Contacting participants for follow-up: how much effort is required to retain participants in longitudinal studies?

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Abstract

Participant retention is essential to the success of longitudinal research projects. Locating participants for follow-up is often time consuming and expensive, which may result in researchers limiting their contact efforts for budgetary reasons. Yet if such a protocol is instituted a fair number of participants will likely be lost. This paper examines the impact of restricted persistence on participant retention and selective attrition in longitudinal research. The data was collected from the developmental trends study (DTS), a longitudinal study of the development of disruptive behavior disorders, consisting of 177 clinic-referred boys who were followed from childhood through young adulthood. The results indicated that limiting contact efforts would have resulted in significant participant loss and selective attrition for participants with disruptive behavior disorders. Cost-estimates showed that the extra effort required to retain ‘difficult’ participants was minimal compared to the initial investment in study costs. Implementing systematic and comprehensive approaches to retention will result in favorable retention rates and can be done in a cost-effective manner.

Keywords: Participant retention; Selective attrition; Longitudinal research; Cost analyses; Participant tracking; Difficult subjects

Longitudinal studies allow researchers to address questions of etiology and development in a variety of areas of interest, as well as outcomes of prevention efforts and intervention strategies (Stouthamer-Loeber, Van Kammen, & Loeber, 1992). Longitudinal designs are especially favorable to researchers assessing childhood psychopathology (Loeber & Farrington, 1994), internalizing disorders (Ollendick & King, 1994), and childhood adjustment problems (Stanger, Achenbach, & Verhulst, 1994). Despite the great interest in longitudinal designs, they are often difficult to carry out, due in large part to the substantial financial investment required (Calpaldi & Patterson, 1987).

There are numerous factors that must be considered for a longitudinal study to be successful. Preplanning is crucial to develop the practical details of the design as well as to identify budgetary issues of the study (Stouthamer-Loeber et al., 1992). One factor that must be considered during the planning stage is a strategy for recruiting and retaining participants. Shumaker, Dugan, and Bowen (2000) warned that many researchers spend little time on theoretical models related to retention and often view participation as a nuisance and somewhat secondary concern.

The success of longitudinal studies depends entirely on the sustained cooperation of its participants. Often, participants are difficult to contact or locate for follow-up assessments, and searching for such participants may require the exploration of a variety of resources. In an earlier report on participant retention (Cotter, Burke, Loeber, & Navratil, 2002), we found that as participants aged, contact efforts increased and scheduling problems were more common. Thus, locating and ultimately retaining participants at follow-up is generally more time consuming and financially burdensome to a research project.

An important issue that researchers need to consider is how much time and effort they are willing to allocate to retain individual participants. Researchers must weigh the time and cost required to retain ‘difficult’ participants versus participant loss and the potential negative effects attrition may have on their long-term outcomes. In general, there is no real consensus in the literature of how much time should be spent tracking participants, with most studies mentioning only that interviewers need to remain persistent.
To some, it may seem prudent for a research project to establish a protocol where limits are placed on contact efforts or the amount of time spent tracking participants. In doing so, researchers would be able to more accurately plan their budgets and timetables. Researchers may also exclude participants at follow-up if they relocate, become incarcerated, or the like. However, such protocols would likely lead to significant increases in participant attrition. Successful outcomes are more likely when an emphasis is placed on vigorously tracking participants.

When participants are not located or refuse to participate at follow-up assessments, selective attrition may be a factor, resulting in the research findings being compromised, threatening both the internal and external validity of the research (Flick, 1988). Statistical procedures such as endpoint analyses, time-controlled analyses, and regression techniques have been developed to address data problems due to subject loss, however, Flick (1988) cautioned that with any statistical method implemented, possible biases might be introduced.

Selective attrition refers to participant loss that is not random; rather there are common characteristics among those participants who drop out. Prinz et al. (2001) stated that if patterns of non-participation occur it may be difficult to determine to whom the results apply. Further, Farrington, Gallagher, Morley, St Ledger, and West (1990) argued that lost subjects are usually not representative of the entire sample. These subjects often include a disproportionate number of antisocial and criminal participants of interest to researchers.

