Introducing positive behaviour support (PBS) into disability services for successful adoption: A synthesised systematic review

Accessible Summary

- Positive behaviour support is used by staff to help people with different disabilities, but we don't know what helps staff to keep using positive behaviour support.
- We looked at all the reports that people have written about using positive behaviour support to find out what helps staff to keep using it.
- We used a special way of putting everything together and found groups of important things to do with positive behaviour support, the people who use it, and things happening around them. These things can help staff use positive behaviour support better and for longer.

Keywords

Adoption; Diffusion of innovations; Disability; Implementation; Meta-aggregation; Positive behaviour support

Abstract

Background: It is necessary to understand which variables successfully contribute to the adoption of positive behaviour support (PBS) in disability services if people with disability are to experience meaningful outcomes. **Methods:** A systematic review of the disability support literature was undertaken, and meta-aggregation was used to synthesise the findings. The study applies ENTREQ statement criteria, and diffusion of innovations theory was used to analyse and interpret the results. **Results:** Twenty-seven papers were included in the analysis, from which over 300 findings were extracted. Forty-one aggregated findings generated a final set of 26 principles which informed the development of a conceptual framework for the adoption of PBS in disability services. **Conclusion:** The conceptual

framework and supporting principles will assist those interested in introducing PBS into disability services for successful adoption, and are applicable to researchers, managers, and practitioners alike. Recommendations are made to expand research on the application of PBS in specific disability contexts and to broaden the application of PBS beyond challenging behaviour.

The contemporary approach to supporting people with disability is positive behaviour support (PBS). PBS is a broad approach for arranging the supports needed to achieve meaningful personal outcomes for people, including those with intellectual and developmental disabilities, while reducing behaviours that pose barriers to these outcomes. It consists of four defining features: (1) application of behavioural science, (2) multiple interventions to provide ecologically valid, practical support, (3) commitment to durable lifestyle outcomes, and (4) implementation within organisational systems for sustained effects (Dunlap, Sailor, Horner & Sugai, 2009).

Few published studies have examined the systematic implementation of PBS within organisations. McGill et al. (2018) described the introduction of PBS in multiple disability residential settings, and Rotholz and Ford (2003) described implementation of PBS in a state disability service. Unless one is knowledgeable about and sensitive to the factors underpinning the successful introduction of PBS, then even the most well-intentioned roll-out of PBS may nonetheless fail. The introduction of PBS into an organisation can be viewed as an event that is either lasting or washes out depending on how well the dynamic properties of the system are harnessed (Hawe, Shiell & Riley, 2009). PBS must have a significant impact for it to change the system's dynamics and be maintained in practice, and to be effective, PBS must lead to positive outcomes.

Additionally, PBS researchers have recommended attention to understanding how individuals, groups and organisations make the decision to introduce PBS for "high fidelity adoption, sustained implementation, and scaled use" (Horner & Suagi, 2018, p. 21). Similarly, Bosco et al. (2019) argue that difficulties with the implementation of PBS are widespread, with Hassiotis et al. (2018) suggesting that future studies should investigate the role of settings, persons, and organisations which underlie the effect of PBS. The present study makes a contribution towards this understanding through the examination of factors for successful adoption.

Positive Behaviour Support and Diffusion of Innovations

Horner, Sugai & Fixsen (2017) argue that PBS is an example of an effective practice that is commonly proposed without attention to the variables needed to facilitate adoption, reliable use, sustainability, and generalisation. Diffusion of innovations (Rogers, 2003) provides a method to evaluate the adoption or 'spread' of PBS between individuals and groups. Rogers' model is described as ground-breaking in its practical contribution to a greater understanding of the variation in the rates of adoption of new ideas (Haider & Kreps, 2004). The definition of diffusion of innovations by Wejnert (2002) is particularly useful when considering PBS: "[diffusion of innovations] refers to the spread of abstract ideas or concepts, technical information, and actual practices within a social system, where the spread denotes flow or movement from a source to an adopter" (p. 297). While diffusion of innovations has been applied to PBS in schools, its application to PBS in disability services has only just begun [see Hayward, McKay-Brown and Poed (2019) and Hayward, Poed and McKay-Brown (2018)].

