Impact of an environment-focused problem-solving and goal setting intervention on self-determination for transition age youth with developmental disabilities

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Thesis

IMPACT OF AN ENVIRONMENT-FOCUSED PROBLEM-SOLVING AND GOAL SETTING INTERVENTION ON SELF-DETERMINATION FOR TRANSITION AGE YOUTH WITH DEVELOPMENTAL DISABILITIES

by

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IMPACT OF AN ENVIRONMENT-FOCUSED PROBLEM-SOLVING AND GOAL SETTING INTERVENTION ON SELF-DETERMINATION FOR TRANSITION AGE YOUTH WITH DEVELOPMENTAL DISABILITIES

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ABSTRACT

High levels of self-determination are associated with positive adult outcomes for young adults with developmental disabilities. Project TEAM is an intervention that teaches skills related to self-determination. The primary aims of Project TEAM are attainment of activity goals and increase in curriculum-related knowledge. This secondary analysis of a quasi-experimental study with pre and post measures and two non-randomized groups (Project TEAM participants and a “goal-setting only” comparison group) had two aims: (a) to evaluate if participation in Project TEAM is associated with greater increases in self-determination over time compared to participation in a “goal-setting only” condition; and (b) to identify predictors of change in self-determination. ANCOVA and ANCOVA analyses evaluated change in self-determination over time and regression analyses were used to evaluate predictors of changes in self-determination. The results suggest a non-significant pattern of increase in self-determination for all youth over time. Although no significant within or between group differences were identified for youth-reported changes in self-determination, youth who were younger and/or had lower levels of self-determination at baseline had greater increases in self-determination, with initial self-determination contributing significant unique variance to a predictive model. The inclusion of adaptive behavior as a covariate
led to the loss of within group effects for parent-reported changes in self-determination. However, adaptive behavior was not significantly associated with or predictive of changes in parent-reported self-determination. We propose that our results reflect a dynamic relationship between personal characteristics, youths’ and parents’ frames of reference, and perceived self-determination.
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Introduction

Higher levels of self-determination are consistently associated with positive adult outcomes for young adults with developmental disabilities in areas including independent living, employment, and quality of life (Chambers, et al., & Singh, 2007; Lachapelle et al., 2007; Wehmeyer, et al., 2004; Wehmeyer & Schwartz, 1997; Wehmeyer & Shalock, 2001). The results of several studies demonstrate that self-determination can be effectively taught to transition-age youth with a variety of abilities (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000; Wehmeyer, Palmer, Williams-Diehm, & Shogren, 2010; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2013). The majority of self-determination interventions teach goal setting, self-monitoring, and problem solving skills.

Project TEAM is an intervention that teaches the above self-determination skills to transition-age youth with an explicit focus on identifying environmental barriers and supports, generating solutions to resolve barriers, and advocating for environmental changes to support participation in valued activities (Kramer et al., 2013; Kramer, Romer, Liljenquist, Shin, & Hart, 2014). Prior research has documented that participants in Project TEAM show attainment of activity goals and increases in curriculum-related knowledge (Kramer et al., 2014). Because Project TEAM teaches many of the aforementioned skills commonly addressed in self-determination interventions, it may also result in a secondary outcome of increased self-determination. Therefore, the aims of this analysis were to explore (a) if participation in Project TEAM is associated with greater changes in self-determination than participation in a “goal-setting only”
condition; and (b) to identify predictors of changes in self-determination. The results of this analysis may help guide clinicians and educators when selecting self-determination curricula and by identifying characteristics that may predict changes in self-determination.

**Background: Self Determination**

The disability community defines self-determination, or agenic action and choice making, as a right (Wehmeyer, 1998). This right is illustrated in the mandated student involvement in transition planning in the Individuals with Disabilities Education Act (IDEA) (Wehmeyer & Shalock, 2001; Wehmeyer, 2007). This mandate has led to an increased focus on special education students identifying the goals they want to achieve after transition to adulthood in areas such as employment and independent living (Agran & Wehmeyer, 2000; Powers et al., 2001).

Theorists operationalize self-determination as a set of skills, including problem solving, self-monitoring, goal setting, decision making, self-monitoring, self-awareness, and self-advocacy (Wehmeyer, 1999; Wehmeyer, 2007). Researchers have consistently linked self-determination and related skills with positive outcomes for young adults with developmental disabilities, such as employment, independent living, and quality of life (Chambers et al., 2007; Lachapelle et al., 2005; Wehmeyer et al., 2004; Wehmeyer & Schwartz, 1997). For example, Wehmeyer and Schwartz (1997) documented that transition age youth with cognitive disabilities who had “high” self-determination were over 30% more likely to have a paid job one year after high school graduation than their peers who had “low” self-determination. In addition to self-determination being linked to
positive adult outcomes, educators have documented positive correlations between self-determination and increased involvement with and knowledge of transition-planning in high school students (Lee et al., 2012; OSEP, 2005; Wehmeyer, Palmer, Soukup, Garner, & Lawrence, 2007).

