Communicating With Clients About Treatment Outcomes: The Use of Meta-Analytic Evidence in Collaborative Treatment Planning

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Key Words: consumer participation • outcome study

The purpose of this article is to describe how therapists can use information from the research literature, specifically from meta-analyses, to inform clients and their family members about probable outcomes of participating, or not participating, in treatment. Meta-analyses are particularly useful to clinicians because they summarize findings from a large number of outcome studies in a rigorous, comprehensive, and concise format. The quantitative presentation of meta-analyses may be daunting to those who are not familiar with meta-analytic procedures and statistics. Therefore, this article describes a simple method for making clinically relevant interpretations of meta-analytic results. Furthermore, specific examples that are based on actual meta-analyses are given as models for communicating with clients and their family members about treatment outcomes in order to facilitate collaboration during treatment planning.
that is least likely to be used in communicating with clients yet one of the most highly valid sources for determining the potential usefulness of a particular treatment intervention.

The Use of Meta-Analytic Evidence for Summarizing Treatment Outcomes Research

Research that specifically addresses treatment outcomes is designed to test the benefits of client participation in a treatment relative to the benefits of participation in another treatment (usually called the control treatment) or no treatment at all. With the recent multidisciplinary explosion of this type of research, it is difficult for therapists to access quickly and successfully all relevant studies. One strategy that the therapist can use to minimize the search time required to find all relevant outcome studies is to access a published meta-analysis that summarizes information about outcome findings in a rigorous, comprehensive, and concise format. Despite the tremendous value of a meta-analytic report for summarization, its quantitative presentation may be daunting to those who are not familiar with meta-analytic procedures and statistics. For the therapist to use the meta-analysis effectively, he or she must be able to translate the quantitative summary into useful clinical information. In the discussion that follows, I provide simple guidelines for interpreting meta-analytic evidence and examples of how to communicate meta-analytic findings to clients and their family members during collaborative treatment planning.

How the Meta-Analysis Is Performed

Before communicating with clients and their family members, the therapist must have a general understanding of how a meta-analysis is performed and what the results mean from a clinical perspective. The general steps that the meta-analyst performs are listed in Appendix A. (For technical details regarding meta-analyses, see Cook et al. [1992] and Cooper and Hedges [1994].)

After determining whether the focus of a particular meta-analysis report is relevant to the therapist’s particular clinical practice or to a specific client, the therapist must interpret the reported average effect size statistic (derived from Step 6 in Appendix A). Meta-analysts use many different types of effect size statistics, but two common ones in the rehabilitation literature are the effect size $d$ and the effect size $r$. Although both statistics can be directly translated into clinically useful terms, Rosenthal and Rubin (1982) have created a simple, practical tool called the Binomial Effect Size Display (BESD) for communicating the meaning of the effect size $r$ in terms that therapists and many clients can easily understand. The BESD translates research findings into treatment success rates. Specifically, it compares the percentage of research participants who benefited from a particular treatment procedure with the percentage of research participants who benefited from a control or non-treatment procedure. In the following section, I describe how to use the BESD clinically. I also describe a simple formula (Rosenthal & Rosnow, 1991) for converting the effect size $d$ to an effect size $r$ so that the therapist can use the BESD when the meta-analyst does not report an effect size $r$.

The Clinical Meaning of the Effect Size Statistic

The effect size ($d$ or $r$) is an estimate of the degree to which two treatment conditions (i.e., treatment vs. control) differ in terms of their therapeutic effectiveness, or, alternatively, the degree to which involvement in treatment is associated with a relatively more successful or beneficial outcome than involvement in a control or no-treatment condition. The effect size $r$, in particular, is a correlation, or partial correlation, that depicts the degree of association between treatment and outcome. An $r$ of +1 means that everyone who receives the treatment has a successful outcome, and everyone who receives the control condition does not have a successful outcome. In other words, there is a perfect positive association between treatment and outcome. An $r$ of 0 means that there is absolutely no difference in the outcomes of treatment versus control conditions. On the average, both groups have equal degrees of successful outcome. An $r$ of -1 means that no one who receives treatment has a successful outcome, whereas everyone who receives the control condition has a successful outcome. In this latter case, there is a perfect negative association between treatment and outcome.