Rogers' (2003) innovation-decision process within diffusion of innovations describes the five-stage progression through which a person, organisation or other unit considers prior conditions and then moves to (1) gaining initial knowledge of an innovation, (2) to forming

an attitude towards it, (3) making a decision to adopt or reject it, (4) to implementing it, (5) to confirming the decision. This study only deals with the prior conditions and the first two stages of this process. Borrowing from Carlson (2008), the *prior conditions* include (a) practices that are used at present (previous practice), (b) feelings that arouse the need for change (felt needs/problems), (c) eagerness or willingness to change or to adopt an innovation (innovativeness) and (d) customary behaviours of the persons in the work environment (norms of the social system). The first stage, *knowledge*, occurs when an individual or other unit is exposed to the existence of PBS and gains an understanding of how it functions. There are three characteristics in this stage: socio-economic, personality, and communication. The second stage, *persuasion*, is when an individual or unit forms a favourable or unfavourable attitude towards PBS. There are five characteristics in this stage: relative advantage, compatibility, complexity, trialability, and observability.

Adoption of PBS in Schools and Disability Services

The conditions required for the successful adoption of PBS vary depending on the context, and this is where the difference between PBS in schools and PBS in disability services becomes most obvious. The success of PBS in US schools (often referred to as school-wide positive behaviour support or positive behaviour interventions and supports) comes in part from federal legislation and funding for national coordination but more importantly from preventative and proactive evidence-based practices implemented in a multitiered system of support. PBS in schools, particularly in the US, shares few similarities with PBS in disability services other than their origin, philosophical orientation and defining features. This is not a criticism; it is evidence of the diffusion of PBS in different countries, service systems and locales.

The sustainability of PBS in schools has been investigated (see for example McIntosh, Mercer, Nese, Strickland-Cohen & Hoselton, 2016) and while superficially it would appear

that applying these findings to disability services would be worthwhile, implementation variability is evident even within and across school systems (Horner et al., 2014), suggesting that this is not recommended. Further, it is necessary to consider the unique variables in the diffusion of PBS in different settings. For example, Dingfelder and Mandell (2011) provide examples of the challenges in adopting practices for supporting children with autism in community settings originally used in schools.

PBS, Implementation Science and Diffusion of Innovations

Fixsen et al.'s (2005) work on implementation science is frequently associated with PBS in schools. The researchers describe six stages of implementation: (1) exploration and adoption, (2) program instillation, (3) initial implementation, (4) full operation, (5), innovation, and (6) sustainability. Horner et al. (2014) note that while Fixsen et al.'s work is a "useful rubric" (p. 206), it necessitates complex application. This is where Wejnert's (2002) conceptual model for diffusion of innovations is useful because of its strength in qualitatively integrating diverse diffusion concepts, variables and processes (Sriwannawit & Sandstrom, 2015). Wejnert's conceptual model is described in the methods section. Gottfredson et al. (2015) referencing Fixsen et al. (2005) argue that successful implementation "depends on the confluence of features of the intervention, characteristics of the organization adopting the intervention, and external (social, economic, and political) forces in the larger community" (p. 915). This is precisely the function of Wejnert's (2002) framework, which is mapped to Fixsen et al.'s (2005) framework in Appendix A. This appendix also elaborates Fixsen et al.'s core intervention and implementation components. Fixsen et al's exploration and adoption stage is equivalent to the prior conditions, knowledge and persuasion stages of Rogers' innovation-decision process discussed earlier.

The present study systematically identifies published studies of PBS use in disability services and in the provision of support to people with disability to identify and then

synthesises the variables which contribute to its successful introduction. Wejnert's (2002) conceptual model of diffusion of innovations is used to consider these variables and the results are aggregated using established methods. Finally, a conceptual framework and principles are proposed by applying Rogers' (2003) theory to maximise the adoption of PBS in disability services and support contexts.

Method

This study uses the *Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) statement* (Tong, Flemming, McInnes, Oliver & Craig, 2012) to report methods and findings. This study is a systematic identification of the literature and reviews the included studies using meta-aggregation, a process which avoids re-interpretation of included studies and provides reliable qualitative synthesis (see Lockwood, Munn & Porritt, 2015), with two differences. First, it includes relevant quantitative data alongside qualitative data. This modification allows the consideration of all data in the identification of diffusion variables. The second modification is that the methodological quality of included studies was not checked because it was not important for the aims of this study. These will be explained in further detail later in the paper. The following section outlines the search strategy, selection of papers for inclusion, coding, and the meta-aggregation process.