**Interventions promoting self-determination**

As research has consistently documented positive correlations between self-determination and positive adult outcomes, several curriculums have been developed to teach the skills and behaviors associated with self-determination. Researchers have consistently found that classroom based interventions that explicitly teach goal setting and use of metacognitive strategies not only improve goal setting and metacognitive strategy use themselves (Fullerton & Coyne, 1999), but also increase self-determination (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Hoffman & Field, 1995; Zhang, 2001) and empowerment (Powers et al., 2001). The efficacy of a variety of classroom-based self-determination curricula was demonstrated in a five-year longitudinal randomized trial (Wehmeyer et al., 2013). In this study, high schools in six states were randomly assigned to implement a self-determination curriculum of their choice during the regular school day for special education students. All the curricula addressed the common elements of selecting goals and planning how to express and/or achieve these goals. The control groups received a placebo intervention not focusing on self-determination. Wehmeyer and colleagues found that students with both intellectual and learning disabilities experienced increases in self-determination significantly greater than controls (Wehmeyer et al., 2013).
Although the research indicates that a variety of approaches can be used to teach self-determination to students with disabilities, the self-determined learning model of instruction (SDLMI) has been most widely studied (Agran, Blanchard, & Wehmeyer, 2000; Agran, Cavin, Wehmeyer, & Plamer, 2006; McGlashing-Johnson, Agran, Slitlington, Cavin, & Wehmeyer, 2003; Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012; Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000; Wehmeyer et al., 2010). The SDLMI uses a three phase problem solving approach: set a goal, take action, and adjust the goal or plan (Wehmeyer et al., 2000). Four “self-talk” questions are used in each phase to direct the learner to, “identify the problem, identify potential solutions to the problem, identify barriers to solving the problem, and identify consequences of each solution” (Wehmeyer et al., 2000, p. 442). In an initial study, Wehmeyer and colleagues observed a significant increase in self-determination after use of SDLMI and attainment of goals by 55% of students (Wehmeyer et al., 2000). Other researchers have also documented the efficacy of the SDLMI for access to the general curriculum (Shogren et al., 2012), achievement of academic and transition-related goals (Agran, Blanchard, & Wehmeyer, 2000; Agran, Cavin, Wehmeyer, & Plamer, 2006; Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012), and job-related goals (McGlashing-Johnson, Agran, Slitlington, Cavin, & Wehmeyer, 2003). Together, these results point to the usefulness of self-determination interventions to promote the attainment of positive adult outcomes.

**Project TEAM.** Project TEAM is another self-determination curriculum. Like SDLMI, it also teaches a problem-solving sequence and utilizes “self-talk” questions.
The goals of Project TEAM are to teach transition age youth with disabilities how to systematically identify and advocate for the resolution of environmental barriers to participation and to meet an activity goal in the community, school or work. This explicit focus on identifying and resolving environmental barriers and supports to goal attainment, makes Project TEAM unique within self-determination curricula.

In Project TEAM, two facilitators (a licensed clinical professional and a self-advocate) teach problem solving through the metacognitive problem solving process Goal, Plan, Do, Check (Meichenbaum, 1977). This strategy employs “self-talk questions,” each of which support problem solving and/or self-monitoring of goal attainment. In Project TEAM, Goal, Plan, Do, Check is operationalized as the “Game Plan.” To answer the self-talk questions, youth are taught to consider eleven unique categories of the physical and social environment and six strategies to resolve environmental barriers. Each step of the Game Plan teaches skills that have been linked to self-determination (Table 1). For example, “Plan Step 1” and its associated self-talk question, “What parts of the environment help me or make it harder for me?” prompts youths to consider their abilities (self-knowledge) and how these abilities interact with the environment (self-awareness).

Project TEAM is designed to be accessible to youth with a range of developmental disabilities, including those with associated cognitive impairments, such as intellectual disability. Accordingly, Project TEAM provides multimodal learning opportunities and structured activities. By providing these learning supports and explicitly teaching skills related to self-determination, such as goal setting, self-
awareness, and problem solving, Project TEAM supports the development of self-determination (Kramer et al., 2013; Kramer et al., 2014). Additionally, completion of intervention activities and goal outings provide youth with opportunities to practice engaging in self-determined behaviors and receive feedback in a supportive environment.

**Characteristics Related to Self-determination**

Many studies have attempted to identify predictors of self-determination. Two types of variables related to self-determination have been examined: individual (including cognitive abilities, age, and adaptive behavior) and environmental (including opportunity to engage in self-determined behaviors).

