and adequately discussed.	Theory development proceeded using selective coding where similar open codes were collated into categories and finally the core category was developed	The analysis produced 1 core category and 3 categories that formed an informative explanatory model. The results offered adequate depth but theoretical saturation was not referred to.
Pechak and Thompson (2010)	An initial appropriate sample was identified and justified through purposive and snowball sampling. It was reported that data collection and analysis occurred simultaneously. Evidence was provided to show that theoretical saturation was achieved.	Open coding was used to identify emerging concepts but these concepts were not presented. Memos were used summarize the transcripts and the definition of concepts.	Theory development progressed using axial coding and constant comparisons to explore the relationships between codes. Diagrams were drawn to represent the emerging themes as a foundation to formulate a conceptual model.	The outcome of the study presented a conceptual model that explains the stages of developing an optimal international service program. It was made clear how the stages were identified to form the model which was validated by participants in the final stages to ensure its meaningfulness.
Wainwright, Shepard, Harman and Stephens (2010)	Purposive sampling was used, although an eligible sample was recruited to answer the research question, it is not clear how the sampling size was determined, because theoretical saturation had not been discussed. Data collection and analysis appeared to have taken place separately in a linear fashion.	Initial concepts were generated from the data using open coding but were not presented.	Theoretical development progressed using axial coding, reflective memos writing and diagramming. Thematic analysis was also used to analyse participants' narratives. It was not made clear how thematic analysis fit with the processes of open and axial coding.	A final model was developed to explain the differences in clinical reasoning between expert and novice physiotherapists. This paper discussed one of the categories that formed the model.
Buccieri, Pivko and Olzenak (2011)	Sampling was done purposively. There was no evidence to suggest that theoretical sampling was used or concurrent data collection and analysis.	Initial coding was carried out to form a coding scheme but the initial codes were not presented.	Theory development was advanced through various strategies including coding and the constant comparison method to form themes.	It is not clear how the final themes were selected. The study presented a linear theoretical framework.
Masley et al. (2011)	The study aimed to describe the role of physiotherapists in acute care settings, thus a purposive sample of 18 physiotherapists who work in acute care was recruited. Although the sample was appropriate, participants' eligibility was not justified whereas no inclusion or exclusion criteria were provided. Theoretical sampling of ideas that emerged from data was used to continue to gather information about these ideas that can satisfy the properties of generate categories.	Initial concepts were generated through coding, comparisons and refinement with subsequent data collection. However, initial concepts were not presented.	Theory development was advanced through various strategies including the constant comparison method, memo-writing, diagramming, revisiting the data and asking increasing focused questions.	The analysis produced an informative explanatory theory of physiotherapists' role in acute care. Theoretical saturation was achieved and adequately supported.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Medina-Mirapeix et al. (2011)	Sampling was done purposively. Recruitment stopped when saturation was achieved. The interview questions were amended after initial interviews, but there is no evidence to suggest that theoretical sampling was used.	Initial coding processes were not reported.	It was reported that some pre-determined themes were used to code the data and also new codes were developed. However, the authors did not report on how new codes were developed from the data. There is no evidence to suggest that a theory was developed, except for stating that the authors agreed that the developed categories were consistent between interviews	It is not clear how the final themes were selected. The study presented descriptive themes and no core or major category was presented.
Middle-Brook and Mackenzie (2011)	An appropriate initial sample was identified purposively. Sampling continued as guided by theoretical sampling and stopped when saturation was achieved.	Initial concepts were identified using open line-by-line coding, but the open codes were not presented.	Theory development progressed using axial coding to form categories of similar codes, making constant comparisons between the data and the analysis and memo-writing to identify relations between codes and themes.	Higher order categories were presented based on continued refinement of a conceptual framework with integrating the literature at the final stage.
Ohman, Astrom and Malgren-Olsson (2011)	Convenience sampling was used to recruit participants from a previous intervention study. Theoretical sampling was not reported.	Open coding was used initially. Open codes were neither presented nor discussed.	The analysis continued by grouping open codes into higher order codes. This was followed by selective coding to group codes into categories. The constant comparison method was used all throughout the analysis.	One core category and two sub-categories were presented in the form of an explanatory theory. The final categories were selected based on their explanatory power as verified through peer reviews and member checking.