Search Strategy

The search was pre-planned and conducted on 26 February 2020. Databases were selected from those which indexed the *Journal of Positive Behavior Interventions* and the *International Journal of Positive Behavioural Support* as well as other databases appropriate for this study. The list of final databases included Academic Search Complete, Cochrane Library, EMcare, CINAHL, Medline, PsychINFO, Scopus, SOCindex, and Web of Science. The search terms were developed from Horner and Sugai's (2018) commentary on the future direction of PBS and Greenhalgh et al.'s (2004) review of diffusion of innovations in service

organisations. The search terms used were (“positive behavio* support” OR “PBS”) AND (diffus* OR adopt* OR implement* OR disseminat*OR sustain*) AND (disability* OR "intellectual disabilit*" OR "developmental disabilit*" OR "mental* retard*" OR "learning disability" OR autis* OR "brain injur*") NOT school*. School(s) were specifically excluded from the search because the adoption of PBS in schools necessitates consideration of diffusion variables in a different context. No limits were applied. Papers from the brain injury literature were included because of the common classification of brain injury as a disability and their inclusion of PBS practices from the disability field.

Selection of Papers for Inclusion

First, papers were screened for inclusion of “PBS” OR “positive behaviour(al) (interventions and) support(s)” in the title or abstract by the first author. If there was no abstract, then the introduction or equivalent section of the paper was used instead. Manualised and proprietary versions of PBS were excluded. Second, the paper was screened for specification of disability services or the provision of support or service to a person(s) with a disability, intellectual disability, developmental disability, learning disability, autism, and/or brain injury in the abstract. If there was no abstract, then the introduction or equivalent section of the paper was used instead. Third, only empirical studies or those with unclear methodology were included using the definition in Gage et al. (2018) and papers that specifically indicated that the focus was on school or educational settings were excluded. Studies solely evaluating the outcome of “training” were excluded. Papers that contained insufficient detail to permit identification of diffusion variables because of the poor description of how PBS was implemented by staff were excluded. Figure 1 outlines the systemic review method.

<Figure 1 about here>

Analysis of included study characteristics.

The primary disability, setting, and focus of the study were extracted from each included paper and imported into the computer program Visone (Algorithmics Group, 2019) as two-mode directed data for the purpose of visualising the relationships between the variables. Two visualisations were constructed: the relationship between the main disability and the study setting, and between the main disability and the focus of the study.

Coding of Papers

Development of the codebook.

The codebook was developed from Wejnert's (2002) conceptual framework for diffusion of innovations. This framework was previously applied by Hayward, Poed and McKay-Brown (2018) in the context of PBS. Wejnert's framework integrates diverse concepts, variables, and processes related to diffusion of innovations. It consists of three major components and twelve variables. The nature of each variable is described and advice for their application to individual persons and collectives is provided. In the present study, Wejnert's variables and their definitions were restated in respect to PBS to aid in more accurate deductive coding. Table 1 provides details of the components and variables in the framework, and the definitions for coding.

<Table 1 about here>

Coding process.

Included papers were reviewed by the first author multiple times, each time only recording a small number of variables. Muller (2015) used a similar approach in the coding of documents. Papers were read and content relating to the coding variables were highlighted. Repeated reference to the definition of the variables was made throughout coding of each paper. At completion of reviewing the paper, each section of highlighted content was read in conjunction with the coding criteria again and confirmation of coding was made or rejected. Confirmed coded content was copied into the relevant cell of a spreadsheet matrix where

each row was a paper and each column a coding variable. After transferring the highlighted material, the spreadsheet was checked for cells which remained empty on the relevant row. The article was reviewed again in a deliberate attempt to identify any absent coded material. If it was identified, then it was included in the spreadsheet. If it remained absent, then it was recorded as missing. The final step included a visual inspection of the data in each column of the spreadsheet to observe for consistently recorded content. For individual entries which appeared inconsistent with that in the same column (i.e. the diffusion variable), then the corresponding article was re-read to confirm accuracy or not of the recorded data and the matrix was amended as necessary.