There is inconsistent evidence regarding the relationship between cognitive abilities (including IQ) and self-determination. Some researchers have found that individuals with higher IQs are more likely to have higher levels of self-determination (Nota, Ferrari, Soresi, & Wehmeyer, 2007; Wehmeyer et al., 2011). Yet in one study, IQ did not predict membership in a “high” versus “low” self-determination group (Wehmeyer & Garner, 2003). Additionally, results from several intervention studies have indicated that the ability to benefit from self-determination interventions is not related to IQ. In a five-year longitudinal study, Wehmeyer and colleagues reported that on one outcome measure, high school students with intellectual disabilities (and lower IQs) made greater gains in self-determination over the course of intervention than those with learning disabilities (and average IQs). However, these findings were not replicated with a second outcome measure, on which all students, with a range of IQs, experienced increases in self-determination over the course of intervention (Wehmeyer, et al., 2010;
Wehmeyer, et al., 2013).

Chronological age may also be associated with gains in self-determination. Wehmeyer (2011) proposed that self-determined behavior is a developmental process that naturally increases with age. This hypothesis was supported by the observation that over the course of a five-year longitudinal study, youth in both the control and intervention groups experienced increases in self-determination over the first three years (Wehmeyer et al., 2013). However, this finding has not been replicated.

As self-determined behaviors include interaction with other people and self-regulation, adaptive behavior and social skills have been evaluated for their relationship with self-determination. One study indicated a positive association with adaptive behavior and self-determination (Stancliffe, Abery, & Smith, 2000) and several have documented the potential role of social skills (Nota et al., 2007; Carter, Trainor, Owens, Sweden, & Sun, 2010; Pierson, Carter, Lane, & Glaeser, 2008).

In addition to personal factors, environmental factors such as opportunity to practice self-determined behaviors may also be related to self-determination (Wolman et al., 1994). For example, people with intellectual disability experienced increases in self-determination after moving to community settings from more restrictive environments (Wehmeyer & Bolding, 2001). Furthermore, personal characteristics may influence self-determination indirectly through opportunity. Although the previously described research suggested that IQ and adaptive behavior may be meaningfully related to self-determination, studies have suggested that these personal characteristics may be associated with self-determination insofar as they tend to predict the environments in
which people work and live, with people who have higher IQs and adaptive behavior living and working less restrictive environments (Wehmeyer & Bolding, 1999; Wehmeyer and Gardner, 2003). Less restrictive settings are believed to provide people with disabilities more opportunities to engage in self-determined behaviors, resulting in higher levels of self-determination. This hypothesis is supported by the observation that youth in special education classrooms reported lower levels of self-determination (including opportunities) than their peers in less restrictive general education classrooms (Wolman et al., 1994). A similar relationship was noted for adaptive behavior, in which individuals with greater adaptive behavior both lived in less restrictive settings and had greater self-determination (Stancliffe et al., 2000). Combined, these studies provide an argument for a relationship between environmental opportunities and self-determination.

The above personal and environmental factors may also be associated with increase in self-determination over the course of Project TEAM or a comparison “goal-setting only” condition. Therefore, in this analysis, we explored the relationship between the above characteristics and self-determination outcomes.

**Research Questions**

1. Is participation in Project TEAM associated with greater changes in self-determination than participation in a “goal-setting only” condition?

2. For transition age youth with disabilities, what factors predict changes in self-determination?
Methods

Design

We conducted a secondary analysis of data from a quasi-experimental study with pre and post measures and two non-randomized groups: intervention participants and matched comparison youth. In the present analysis, comparison youth and Project TEAM participants were not matched as additional comparison youth needed to be recruited at the time this study was conducted.

Participants

Sample selection and recruitment. Data were collected from youth who participated in six implementations of Project TEAM in Boston and Detroit. Recruitment for both conditions targeted organizations and parent groups that serve youth with developmental disabilities, both with and without intellectual disabilities. A facilitator met interested youth at their homes or a location convenient to them to explain the study and acquire consent.

Original inclusion criteria included:

• 14–22 years old

• Developmental delay as determined by having functional delays in at least three areas (self-care, learning, self-direction, economic self-sufficiency, expressive and/or receptive language, mobility, and capacity for independent living)

• Able to communicate at least basic needs, wants, and some meaningful ideas

• Some functional literacy

• Able to attend to task for 10 minutes and follow two-step directions
• Identifies as a person with a disability, in special education, and/or who has problems completing activities

• Able to categorize concrete and abstract concepts

Exclusion criteria included:

• Youth with only conditions or diagnoses who do not qualify as developmental delay, such as learning disabilities, diabetes, and asthma

Participants were 14.4–20.9 years old at intake (Table 2). They had a range of diagnoses, including autism spectrum disorders, cerebral palsy, intellectual disability, spina bifida, and genetic disorders. The majority of Project TEAM participants (“trainees”) and comparison youth had diagnoses of intellectual [trainees: 75.9%, comparison youth: 62.5%] and developmental disabilities [trainees: 86.2%, comparison youth: 87.5%].