Previous studies have identified certain participant characteristics such as ADHD (Green, Navratil, Loeber, & Lahey, 1994), substance abuse (Siddiqui, Flay, Phil, & Hu, 1996), and minority race (Badawi, Eaton Mlylyluoma, Weimer, & Gallo, 1999) to be commonly associated with attrition in longitudinal studies. Cordray and Polk (1983) stated that selective attrition does occur, and it is not only correlated with general dimensions such as class background, ethnicity, and educational achievement, but also with deviant behavior. Therefore, researchers must be aware of the characteristics that make up their sample and have well developed strategies to retain those participants that may have an increased likelihood of dropping out. For instance, Hartsough, Babinski, and Lambert (1996) suggested longer contact intervals for socially and behaviorally disordered samples.

At what point does participant loss bias research outcomes? Vaillant (as cited in Desmond, Maddux, Johnson, and Confer (1995)) stated that a 5% attrition rate may cause a study to lack credibility and that studies with a 20–25% attrition rate ‘are probably not worth doing’. In contrast, Polich (as cited in Desmond et al. (1995)) stated that 70% is an acceptable retention rate and further argued that the expense and time needed to increase the rate above 70% exceeded the contribution of the added cases to the overall validity. In general, researchers trust that an 80% capture rate is sufficient (Fischer, Dornelas, & Goethe, 2001).

Although it is difficult to determine the extent to which lost participants would contribute to the overall value of a study, we contend that the extra effort required to retain such individuals is worthwhile. Considering the initial financial investment involved for each participant in a study, the added costs associated with tracking difficult participants would likely be minimal.

The present paper examines participant retention in the developmental trends study (DTS), a longitudinal study examining the development of disruptive behavior disorders. Through utilizing a systematic approach to retention, and placing an emphasis on tracking participants, the DTS has achieved a high retention rate. We were interested in examining what effect less persistence would have had on our retention rates. Specifically, we address the following questions:

1. What effects would setting contact limits have on our overall retention?
2. If we set limits on contact attempts, does selective attrition occur for those participants with disruptive behavioral disorders?
3. Are the financial costs required to retain difficult participants worthwhile to a research project?

1. Method

1.1. Subjects

The DTS is a longitudinal study of the development of disruptive behavior disorders in a sample of 177 clinic-referred boys recruited in two states in 1987 (Pennsylvania (n=96); Georgia (n=81)). The sample was 70% white and 30% African–American. Regarding socioeconomic status, 41% of the sample fell within the lower two levels of Hollingshead (1975) index. At the beginning of the study, nearly half the sample lived in a rural setting (47.5%), and the remainder was considered urban residents. The sample included a high proportion of boys with disruptive behavior disorders. Using DSM-III-R (American Psychological Association, 1987), at initial study assessment, 83.6% qualified for oppositional defiant disorder (ODD), 38.4% for conduct disorder (CD), and 68.9% for attention deficit hyperactivity disorder (ADHD). For additional information regarding the sample and the study, please see Loeber, Green, Lahey, Frick, and McBurnett (2000).

1.2. Procedure

In earlier reports of participant retention in the DTS (Green et al., 1994; Navratil, Green, Loeber, & Lahey, 1994) project years 1–5 of the DTS were examined.
Retention rates for years 2, 3, and 4 were 100, 97.7, and 98.0%, respectively. Full assessments could not be conducted in year 5 due to a lack of funding. The current paper expands on these earlier findings and focuses on retention data obtained for project years 6–13 of the DTS.