Meta-aggregation process.

Typical meta-aggregation processes aggregate findings into categories and further on into synthesis. In the present study, Wejnert's (2002) diffusion variables instead acted as the categories, thereby avoiding this inductive step. This was achieved by applying the levels of plausibility defined by Lockwood, Munn & Porritt (2015) to each item of extracted content in the matrix. Unsupported assertions were not identified in the present study so are not considered in the remainder of this paper. Content from the status, socio-economic, position, and geography variables were not subject to synthesis as these variables contain static content not requiring this level of analysis.

Earlier in this paper we highlighted that our application of meta-aggregation has two main differences to typical application. The inclusion of relevant quantitative alongside qualitative data here allows all coded data to contribute to the identification of diffusion variables. This was necessary because of the variation in the types of studies included in the review and the necessity of including all sections of papers in order to code all possible diffusion variables, many of which do not necessarily relate to the methods or results sections which are common sections from which to code data for systematic review. Results were

synthesised manually into Wejnert's three major diffusion components, namely characteristics of innovations (i.e. characteristics of PBS), characteristics of innovators (i.e. characteristics of those using PBS), and environmental context. Only the findings which were extracted from two or more disability service types (e.g. brain injury, family etc.) were included in the final synthesis, consistent with meta-aggregation procedures which require a minimum of two extracted findings to aggregate. The aggregation procedure followed that described by Hannes and Pearson (2012).

In the present study, unequivocal and credible findings were stated separately for individual diffusion variables. The aggregated findings were allocated to prior conditions, knowledge, and persuasion stages in Rogers (2003) innovation-decision process by contrasting each aggregated finding with the definition of each characteristic in the stage. For example, in the *impact* variable, the finding "PBS can help achieve improved behaviour" can be matched to the *felt needs* prior condition because improving the behaviour of a person with a disability may be a desired need for change. Similarly, improved behaviour through PBS be may perceived as an improvement (advantage) over current practices which are not improving behaviour. The synthesised findings were then fitted to a matrix according to Wejnert's (2002) three major diffusion components and the three included stages of Rogers (2003) innovation-decision process. These are presented as principles and mapped to Fixsen et al.'s core intervention and implementation components.

Results

Characteristics of Included Studies

A total of 27 papers were included in the review and the characteristics of these are outlined in Table 2. The complete references for these papers are listed in Appendix B. The majority of these studies were conducted in the USA, followed closely by England. The settings for the study show some unique results: the USA shows the majority of family

studies, England the majority of disability support service studies, Canada only reported family studies and Australia only reported studies concerning persons with brain injury. The majority of studies concerned the support of persons with intellectual disability (52%). The studies concerning support for persons with autism were overwhelmingly from Canada and the USA. Twenty-two of the 27 studies (81%) were focused on behaviour of persons with disability.

<Table 2 about here>

The visualisation of the relationship between the study populations and the settings shows the dominance of studies of PBS for persons with intellectual or developmental disabilities. Persons with autism, and persons with brain injury show the same number of settings (two each), while the use of PBS for persons with both intellectual disability and autism are from a single setting (Figure 2, left). When considering the focus of studies, those of PBS for persons with intellectual or developmental disability are more common (six purposes). The use of PBS for persons with autism is in two contexts, while both brain injury, and intellectual disability and autism are only in one context each. Behaviour is a focus of studies in all populations (Figure 2, right).

<Figure 2 about here>

Characteristics of the Coded Variables and Findings

A total of 313 findings were coded from the included studies. 228 of these (73%) were unequivocal and 85 (27%) were credible. Studies of disability support services and families accounted for 55% of all coded findings. This is not surprising as 21 of the 27 studies included in the review were from these settings, thereby providing more content from which to code. The "costs" variable accounted for 23% of the findings followed by the "impact" variable with 17%. The least number of findings were coded from the "status", "socioeconomic", "position", and "geography" variables, accounting for a combined total of

17%. Again, this is not surprising as these variables are more static, insofar that they contribute little to the studies themselves and represent more factual elements such as the people involved, where people lived or worked, their titles, and if people were in contact with each other. A total of 41 aggregated findings were included in the final analysis, with 34 of these considered unequivocal. Again, disability services and family studies contributed to the majority of aggregated findings. Appendix C details the extracted findings according to service type.