Rarely in empirical or clinical practice are treatments found to be perfectly associated ($r = +1$ or $-1$) with outcomes. Because of differences between individual clients in their responsiveness to treatment, limited reliability and validity of outcome measures, problems in the administration of treatment, and many other factors, the associations usually fall on a continuum between 0 and $+1$ or $-1$. To translate more clearly the meaning of $rs$ that range between 0 and $+1$ or $-1$, Rosenthal and Rubin (1982) created the BESD. (See Appendix B for symbolic formulas for all descriptions given in the following paragraphs.) The meaning of $r$ on the basis of the BESD is demonstrated in Table 1, using the findings of three recent meta-analyses relevant to occupational therapists. In Carlson, Fanchiang, Zemke, and Clark (1996), the average effect size associated with the outcome of occupational therapy with elderly clients was found to be $d = .51$. The effect size

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3This $d$ was an “unweighted” calculation of the effect size. The authors reported other $d$s that have been weighted for sample size or reliability. It does not matter which $d$, weighted or unweighted, is used in the transformation to $r$ because from a clinical standpoint, the meaning does not usually change substantially. Furthermore, therapists can use either the weighted or unweighted $r$ when meta-analyses report one or both. In the conversion to the BESD, it usually makes little clinical difference which one is used. The success rates for the control and treatment conditions should sum to 100%. Rounding up or down during the calculations to achieve this sum of 100% is acceptable.
Table 1
Increases in Success Rates Associated With Participation in Treatment

<table>
<thead>
<tr>
<th>Meta-Analysis Report</th>
<th>Treatment Description</th>
<th>Outcome Description</th>
<th>Number of Studies</th>
<th>Effect Size</th>
<th>From (Control)</th>
<th>To (Treatment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlson, Fanchiang, Zenke, and Clark (1996)</td>
<td>Occupational therapy for older adults</td>
<td>Performance and psychosocial benefits</td>
<td>15</td>
<td>.24</td>
<td>38%</td>
<td>62%</td>
</tr>
<tr>
<td>Lin, Wu, Tickle-Degnen, and Coster (1997)</td>
<td>Occupationally embedded exercise</td>
<td>Movement performance</td>
<td>17</td>
<td>.50</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>Fisher (1992)</td>
<td>Play</td>
<td>Developmental performance gains</td>
<td>46</td>
<td>.34</td>
<td>33%</td>
<td>67%</td>
</tr>
</tbody>
</table>

$d$ can be transformed easily to $r$. First, $d$ is squared and added to 4. Second, the square root of the resulting sum is divided into $d$. The final value from this second step is the effect size $r$. With this formula, a $d$ of .51 is transformed to an $r$ of .24. With the BESD, the $r$ of .24 means that there was a 24% difference in beneficial outcome rates between the older clients who received occupational therapy and those who received either no treatment or a non-occupational therapy treatment control.

To determine the success rate (%) for the persons in the control group, the $r$ is converted into a percentage (by multiplying by 100), then divided by 2, and finally subtracted from 50. In Carlson et al.’s (1996) meta-analysis, the percentage of clients in the control conditions who had successful outcomes was 38%. To determine the success rate for the persons who received occupational therapy treatment, the $r$ is converted into a percentage, then divided by 2, and finally added to 50. In Carlson et al.’s meta-analysis, the percentage of clients who had successful outcomes with occupational therapy treatment was 62%. Therefore, the success rate increased by 24% (from 38% to 62%) when occupational therapy was used with older clients relative to when it was not used. If we divide 62% by 38%, we see that the older clients who participated in occupational therapy were more than one and one-half times more likely to have beneficial outcomes than those who did not participate in occupational therapy.

A meta-analysis by Lin, Wu, Tickle-Degnen, and Coster (1997) reported the effect size $r$ and included the BESD interpretation in his report, precluding the necessity for making the calculations. Fisher’s meta-analytic study found that play increased children’s successful performance by 34% ($r = .34$). In other words, 67% of children who played had beneficial developmental outcomes versus 33% of children who did not play. The relative benefit ratio demonstrates that children who played were twice as likely to experience developmental gains as children who did not play.