Each of the participants and a biological parent (the mother in almost all cases) were interviewed annually until the age of 17. Interviews completed up until the participant was 17 years old were considered youth interviews, while interviews completed while the participants were 18–19 years old were categorized as young adult interviews, and conducted without the parents. The current paper uses data from follow-up assessments through age 19 participation, which results in a range of waves for each age. That is, 17 year olds at year 6 were interviewed three times, 16 year olds four times, and so on, with the youngest group (12 year olds) completing eight interviews.

In year 6, parents were paid $40 and boys $20 for their participation. Parent payments were increased by $5 in year 8 and each year thereafter. Child payments increased by $10 in years 7 and 8, and by $5 per year through their age 19 participation. The standard interview protocol was to have the participant come into the office to complete the assessment. If the participant was unable to come into the office, a home interview was attempted, and as a last resort, a telephone interview was conducted. If a participant was incarcerated or institutionalized, attempts were made to conduct the interview within the institution.

1.3. Measures

1.3.1. Contact attempts

Our measure of contact attempts included any discrete act directed towards completing an interview with a participant. The first contact attempt was almost always a letter sent to the last known address of the participant. Subsequent contact attempts included phone calls, Internet searches, personal visits and correspondence to family members, as well as efforts to obtain or verify new contact information, and calls to schedule or confirm the time of the interview. Documentation regarding each effort to contact the participant was maintained for each year, and as a last resort, a telephone interview was conducted. If a participant was incarcerated or institutionalized, attempts were made to conduct the interview within the institution.

1.3.2. Child functioning

Symptoms of psychiatric diagnoses were assessed by separately interviewing the participant and his parent at each phase using parallel parent and child versions of the NIMH Diagnostic Interview Schedule for Children (Costello, Edelbrock, Dulcan, Kalas, & Klaric, 1987). Diagnoses of ADHD, CD, ODD, overanxious disorder, separation anxiety disorder (SAD), dysthymia, and major depression were assessed. However, the portion of the DISC used to assess ADHD was dropped from the child assessment interview following year 2. Therefore, ADHD symptoms used in this study were generated using only parent report.

2. Results

2.1. Retention rates

The DTS has maintained a high retention rate. On average, the retention rate for the youth cohort was 92.6%, with a 7.4% refusal rate and 0% of the participants not located. The retention rate for the young adult cohort was 90.3%, with a 7.7% refusal rate and 2.0% of the participants not located.

The mean number of contact attempts steadily increased each year, in both the youth and young adult cohorts, except for year 9 where there was a slight decrease in the number of contact attempts (see Fig. 1). Therefore, as participants aged, more work and time was needed on the part of the interviewer in order to locate them and complete interviews.

In project years 6–13 a total of 10,756 contact efforts were made. Of this total, 9852 contacts accounted for participants who completed interviews, while 904 (8.4%) contact attempts resulted in the participant ultimately refusing participation or not being located. This finding illustrates the considerable amount of time researchers may spend tracking participants with unfavorable results. However, we largely viewed refusals as circumstantial and had great success approaching participants the following year. In the time period examined, 72% of the participants who refused an assessment were retained in the following year.

Fig. 1. Mean number of contact attempts to complete interviews for project years 6–13 of the DTS.
2.2. Limiting contact attempts

Examining each contact attempt across project years 6–13 that led to the completion of an interview, we set cutoff points at 5, 10, and 20 contact attempts and compared the results to our actual retention, which consisted of unlimited contact efforts.

Figs. 2 and 3 compare the overall retention rates for the youth and young adult assessments with what the DTS retention rates would have been had we restricted our contact efforts. Both the youth and young adult cohorts would have experienced significant participant loss if contact limitations were imposed. The attrition rates steadily increased across the project years and were more significant for the young adult cohort. This trend supports our earlier finding (Cotter et al., 2002) that more effort is required to retain participants over the course of a study.

To gain a general overview of the number of contact attempts required to complete interviews, we clustered the number of attempts into three groups: 0–10 attempts, 11–20 attempts, and 21 attempts or more. Both the youth and young adult contact efforts were included in these groups. Fig. 4 shows that if we had stopped trying to contact participants after 10 attempts we would have lost nearly a third (32%) of our participants. Likewise, we would have lost about 12% of the participants had we limited our contact efforts to a maximum of 20 attempts.