Petty, Scholes and Ellis (2011)	Purposive sampling was used to recruit physiotherapists who completed master degrees in the UK. Theoretical sampling was not reported however the iterative process of data collection as informed by previous data analysis was clearly described.	Although the coding procedures used were not referred to and no initial were presented, a discussion was provided to explain how the initial concepts were developed as informed by relevant existing theories and emerging ideas which were further sample.	Theoretical development progressed by constructing a matrix through which the relationship between categories were explored.	There was a clear discussion of how the final categories were selected using comparisons and rendering ideas through writing to stimulate further analysis. The study produced a theory that explained how master of science students develop their learning.
Thomson and Hilton (2011)	An initial appropriate sample was identified and justified through purposive and continued through theoretical sampling until saturation was achieved. Adequate evidence was provided to support that theoretical saturation was achieved.	Initial concepts were identified using line-by-line coding. The codes were presented and the processes of constant comparisons made to refine the emerging initial concepts were made clear.	Theory development progressed using axial coding, selective coding and constant comparisons to group codes into abstract categories. Diagrams were drawn to represent the emerging themes as a foundation to formulate a conceptual model.	The study presented a conceptual model that explains students' understanding of the outcome of a college-based physiotherapy program. It was made clear how the stages were identified to form the model
Wainwright, Shepard, Harman and Stephens (2011)	Purposive sampling was used to recruit a suitable sample that was justified based on the aims of the study. It was made clear how data collection and analysis occurred simultaneously as informed by one another, but theoretical sampling was not referred to.	Preliminary codes and themes were identified using open coding. The codes were presented and the processes of constant comparisons made to refine the emerging initial concepts were made clear.	Theory development continued using axial coding, memo-writing and peer discussions between the authors to produce an exhaustive coding scheme to be applied to subsequent data.	The outcome of the study was presented in the form of 4 major themes related to one category of the findings that is 'the different use of reflection between expert and novice physiotherapists '. However, the research produced a conceptual framework that was published elsewhere. Saturation was not reported on.
Ahlqwist and Sallfors (2012)	Purposive sampling was initially used to recruit participants followed by theoretical sampling as driven by information from the study itself.	Open coding was used to label the data either word-by-word or line-by-line based on the amount of information presented within the data.	Open codes were grouped into higher order codes using selective coding and constant comparisons to build sub-categories and categories. The analysis was facilitated by using NVivo	The core category, categories and sub-categories formed a substantive theory, illuminating how young people with low back pain experienced physiotherapy.
Corrigan and McBurney (2012)	The type of initial sampling technique used was not reported, but the inclusion criteria were provided. No evidence to suggest that theoretical sampling was used. It was reported that saturation was achieved	Preliminary codes and themes were identified but were not presented.	Codes were grouped into themes and comparisons were made to link the themes to one another and to previously identified themes presented in existing literature.	The study presented 5 themes that describe the factors that stroke patients need to successfully return to the community. The themes were descriptive.

GTM: Grounded theory methodology, UK: United Kingdom.

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Dunn, Smith, Whitehead and Keeling (2012)	Early recruitment used purposive sampling followed by theoretical sampling to explore, expand and challenge the developing theory using data generated from the study itself.	The procedures involved in open coding were reported on but the open codes were not presented. NVivo was used to assist in the data analysis	Higher level coding techniques were not reported on. It is not clear if the analysis progressed beyond open coding and continued to identify new codes or construct abstract categories	The findings presented narrative themes describing the factors underpinning participants' choices. No model was presented.
Harding, Stewart and Knight (2012)	Convenience sampling was used. The sampling size and frame were not justified. No evidence was provided to show that theoretical sampling was used.	Initial coding processes were not reported.	No evidence to suggest that a theory was developed.	It is not clear how the final themes were selected. The study presented descriptive themes and no core or major category was presented. Saturation was not reported.
Schmitt, Akroyd and Bruke (2012)	The type of sampling technique used was not reported, but the inclusion criteria were provided. No evidence to suggest that theoretical sampling was used.	A priori codes were developed from the literature to guide the initial analysis of data. It was not made clear whether new concepts were identified during early stages of the analysis or whether the a priori themes were exhaustively applied to the data.	Content analysis was used to analyse the data. No evidence to suggest that a theory was developed.	It is not clear how the final themes were selected. The study presented descriptive themes and no core or major category was presented. Saturation was not reported.