In these three examples, the effect size $r$ was positive; that is, the treatment had greater successful outcomes than did the control. If a meta-analysis were to have a negative effect size $r$, then the therapist would simply reverse the interpretations as described previously. For example, if the $r$ for an occupational therapy treatment was $-.20$, the BESD would show that the occupational therapy treatment condition had a 40% success rate, whereas the non-occupational therapy condition had a 60% success rate. To date, I have not seen a meta-analysis demonstrating an average negative treatment effect for relevant occupational therapy interventions; however, it is not uncommon to find at least one study contained within a meta-analysis that has found lower benefits for a treatment relative to a control condition. The meta-analysis takes these negative findings into account in the overall average effect size.

Communicating Treatment Outcomes to Clients

Imagine an older woman who has Parkinson’s disease and who has been referred to occupational therapy for treatment. The occupational therapist might well discuss treatment effectiveness to the woman and her family members by using the results of the meta-analysis by Carlson et al. (1996) in the following manner:

You asked me whether it is worth it to become involved in occupational therapy treatment. Your concern is understandable given the cost of treatment and the efforts required to carry out the treatment program.

A recent review of the research on the effectiveness of occupational therapy with older clients found that 38% of clients had positive results without occupational therapy, but 62% had positive results with occupational therapy. A study involving older clients with Parkinson’s disease, in particular, found that clients receiving occupational therapy performed better than those who did not receive occupational therapy, but there was not a large difference between the two groups.

You are unique. You may or may not benefit from occupational therapy. Let’s talk more about the benefits and costs of your participating in occupational therapy.
Similar discussions could occur with clients, using the other meta-analytic studies cited in this article. For example, the middle paragraph in the previous discussion could be substituted with the following paragraph. When talking with an adult who has had a stroke and needs leg strengthening, the therapist could refer to the findings from Lin et al.'s (1997) meta-analysis:

A recent review of the research demonstrated that people do more repetitions of an exercise, do the exercise longer, and move with higher quality when they are participating in activities that aren't simple repetitive exercise motions but rather when they are moving to perform tasks that involve everyday objects. For example, people tend to kick a ball more times than when they simply kick their leg. That's why we use objects in occupational therapy when we are doing strengthening. The use of objects in this manner has been found to be particularly effective with clients who have a neurological condition, like stroke.

When talking to the mother of a child who might benefit from more involvement in play activities, a therapist could use the Fisher (1992) meta-analysis results in the following manner:

A recent review of the research on the role of play in children's development found that about one third of children showed performance gains in activities without playing, but with play, two thirds of children showed performance gains. This review of research was of children who are developing normally. Although your daughter is somewhat delayed in her development, as you are well aware, she may benefit in many ways from participating fully in play activities.

These examples demonstrate that the therapist can choose to use the BESD numbers in various forms, such as in percentages (first example), in fractions (third example), or without the use of numbers (second example). The therapist should be able to move fluently between numerical and nonnumerical interpretations of meta-analytic evidence in order to communicate effectively with different audiences. Some clients, and certainly many colleagues, may prefer and understand the quantitative summarizations, whereas others may find the quantitative summarization obscure or confusing. Nevertheless, the therapist should be fully aware of the probabilities of benefit associated with different treatment methods in order to provide the most appropriate evidence-based treatment options to clients and their family members.

The Importance of Individuating Information in Communicating With Clients About Evidence From Meta-Analytic Findings

One important cautionary note for using meta-analytic evidence for informing clients about treatment outcomes is that the therapist must be fully aware that the probabilities of success derived from meta-analytic findings are based on the average performance of large groups of people. An individual client may derive benefits from the treatment that exceed the group average, that is, do better in response to the treatment than would be anticipated on the basis of the meta-analytic evidence. Alternatively, an individual client may derive less benefit than would be anticipated from the evidence. Therefore, in using this evidence-based approach to communicating treatment outcomes, the therapist must also include individuating information, that is, information that is most relevant to the client's own particular circumstances.