2.3. Selective attrition

Since our study largely focused on deviant behavior, we were particularly interested in examining whether or not setting contact limits would have led to increased attrition rates among those participants with disruptive behavior disorders. To examine selective attrition, we developed dummy variables to indicate: (1) those who were retained versus those who were not (unlimited contacts); (2) those who were retained with 20 or fewer contact attempts versus those who required more to complete an interview; and (3) those who were retained after 10 or fewer contact attempts versus those who required more. We used logistic regression models with robust estimators of variance to analyze the relationship between the disorder and the retention outcome.

Since we did not collect data on these disorders at young adult follow-up, these analyses use data only from the youth cohort from years 6 to 11. When no limitations were placed on contact efforts, ADHD, ODD, and CD were not significantly related to retention. However, when contact attempts were limited to 20 or fewer, those with CD were significantly less likely to be retained (OR = 0.33, SE = 0.095, p < 0.001), as were those with ODD (OR = 0.42, SE = 0.12, p = 0.002). Likewise, when contacts were limited to 10 or fewer, those with CD were still less likely to be retained (OR = 0.39, SE = 0.08, p < 0.001),
as were those with ODD (OR = 0.48, SE = 0.09, \( p < 0.001 \)). Restricting contact attempts did not significantly influence participants with ADHD.

Figs. 5 and 6 show that limiting our contacts to 10 attempts would have resulted in a 36% attrition rate for participants with CD and 32% attrition rate for participants with ODD. Likewise, limiting contacts to 20 attempts would have resulted in attrition rates of 15 and 12% for CD and ODD, respectively.

2.4. Cost analyses

We were further interested in obtaining an estimate of the cost required to complete assessments for those participants who would have been lost had we imposed contact restrictions. For this purpose, we determined, albeit roughly, two figures: the value of each interview, and the cost of each contact attempt. Since obtaining new data was key to the project, we considered each interview to share a direct proportion of the worth of the study. The total value of the project, as determined by direct costs approved by grants from NIMH, was $1,260,238 during years 6–13. We sought 966 assessments during this time. Based on its relative proportion of the overall project, each assessment thus had an initial investment of $1304.

To determine the cost for each contact attempt, we identified the project costs related only to contact efforts. Project costs for the ‘tracker’, the person responsible for locate participants and schedule interviews, totaled $214,421 for years 6–13 of the study, and resulted in the aforementioned 10,756 contact attempts being made. The estimated cost per contact was determined to be $19.93, which we rounded to $20.00 per contact attempt.

If we limited our efforts to 20 contact attempts, 109 assessments would have been lost, which would be valued at $142,136 based on the initial investment figures. We spent a total of 4706 contact attempts trying to retain participants beyond those participants who participated with 20 or fewer contact attempts. The cost to retain participants above 20 contact attempts would have been $94,120. When compared with the value lost from the initial investment in each assessment, utilizing a protocol of unlimited contact attempts appears not to be unduly costly in financial terms, which themselves pale in comparison to the scientific costs of participant loss and selective attrition.

3. Discussion

Placing restrictions on contact efforts or participant tracking would have resulted in significant participant loss in the DTS. The amount of time and effort that is required to locate participants at follow-up varies greatly. There is no definable time frame or number of contacts that determines the effort required to locate participants. Davis, Broome, and Cox (2002) reported that the estimated number of contacts to locate participants for follow-up ranged from 3 to 7 attempts. However, many cases require far greater effort to secure participation.

As participants grow older they are likely to change patterns in their lives and thus be more difficult to contact for follow-up. In the DTS, the mean number of contacts required to completed interviews for our youth cohort was 5.81 attempts, while the mean number more than doubled (14.22) for our young adult interviews. The majority of participants were located through past contact references or relatively simple search methods, such as on-line directories (Cotter et al., 2002). However, a fair number of cases required a variety of search methods to locate participants. Exploring various search methods is often time consuming and results in no new contact information being acquired. However, persistence will likely yield favorable results.