Synthesised Findings

A total of 26 synthesised findings were developed, with only three of these being credible compared to unequivocal (Appendix D). Each variable has two to four synthesised findings. The "status", "socioeconomic", "position", and "geography" variables were not included in the synthesised findings as previously discussed. Appendix A shows the associations between the stages of the innovation-decision process and the major diffusion components. Synthesised findings related to the characteristics of PBS were applicable to nine of the 12 characteristics across the stages, followed by characteristics of those using PBS with eight, and environmental context with five. The socioeconomic characteristic was excluded from aggregation as previously discussed.

Applied Principles

The synthesised findings were operationalised into a 3 x 3 matrix of principles presented by innovation-decision stage and major diffusion component. Characteristics of PBS contained the most principles (n=16) as did the persuasion stage (n=14). Combined, persuasion of PBS as an innovation contained the greatest number of principles (n=8). Table 3 outlines the full details. Application of Fixsen et al.'s (2005) core implementation and intervention components shows a clear progression consistent with Roger's (2003) stages of the innovation-diffusion process, with staff selection and training present in the prior

conditions stage, coaching and administrative support present in the knowledge stage, and staff evaluation, program evaluation, and systems interventions present in the persuasion stage.

<Table 3 about here>

Using the guidance of Imenda (2014), the principles were integrated into a conceptual framework, bringing together Rogers' (2003) theory and Wejnert's (2002) model to provide a broader understanding of the process for the successful adoption of PBS in disability services (Figure 3). It positions the wider conditions as the necessary first considerations, then attends to the users/implementers of PBS second, then the practices of PBS third.

<Figure 3 about here>

Discussion

Horner and Sugai (2018) challenged the discipline of PBS to address the adoption, implementation and scaled use of PBS. The present study responded to this by identifying key insights from existing studies of PBS implementation in disability services. Using the combination of a systematic review and meta-aggregation, 27 papers were identified from which 313 diffusion variables were extracted. From these, 41 aggregated findings were generated forming 26 final synthesised findings presented as principles for introducing PBS into disability services for successful adoption. Twenty-three of the 26 synthesised principles were unequivocal according to Lockwood, Munn and Porritt's (2015) criteria. This was an unanticipated yet welcomed result, strengthening the robustness of the principles.

The conceptual framework and principles are sufficiently broad so that they can be applied in a variety of disability settings where PBS may be introduced. This allows for the unique variables of each setting to be considered in a staged manner consistent with the innovation-decision process. We chose to present the synthesised findings as principles rather than recommendations to confer the importance of applying them in an integrated manner, as

we did in the development of the conceptual framework (Figure 3). There are few published sources detailing steps towards the adoption of PBS, indicating a tendency to ignore the myriad of considerations necessary for reaching the decision stage where practice can commence and be maintained with a degree of confidence within a disability service. This is why, perhaps anecdotally, that the implementation of PBS sometimes fails in disability services. We say "anecdotally" because of a possible publication bias which we will address in the following section. Failing to appropriately consider the initial introduction and adoption of PBS potentially risks the investment of time and funds, both of which are in short supply in organisations supporting people with disability. Adoption of PBS therefore necessitates more than just "training" (Bosco et al., 2019). Perhaps this is a contributing factor to the relative plethora of studies investigating PBS training compared with studies of systemic implementation of PBS in disability services.

The content of the principles (Table 3) requires some discussion. The *knowledge* stage contains less guidance than the other two stages and we suggest there may be four reasons for this. First, as the innovation-decision process concerns information-seeking and processing to understand how the innovation (in this case PBS) works, the studies included in this review infrequently state who initiated the involvement of the researchers and why. This is an important consideration as researchers here are the individuals whom first obtain information about PBS, not those implementing it. Second, the exclusion of studies primarily about training may have inadvertently excluded details which may have been incorporated in the knowledge stage. Third, Liebe, Husers and Hubner (2016) point out that the decision to adopt an innovation by front-line workers is rarely independent of strategic and operational decisions within the organisation or work unit. It is at these more senior levels that the knowledge stage is influential in the innovation-decision process. And the fourth reason may

be a poor focus on the knowledge stage of the included PBS studies. All four reasons provide opportunities for future investigation.