Stenberg, Fjellman-Wiklund and Ahlgren (2012)	Purposive sampling was used. The authors did not report using theoretical sampling. Some evidence was provided to show that data collection and analysis occurred simultaneously until theoretical saturation was achieved.	Preliminary codes and themes were identified using open coding. The codes were presented and the processes of constant comparisons made to refine the emerging initial concepts were made clear.	Theory development continued using axial coding to group the open codes into categories.	The study presented a conceptual model that explains gender in expectations and experiences of healthcare. A core category was identified and the theory presented ideal types of gender expectations of healthcare.
Wedge et al. (2012)	Purposive and theoretical sampling was used. An appropriate sample was recruited and justified based on the study objectives and the achievement of saturation.	Initial concepts were generated from the data using line by line coding but were not presented.	The analysis progressed by grouping initial codes into sub-categories and categories.	A conceptual map was presented to illustrate the main categories developed.
Eriksson, Arne and Ahlgren (2013)	Purposive sampling was used to recruit participants followed by theoretical sampling to refine and test the developed theory	Data was initially analysed using open coding. The authors used OpenCode in addition to manual coding.	Theoretical development continued using focused and theoretical coding, memo-writing, theoretical sampling and member checking.	The findings were presented in the form of an explanatory theory. A discussion was provided to explain the how the final categories were selected.
Lindhal et al. (2013)	It was not made clear how the initial sample was identified, but evidence was provided to show that theoretical sampling was used to focus the inquiry and guide subsequent data collection.	Preliminary codes and themes were identified using open coding, but the codes were presented	Theory development progressed using axial coding, selective coding and constant comparisons to group codes into abstract categories.	The outcome of the study presented a conceptual model. The study explained how the final categories were selected and how the core category was constructed.
Medina-Mirapeix et al. (2013)	Purposive sampling was used to recruit patients with varying characteristics. Theoretical sampling was not reported on, although saturation was claimed.	Predetermined codes were developed from exiting literature and used to label the data during early phases of the analysis. The predetermined codes were reported.	The analysis progressed over 3 iterative rounds of coding where new codes were developed from the data and added to pre-determined codes to develop a framework to analyse participants' narratives. MAXqda2 was used to facilitate the analysis.	The final themes were developed by grouping categories with hierarchical conceptual uniformity into themes and subthemes. The themes were descriptive, no core category was identified, theoretical models were not developed
Thomson and Love (2013)	An appropriate initial sample was recruited using purposive sampling. It was then reported that theoretical sampling was used but no information was provided to describe how. Theoretical saturation was achieved and understood as the point at which the categories were fully understood.	It was not clear how the initial concepts were identified.	Theory development progressed using axial and selective coding.	It was reported that a conceptual framework was developed but it was not presented in the paper. The papers presented some of the developed categories.
Dufour, Lucy and Brown (2014)	An appropriate initial sample was recruited using purposive sampling. Evidence was provided to show that theoretical sampling was then used to focus the inquiry and guide subsequent data collection.	Preliminary codes and themes were identified using open coding, but the codes were not presented.	Theory development progressed using axial coding, selective coding and constant comparisons to group codes into abstract categories. Diagrams were drawn to represent the emerging themes as a foundation to formulate a conceptual model.	It was reported that a conceptual framework was developed and a discussion was provided to show how the final categories were selected after discussions between the authors and revision of memos and revisiting data. Saturation was not reported on.
Ekerholt, Schau, Mathismoen and Bergland (2014)	Purposive sampling was used to strategically select an appropriate sample that was justified based on the study objectives. There is no evidence to suggest that theoretical sampling was used.	The data was broken down into discrete parts using open coding but open codes were not presented.	Theory development progressed using axial coding to put the open codes in new ways that would link together participants' stories. Axial codes were not presented.	2 main inter-related phenomena where identified as integral to participants' experiences. These phenomena represented the main analytical themes that emerged from data.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Lloyd, Roberts and Freeman (2014)	An appropriate initial sample was recruited using purposive sampling. Evidence was provided to show that theoretical sampling was then used to focus the inquiry and guide subsequent data collection.	Open coding was performed at the meaning level of sentences but the open codes were not presented.	Theory development progressed using axial coding to put the open codes in abstract categories. Memos and diagrams were used to aid theory development.	The findings were presented in the form of themes. It was reported that theory development is provisional at this stage because theoretical saturation has not been achieved yet.