To address treatment outcomes in a communication format that elicits discussion and collaboration and includes individuating information, the following guidelines provide a preliminary and untested suggestion:

1. Validate the importance of client and family decision making.
2. Summarize treatment outcome research in clear, simple language. Use numerical interpretations if preferred and understood by the client. Eliminate technical jargon and use common lay terminology.
3. Provide individuating information that is relevant to the client and his or her family members. Meta-analysts often report effect sizes for subsets of studies in their meta-analyses, for example, results for different types of client populations or age groups and for different types of outcomes. These results are often referred to as "moderator analyses" (see Steps 3 and 7 in Appendix A). Other types of professional literature can be used to individuate the evidence, such as case reports and qualitative research. The therapist's own clinical experience should also enter into recommendations.
4. If the meta-analysis is based on a very small number of studies or studies that do not test treatment outcomes rigorously or powerfully, clarify that the evidence may be weak.
5. Offer to discuss the costs and benefits of participating and not participating in treatment. There are many factors associated with participation in treatment besides treatment outcome factors, such as financial cost, time constraints, or transportation issues.

Conclusion

The rapid and paradigmatic changes occurring in health care delivery are creating challenging questions that occupational therapists must address. Can occupational therapists provide services that are powerfully effective, especially in that they demonstrate outcomes that are observable, timely, and long-lasting? Can occupational therapists engage clients, family members, and other practitioners effectively in the treatment selection process by providing evidence-based information about treatment outcomes? Using meta-analytic evidence to educate ourselves and our clients about treatment outcomes is one method by which we can start to address the challenges posed by these questions. This method falls under the rubric of a larger health care frame of reference called "evidence-based practice" or "evidence-based health care." Researchers and clinicians across the health care professions have begun to develop concrete, sys-
tematic strategies for using research methods and findings in clinical decision making, treatment implementation, and outcomes monitoring (Sackett, Richardson, Rosenberg, & Haynes, 1997). The approach presented in this article conforms to this larger health care frame of reference, yet it contributes a unique perspective not often highlighted in the developing literature on evidence-based practice. The unique perspective is this: The communication of research evidence about treatment outcomes between practitioner and client is fundamental to the ethics of collaboration. ▲

Acknowledgments

I thank Ching-min Chang, MS, OT, for informing me about Fisher’s (1992) meta-analytic study. I also thank Robert Rosenthal, PhD, for his helpful critique of the manuscript.

Appendix A

The Steps the Meta-Analyst Follows When Performing a Meta-Analytic Review of the Research

Step 1. Identifies which treatment and what types of outcomes are the focus of the meta-analysis.

Step 2. Conducts a comprehensive search for quantitative research studies that are relevant and records which studies do and do not meet basic quantitative and design criteria.

Step 3. Records major characteristics of each study, such as age, gender, and clinical status of research participants; method; duration and intensity of treatment; specific outcome measures; research design used; and types of experimental control.

Step 4. Makes a quantitative transformation of the reported statistical findings of each study. This transformation ensures that each study has a uniform statistic, called the effect size, so that the studies’ findings can be averaged.

Step 5. Averages the effect size of the studies in order to arrive at the general effect of treatment on all outcomes across all studies.

Step 6. Reports the average effect size as well as summarizing information about characteristics of the studies.

Step 7. Reports how characteristics of the studies (recorded in Step 3) are related to the effect size. For example, studies of older clients may show larger treatment effects than studies of younger clients.

Appendix B

Formulas Involved in Calculating Success Rates

The following three formulas are drawn from Rosenthal and Rosnow (1991) or Rosenthal and Rubin (1982):

1. Formula for converting effect size \( d \) to \( r \):
   \[
   r = d / \sqrt{d^2 + 4}
   \]

2. Formula for success rate of clients who receive the control or no-treatment condition:
   \[
   \text{success rate for control condition} = \frac{50 - (r \times 100)}{2}
   \]

3. Formula for success rate of clients who receive treatment:
   \[
   \text{success rate for control condition} = \frac{50 + (r \times 100)}{2}
   \]

References