Similarly, the *persuasion* stage contains comparably more content and we contend that this may be related to the general positive attitude towards PBS by stakeholders seen throughout the literature. As the persuasion stage immediately precedes the decision stage where PBS is adopted or not, there may be an implicit favourable attitude towards PBS, but this is yet to translate to a decision to use it. As such, it is important to look beyond simply attitudes towards PBS as the only criteria to evaluate successful adoption. Berggren (1996) demonstrated a similar finding in the attitudes of midwives who were aware of particular practices (the knowledge stage) but did not believe in using them (the persuasion stage).

At face value, Fixsen et al.'s (2005) core intervention and implementation components usefully fit to the principles according to Rogers' (2003) innovation-diffusion stages. This logically suggests that a successful introduction of PBS first requires a suitable workforce with a necessary understanding of PBS. The next step is progression into practical skill development and feedback from leadership, then into evaluation of staff and the 'program' of PBS. The final step is sustainability through extended resource allocation. The principles presented in Table 3 provide the details necessary to successfully implement these.

The methodology used in the present study met the ENTREQ standards (Tong, Flemming, McInnes, Oliver & Craig (2012) and was strengthened by the use of Wejnert's (2002) conceptual framework. Wejnert's conceptual framework successfully identified diffusion variables in all the included studies, lending additional support for the use of this conceptual framework in PBS. This conceptual framework was easier to apply than Fixsen et al.'s (2005) implementation science monograph which is commonly referenced in the PBS literature, suggesting that Wejnert's conceptual framework may helpfully provide the step between Fixsen et al.'s monograph and practical application of the constructs of

implementation science and diffusion of innovations. Meta-aggregation was an appropriate methodology to synthesise the large number of extracted coded content. While meta-aggregation methods diminish reinterpretation of data by the researcher, the synthesis step requires the researcher to apply an element of subjective interpretation. However, the use of a multi-pass coding method and the separation of unequivocal and credible findings in the synthesis helped to improve the quality of this process.

The risk of publication bias in this study is important to acknowledge. All but the study by Hassiotis et al. (2018) and its subsequent evaluation by Bosco et al. (2019) reported positive outcomes. Studies which quantify the factors which contribute to poor implementation of PBS in disability services would help to balance this, and more importantly, provide direction for future research and practice. There is a bias towards studies from a small number of countries, and interestingly, the only two studies from services supporting persons with brain injury were from Australia and none from this country pertained to the support of persons with intellectual disability. There appears to be a lack of published research about the implementation of PBS in disability services in Australia despite state and national policy advocating for its use (Hayward, McKay-Brown & Poed, 2019).

The dominance of studies of PBS use for people with intellectual disability (Figure 2) highlights under-served populations, particularly people with autism. This is important from the perspective of the cooccurrence of autism and intellectual disability. The focus on behaviour in all but five of the studies shows that PBS is primarily viewed as a method for addressing challenging behaviour (Figure 2). This is a laudable aim; however, it is a narrow application of Dunlap, Sailor, Horner and Sugai' (2009) defining features of PBS. Consistent with the standpoint of the present study, there is opportunity for greater consideration of the systems features of PBS in future studies.

The findings from this study are predicated on PBS coming to the attention of persons who evaluate it and make a decision to adopt it, at least initially. But this is a simplistic perspective. The decision to initially adopt an approach such as PBS is subject to many factors in Rogers' (2003) diffusion of innovations theory. Indeed, sustained PBS practices requires consideration of the additional stages in Rogers' model. There is scope for future studies of PBS implementation in disability services to give more attention to diffusion variables by deliberately accounting for them in implementation planning, manipulating them to identify which may have greater influence, and the examination of networks which may help or hinder the adoption of PBS. Research elaborating these would contribute to reducing the uncertain outcome of introducing PBS.