MacKay et al. (2014)	Convenience sampling was used to recruit younger adults who suffer from knee osteoarthritis. The eligibility criteria were justified which suggests that an appropriate initial sample was identified. Purposive sampling was then used to progress the data collection by seeking participants with different demographics. Theoretical sampling of ideas was then followed and a discussion was provided to describe the processes of simultaneous data collection and analysis.	Open coding was used to generate the initial concepts; however no initial codes or concepts were presented.	Theory was advanced using axial coding and the constant comparison method where data was compared to data, data with categories and categories with categories. A core category was developed based on its ability to explain the central theme of the data.	The findings presented theoretically dense categories and an explanatory model.
O'Brien, Clemson and Canning (2015)	An appropriate sample was recruited using purposive sampling. A discussion was provided to show how data collection & analysis occurred simultaneously but theoretical sampling was not reported.	Preliminary codes and themes were identified through a process of coding and sorting of the data.	Theory development advanced by grouping codes into subthemes and more abstract themes. Tables were presented to describe these processes.	A theoretical model was constructed to explain the process of decision making for people with Parkinson's disease. Evidence was provided to show that theoretical saturation has been achieved.
Fjellman-Wiklund, Nordin, Skelton and Lundin-Olsson (2016)	Convenience sampling was used to recruit physiotherapists from a previously conducted randomized controlled trail. Theoretical sampling was not reported.	Line-by-line open coding was first used to analyse the data. The developed codes and initial concepts were presented and discussed.	Line-by-line open coding was first used to analyse the data. The developed codes and initial concepts were presented and discussed.	The findings were presented in the form of an explanatory matrix with 1 core category and 2 categories that explained participants' experiences. The relationships between categories were discussed.
Gosling and Rushton (2016)	Purposive sampling was utilised to capture a wide range of views and perspectives of participant experience. Theoretical sampling was not reported.	Initial coding, memo writing and discussions between the authors were used to identify preliminary concepts.	The analysis progressed through focused and selective coding. These processes grouped the initial codes into abstract codes based on relationships and patterns within and among the data.	The findings were presented using 4 key categories. The final categories were selected based consensus between the researchers and participant to identify and describe the central themes that captured participants' understandings.
Hinman et al. (2016)	A suitable sample was recruited using purposive sampling from a larger pool of participants who took part in a randomized controlled trial. A discussion was provided to show that saturation has been achieved.	Open line-by-line coding was used to identify initial concepts.	Axial coding was used to regroup the data. There is no evidence to show that a theory has been developed.	The findings were put in the form of 4 descriptive themes that represent repeated meanings in the data.
Jachyra and Gibson (2016)	The initial sampling technique used to recruit participants was not specified but appeared to be convenience sampling. Theoretical sampling was not referred to, although evidence was provided to describe how subsequent data collection was informed by previous data analysis and emergent from information generated from the study itself.	Initial coding was used to generate preliminary concepts.	Theoretical development progressed through axial and selective coding, constant comparison, writing analytical memos and maintaining a reflexive research diary.	The outcome of the study presented a conceptual model and a theory which explained the factors influencing participants' behaviours. The study explained how the final categories were selected and refined through multiple coding cycles, comparisons and specifying the relationships between concepts.
Timothy, Graham and Levack (2016)	An appropriate initial sample was recruited using purposive sampling. Evidence was provided to show that theoretical sampling was then used to focus the inquiry and guide subsequent data collection.	The process of initial or open coding was not reported on.	The process of theory development continued by grouping open codes into higher order codes, sub-categories and categories.	The developed categories and core category were informative and theoretically dense.

GTM: Grounded theory methodology

Author(s) & publication year	Did sampling follow the strategies of GTM?	How were initial concepts developed?	How did theoretical development progress after initial concepts were mapped?	What was the outcome of the research & how was it constructed?
Clouder and Adefila (2017)	Purposive sampling was used to recruit participants. Theoretical sampling was not reported.	Initial coding procedures and preliminary concepts were not reported.	The codes were grouped into categories and categories were collapsed into themes. The analysis was facilitated using Excel spreadsheets. There was no discussion of how coding was conducted and the aspects according to which codes were grouped.	The findings presented 3 themes.