We found that the majority of our participants, approximately 65%, were retained with 10 or fewer contact

Fig. 5. Selective attrition due to conduct disorder (retention by contact attempts).

Fig. 6. Selective attrition due to oppositional defiant disorder (retention by contact attempts).
attempts; however, a substantial amount (12%) of participants required over 20 contact attempts to retain. We argue that retaining these difficult participants is vital to the integrity of the study and its conclusions. By developing cost-effective retention strategies, researchers can afford to place a greater emphasis on locating and retaining lost participants.

Well-planned approaches to retention can greatly minimize problems at follow-up, such as overcoming problems with resistant or reluctant participants and acquiring contact information for transient participants. Eckland (1968) stated that these are the participants that are likely to be lost in longitudinal studies simply because not enough effort is made to retain them.

Retention strategies described by Badawi et al. (1999), Cottler, Compton, Ben-Abdallah, Horne, and Claverie (1996), Desmond et al. (1995), Morrison et al. (1997), Sullivan, Rumpz, Campbell, Eby, and Davidson (1996), and Weinberger, Weinberger, Fineberg, Fineberg, and Wagner (2002) stress adjusting the order of tracing procedures by their expected yield. Accordingly, tracking methods can be adjusted by their overall cost allowing researchers to invest in more costly resources only for those participants that have not been located through lesser, more inexpensive search methods. Shumaker et al. (2000) stated that a participant’s contact and scheduling history, based on good tracking data, is essential for cost-effective retention.

Since our study focuses on the development of disruptive behavior disorders, the finding that participants, identified with CD and ODD, would have had a greater likelihood of not being retained had we limited our contact efforts was particularly significant. Such a loss would have compromised our study from achieving our long-term outcomes. Cordray and Polk (1983) stated that the differential loss of deviant participants would likely distort the results of bivariate and multivariate analyses observed based on information obtained from the remainder of the sample.

Cost analyses conducted in other studies (Margitic et al., 1999; Weinberger et al., 2002) were able to fairly accurately determine their direct costs in relation to contacting and retaining participants. Both studies concluded that through utilizing cost-effective protocols, participant retention costs were relatively modest. Likewise, in the present study, we were able to roughly estimate the extra cost required to retain participants utilizing a protocol of unlimited contact attempts, and found that the cost to retain more difficult participants was minimal compared to the overall costs of the project itself.

Interviewer persistence is essential for longitudinal studies to minimize attrition. Researchers are encouraged, during the planning stages of a study, to develop comprehensive strategies in regards to retention. Such strategies can be developed in a cost-effective fashion that allows researchers maximize their retention rates while keeping the costs minimal. Through utilizing a protocol that emphasizes vigorously tracking participants, exploring a variety of search methods, and creative teamwork, longitudinal studies will be more likely to be successful in addressing their long-term aims.

4. Lessons learned

Entering the 17th year of the project, the DTS has faced many problems common to all longitudinal studies, especially issues concerning participant retention. The one certainty we have realized is that there is no ‘magical’ method of achieving high retention rates; rather it requires commitment and persistence from the entire project staff. For more information on tracking participants and securing their continued cooperation, the reader is referred to Cotter et al. (2002).

Although the cost analyses in the current study represent only rough estimates of retention costs we feel it would have been beneficial to have a more accurate account of our direct costs towards retention. Accurate recording of retention costs will allow for researchers to strengthen their overall retention protocols for budgetary reasons and foreseeing potential scheduling problems.

The DTS has always placed an emphasis on vigorously tracking participants, which has led to a low attrition rate. The present study emphasizes the importance of retaining participants, especially those of a special population. Researchers are encouraged to examine their retention procedures to ensure that they are maximizing their resources to achieve high retention rates.

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References