Conclusion

It is the innovation-decision process that leads to either adoption or rejection of PBS. Adoption ultimately occurs at the decision stage of this process and therefore it is necessary to consider the prior stages for confident progression towards adoption. Introducing PBS for initial adoption is a complex undertaking however this study has helped to clarify the factors important for the adoption of PBS in disability services and articulated these as a conceptual framework (Figure 3) and supporting principles (Table 3) which can be applied by researchers, managers, and practitioners alike. This is the first step for helping PBS to avoid "washing-out" (see Hawe, Shiell & Riley 2009) and thereby remaining significant to affect the system in which it exists so it can deliver meaningful outcomes for people with disability. We concur with McGill et al. (2018) that following successful and sustained adoption of PBS in disability services, the next step should be to apply the wisdom generated from the scaling-up of PBS in schools in North America to PBS in disability services internationally.

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Table 1. Coding criteria developed from Wejnert (2002). This was used as the codebook in the study.

Major component	Variable	Definition
Characteristics of PBS	Impact†	What is the impact of PBS on (a) those implementing it and (b) those in receipt of PBS supports?
	Costs†	What are the (a) monetary and (b) nonmonetary costs of using PBS?
Characteristics of those using PBS	Entity†	(a) Who is using PBS? Individuals or groups, and (b) what was the rationale for selecting PBS?
	Familiarity†	(a) How "new" is PBS to these persons, (b) who suggested PBS be selected, and (c) why is this person(s) or organisation promoting PBS?
	Status	What are the positions or roles of people charged with implementing and/or being trained to use PBS?
	Socio-economic	What are the (a) economic and (b) socio-demographic characteristics of persons involved in implementing PBS?
	Position	(a) Are persons members of the same social group(s) or organisation(s), and/or (b) do they have existing relationships?
	Personal†	What is the confidence and independence of persons to take up and/or use PBS?
Environmental content	Geography	(a) How are the professional and work environments of persons conducive to using PBS, (b) are there groups of persons using PBS within proximity to each other, and (c) are these persons or groups in contact with each other?
	Society†	How do the values, norms, language, religion, culture and ideologies of persons relate to using PBS?
	Political†	How do laws, regulations, policies, and norms influence the use of PBS?
	Uniformity†	(a) What was the source of information for selecting PBS and (b) what encouraged this selection?

Note. † variables subject to meta-aggregation synthesis; PBS = positive behaviour support

Table 2. Description of the studies included in the review (full references are provided in Appendix B)

Author	Country where study was conducted	Setting	Main disability	Focus of study
Arco & Bishop (2009)	Australia	Family	Brain injury	Behaviour
Bambara et al. (2001)	USA	Disability service	Intellectual	Team experience
Binnendyk & Lucyshyn (2009)	Canada	Family	Autism	Behaviour
Boettcher et al. (2003)	USA	Family	Autism	Behaviour
Bosco et al. (2019)	England	Disability service	Intellectual	Behaviour
Buschbacher et al. (2004)	USA	Family	Developmental	Behaviour
Carmichael et al. (2020)	Australia	Practitioners	Brain injury	Behaviour
Cheremshynski et al. (2013)	Canada	Family	Autism	Behaviour
Erbas (2010)	Turkey	Family	Developmental	Behaviour
Grey & McClean (2007)	Ireland	Disability service	Intellectual	Behaviour
Grey et al. (2018)	Ireland	Disability service	Intellectual	Behaviour
Ham et al. (2014)	USA	Workplace	Autism	Behaviour; employment
Hassiotis et al. (2018)	England	Disability service	Intellectual	Behaviour
Iemmi et al. (2016)	England	Family	Intellectual	Economic evaluation
Jensen et al. (2001)	USA	Variety[†]	Intellectual	Behaviour; QoL[‡]
Lee et al. (2007)	USA	Family	Autism	Independent skills
Lewis et al. (in press)	England	Clinical service[§]	Intellectual	Behaviour; QoL
Lucyshyn et al. (2007)	USA	Family	Autism	Behaviour; LT evaluation
Lucyshyn et al. (2018)	USA & Canada	Family	Developmental	Family QoL
McGill et al. (2018)	England	Disability service	Intellectual	Behaviours; care improve.
McClean & Grey (2012)	Ireland	Variety[†]	Intell. & Autism	Behaviour; QoL; MH[¶]
McClean et al. (2007)	Ireland	Disability service	Intellectual	Behaviour; QoL; MH[¶]
Neufled et al. (2014)	Canada	Family	Autism	Behaviour
Palmes & Millington (2012)	England	Family	Intellectual	Behaviour
Riding (2016)	England	Inpatient	Intellectual	Restrictive practices
Shukla et al. (1995)	USA	Disability service	Intellectual	Behaviour; self-initiations
Vaugahn et al. (1997)	USA	Family	Intellectual	Behaviour