Giardini et al. (2017)	Convenience sampling was used to recruit patients with Parkinson's disease who participated in an in-patient multi-disciplinary rehabilitation program. The eligibility criteria were described and justified which suggested the recruitment of an appropriate study sample to address the research objectives. Theoretical sampling was not reported.	Line-by-line open coding was first used to analyse the data. Examples of initial codes were not presented.	The analysis progressed using axial and theoretical coding to construct the core categories and sub-categories that can provide abstract explanations of participants' experiences.	The final core category and sub-categories were selected based on the following criteria: data frequency and consistency, link to the other sub-categories and increased explanatory power. The generated theory was presented in the form of an explanatory matrix with explicit relationships between categories.

GTM: Grounded theory methodology

Table 4: Summary of study methodological quality

Author(s) & publication year	Synchronous data collection & analysis (n=47, 69%)	Systematic coding procedures (n=50, 74%)	Constant comparative method (n=53, 78%)	Memo-writing (n=29, 43%)	Theoretical sampling (n=16, 24%)	Integration of theoretical framework within relevant literature (n=30, 44%)
Ohman and Hagg (1998)	Yes	Yes	Yes	No	No- Saturation was not reported	Yes
Albert (1999)	No	Yes	No	No	No- Saturation was not reported	Yes
Ohman, Hagg and Dahlgren (1999)	Yes	No	Yes	Yes	No- Saturation was not reported	Yes
Jensen et al. (2000)	Yes	Yes	Yes	No	No- Saturation was reported	Yes
Mackey and Sparling (2000)	No	Yes	Yes	No	No- Saturation was not reported	No
Stephenson and Wiles (2000)	No	No	No	No	No- Saturation was not reported	No
Stiller (2000)	Yes	Yes	Yes	No	No- Saturation was not reported	No
Trede (2000)	No	No	No	No	No- Saturation was not reported	No
Jette, Grover and Keck (2003)	Yes	Yes	Yes	No	No- saturation was not reported	Yes
Milligan (2003)	No	No	No	No	No- Saturation was reported	No
Edwards et al. (2004)	No	Yes	Yes	No	No- Saturation was not reported	Yes
Ekerholt and Bergland (2004)	Yes	Yes	Yes	No	No- Saturation was not reported on.	Yes
Heine, Koch and Goldie (2004)	Yes	Yes	Yes	Yes	No- saturation was reported	No
Johansson and Fjellman-Wiklund (2005)	No	No	Yes	No	No- Saturation was not reported	No
Miller et al. (2005)	Yes	Yes	Yes	No	No- Saturation was reported	No
Piegorsch et al. (2005)	Yes	No	No	No	Yes- Saturation was reported	No
Reynolds (2005)	Yes	Yes	Yes	Yes	No- Saturation was reported	Yes
Solomon and Miller (2005)	Yes	Yes	Yes	Yes	No- Saturation was reported	Yes
Ekerholt and Bergland (2006)	Yes	Yes	Yes	No	No- Saturation was reported	No
Slingsby (2006)	No	Yes	Yes	No	No- Saturation was reported	No
Booth and Kendall (2007)	Yes	Yes	No	No	Yes- Saturation was not reported	No
McGlynn and Cott (2007)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	Yes
Ekreholt and Bergland (2008)	Yes	Yes	Yes	No	No- Saturation was reported	No
Hall et al. (2008)	No	Yes	Yes	No	No- Saturation was achieved for some categories	Yes
Lee et al. (2008)	Yes	Yes	No	No	No- Saturation was reported	No
Redmond and Parrish (2008)	Yes	No	Yes	No	Yes- Saturation was reported	No
Galvin, Cusack and Stokes (2009)	No	No	Yes	No	No- Saturation was not reported	No-
Hannes et al. (2009)	Yes	Yes	Yes	No	No- Saturation was not reported	Yes
McGinnis et al. (2009)	No	Yes	Yes	Yes	No- Saturation was reported	Yes
Pechak and Thompson (2009)	Yes	Yes	Yes	Yes	No- Saturation was reported	Yes
Rindflesch (2009)	Yes	No	Yes	No	No- Saturation was not reported	No
Slade, Molloy and Keating (2009)	No	No	No	No	No- Saturation was reported	No
Blaney et al. (2010)	No	Yes	Yes	Yes	No- Saturation was reported	No

Author(s) & publication year	Synchronous data collection & analysis (n=47, 69%)	Systematic coding procedures (n=50, 74%)	Constant comparative method (n=53, 78%)	Memo-writing (n=29, 43%)	Theoretical sampling (n=16, 24%)	Integration of theoretical framework within relevant literature (n=30, 44%)
Mok et al. (2010)	Yes	Yes	Yes	No	No- Saturation was reported	No
Olofsson, Fjellman-Wiklund and Soderman (2010)	Yes	Yes	Yes	No	No- Saturation was not reported	Yes
Pechak and Thompson (2010)	Yes	Yes	Yes	Yes	No-Saturation was reported	No
Wainwright, Shepard, Harman and Stephens (2010)	No	Yes	No	Yes	No- Saturation was not reported	Yes
Buccieri, Pivko and Olzenak (2011)	No	Yes	Yes	No	No- Saturation was not reported	No
Masley et al. (2011)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	Yes
Medina-Mirapeix et al. (2011)	Yes	No	No	No	No- Saturation was reported	No
Middle- Brook and Mackenzie (2011)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	Yes
Ohman, Astrom and Malgren-Olsson (2011)	Yes	Yes	Yes	Yes	No- Saturation was not reported	No
Petty, Scholes and Ellis (2011)	Yes	No	Yes	Yes	No- saturation was not reported	Yes
Thomson and Hilton (2011)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	Yes
Wainwright, Shepard, Harman and Stephens (2011)	No	Yes	Yes	Yes	No- Saturation was not reported	Yes
Ahlqwist and Sallfors (2012)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	No
Corrigan and McBurney (2012)	No	Yes	No	No	No- Saturation was reported	Yes
Dunn, Smith, Whitehead and Keeling (2012)	Yes	No	No	Yes	Yes- Saturation was reported	No
Harding, Stewart and Knight (2012)	Yes	No	No	No	No- Saturation was not reported	No
Schmitt, Akroyd and Bruke (2012)	No	No	No	No	No- Saturation was not reported	No
Stenberg, Fjellman-Wiklund and Ahlgren (2012)	Yes	Yes	Yes	No	No- Saturation was reported	Yes
Wedge et al. (2012)	Yes	Yes	Yes	No	No- Saturation was reported	Yes
Eriksson, Arne and Ahlgren (2013)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	No
Lindhal et al. (2013)	Yes	Yes	Yes	No	Yes- Saturation was not reported	No
Medina-Mirapeix et al. (2013)	No	No	No	No	No- saturation was reported	No
Thomson and Love (2013)	Yes	Yes	Yes	No	Yes- Saturation was reported	Yes
Dufour, Lucy and Brown (2014)	Yes	Yes	Yes	Yes	Yes- Saturation was not reported	Yes
Ekerholt, Schau, Mathismoen and Bergland (2014)	Yes	Yes	Yes	No	No- Saturation was reported	No
Lloyd, Roberts and Freeman (2014)	Yes	Yes	Yes	Yes	Yes- saturation has not been achieved yet.	No
MacKay et al. (2014)	Yes	Yes	Yes	Yes	Yes- Saturation was reported	No

Author(s) & publication year	Synchronous data collection & analysis (n=47, 69%)	Systematic coding procedures (n=50, 74%)	Constant comparative method (n=53, 78%)	Memo-writing (n=29, 43%)	Theoretical sampling (n=16, 24%)	Integration of theoretical framework within relevant literature (n=30, 44%)
O'Brien, Clemson and Canning (2015)	Yes	No	Yes	Yes	No- Saturation was reported	No
Fjellman-Wiklund, Nordin, Skelton and Lundin-Olsson (2016)	Yes	Yes	Yes	Yes	No- The authors were not sure if saturation was reached	No
Gosling and Rushton (2016)	Yes	Yes	Yes	Yes	No- Saturation was reported	No
Hinman et al. (2016)	No	Yes	Yes	No	No -Saturation was not reported for all categories	No
Jachyra and Gibson (2016)	Yes	Yes	Yes	Yes	No- Saturation was reported	Yes
Timothy, Graham and Levack (2016)	Yes	No	Yes	Yes	Yes- Saturation was reported	Yes
Clouder and Adefila (2017)	Yes	Yes	Yes	No	No- Saturation was reported	Yes
Giardini et al. (2017)	No	Yes	Yes	Yes	No- Saturation was not reported	Yes