Note. [†] this study was conducted in a number of different settings; [‡] quality of life; [§] a community learning disability service; [¶] mental health

Table 3. Principles for the successful introduction of PBS in disability services

Diffusion component[†]	Innovation-decision stage[‡]		
	1. Prior conditions	2. Knowledge	3. Persuasion
Characteristics of PBS	• Why is PBS being considered over all other options? [T] • Who suggested PBS and why? [T] • How will PBS address the needs of people with disability and others? [T] • How will PBS contribute to advancing the existing standards of work? [T] • How will others be encouraged to change their practice towards PBS? [T] • How will others be prepared for assessment of their skills in PBS? [T]	• How will the setting ensure respectful and productive discussion of PBS practice? [T/C/E] • How will data be collected and communicated to inform intervention and evaluation? [C/A]	• What improved outcomes for people with disability, others, and the setting are expected with PBS compared with existing approaches? [P] • How is a PBS approach consistent with what is valued and needed by others? [T/P] • How will others see the results of PBS improve the standard of what they do? [C/E/P] • How will commitment to PBS be sustained when early positive impacts for people with disability and others may not be experienced? [P/A] • How will others be supported to integrate PBS professionals into their workplace for skill development and demonstrated fidelity of practice? [A/I] • How will the setting organise for the development of local materials to support PBS practices? [I] • Are finances available for any unexpected costs? [I] • Are others prepared to seek and facilitate people with disability accessing other services are required? [I]
Characteristics of those using PBS	• How will PBS as an evidence-based practice be viewed by others? [T] • How can others be exposed to the principles and practices of applied behaviour analysis (ABA) prior to PBS? [T] • How will previous knowledge or practice of PBS be used to engage others? [T] • How will others be motivated towards PBS? [T]	• How will those who remain uncommitted or objectors to PBS be supported, and how will their potential negative influence be managed? [T/C/A]	• How will PBS as an evidence-based practice be promoted as the framework for practice and service delivery? [P/A] • How will the setting formally acknowledge implementation of PBS? [P/A] • How is the relationship between PBS and ABA (if it is already known by others) presented positively? [T] • How will others be encouraged to persist with PBS if they have experiences of failed start-up? [C/P/A]
Environmental context	• What is the external influence(s) for the consideration of PBS; how will this be applied? [T] • How is PBS to be used to deliver meaningful outcomes for an individual or group of people with disability? [T] • Why are others interested in changing their practice approach to PBS? [S]	• How will existing shared or espoused beliefs be used to support the introduction of PBS? [C/S/T] • How will the values of the implementing setting be demonstrated by leaders? [A]	• How will the philosophical beliefs and key practices in PBS be matched with the experiences and needs of others? [T/C] • How will the values of the implementing setting be revised to include PBS? [P/A]

Note. [†] from Wejnert (2002); [‡] from Rogers (2003); PBS = positive behaviour support; "Others" refers to those persons providing support to people with disability through the application of PBS; "Setting" refers to the environment where PBS is used in practice. Characters in brackets represent Fixsen et al.'s (2005) core components: T = training; C = coaching; E = staff evaluation; P = program evaluation; A = administrative supports; I = systems interventions; S = staff selection

Figure Legends

Figure 1. Method and outcomes of the systematic review process

Figure 2. Figure 2. Left: Visualisation of populations and settings included in the review. Squares are populations; circles are settings. Right: Visualisation of populations and study foci of the studies included in the review. Squares are populations; circles are study foci. ID = intellectual disability; ASD = autism spectrum disorder; Variety = a variety of settings; DD = developmental disability; Dis. Service = disability services

Figure 3. Conceptual framework for the adoption of PBS in disability services