**Intervention**

Project TEAM is a 12-week manualized group intervention co-facilitated by a self-advocate and a licensed clinical professional (in this study, social workers) (Kramer et al., 2014). This intervention was developed in collaboration with a team of youth and young adults with disabilities and has been documented to have social validity (Kramer et al., 2013).

Six cohorts of participants, called “trainees,” enrolled in Project TEAM and received intervention in the following settings: after school program (n = 3, one Boston and two Detroit cohorts) and during school hours at a public school (n = 3, three Boston cohorts). Prior to beginning Project TEAM, each trainee identified a personal activity
goal related to increasing his or her participation in school, work, or the community.

Trainees participated in Project TEAM two times per week; they progressed through eight modules in 15 group sessions, each 1.5 hours, during which they completed activities that teach, structure, and reinforce each step of the Game Plan. For example, Project TEAM addressed Plan Step 1 (see Table 1) in two modules. First, trainees learned 11 different categories of the environment, practiced identifying objects and environmental features in each category of the environment, and played the games “Environmental Uno” and “Environmental Scategories.” In the second module, trainees learned to identify environmental supports and barriers through discussion and personal examples. Each module ended with the direct application of knowledge of the current Game Plan step to each trainee’s personal activity goal. The implementations facilitated by the Boston facilitators had a higher overall fidelity rate (96.1%) than those facilitated by the Detroit facilitators (75.0%).

In addition to attending group sessions, youth also had contact with a peer mentor via phone eight times to reinforce each module’s learning goals. Each trainee also attended a community outing during which they had the opportunity to complete their activity goal with the support of a facilitator and their peer mentor. Trainees received $50 to support attainment of their goal (e.g., to pay for public transportation, a community class, etc.).

“Goal-Setting Only” Comparison Condition

Participants met with a licensed professional (Project TEAM facilitators) to identify personal activity goals. They received $50 to support their attainment of the goal.
Participants in the comparison control condition continued their typical school and therapy activities over the course of 12 weeks (the same length as Project TEAM). They received two reminders from the interventionists (via phone or email according to individual preference) during the 12 week period about their goal. Comparison youth participated in the same schedule of data collection as intervention participants (Figure 1).

**Instruments**

**AIR Self-Determination Scale (AIR).** The AIR Self-Determination Scale operationalizes the theory that self-determination is a result of the interaction between an individual’s capacities and their opportunities to practice self-determination skills and behaviors (Wolman et al., 1994). The AIR is designed to measure capacities (ability, knowledge, and perception) and opportunities (at school and at home) related to three problem solving steps (thinking, doing, adjusting). These problem solving steps are similar in theoretical orientation to the Game Plan (Goal-Plan-Do-Check). Additionally, this measure evaluates both opportunity and capacity, both of which have been described as predictive of self-determination and may be influenced by Project TEAM.

The AIR has youth (“student”) and parent forms. The youth form has 24 items, six in each of the following subscales: “things I do” (ability and knowledge), “how I feel” (perceptions), “what happens at school” (school opportunities), and “what happens at home” (home opportunities). The parent form has 18 items in the following subscales: “things my child does do” (ability and knowledge), “what happens at school” (school opportunities), and “what happens at home” (home opportunities). Both the youth and
parent forms use a five point scale from never (1) to always (5), where higher scores indicate higher levels of self-determination. Scores can range from 24–120 and 18–90 on the youth and parent reports, respectively.

The initial validation and evaluation of reliability of the AIR was conducted with over 450 students, 82% of them in special education. The majority of students (79%) had disabilities classified as “mild to moderate,” and had diagnoses such as intellectual disability, sensory and physical impairments, and learning disabilities. A smaller proportion (21%) had “moderate to severe” disabilities, with diagnoses such as moderate, severe, or profound intellectual disability, autism spectrum disorder, traumatic brain injury, and multiple disabilities. The sample was 61% male and racially diverse. Internal consistency was high \( r = .95 \) and there was high test-retest reliability \( r = .74 \) (Kielhofner & Tomita, 2006). Factor analyses demonstrated construct validity, with items loading on the four subscales described above.

**Brief Problem Monitor-Parent (BPM-P).** The BPM-P (Achenbach, McConaughy, Ivanova, & Rescorla, 2011) is a short version of the Child Behavior Checklist and evaluates adaptive behavior. The BPM includes subscales for internalizing and externalizing behaviors and attention problems. The BPM, like many assessments of adaptive behavior, includes items regarding the ability to regulate behavior in the context of social interactions. The assessment has very high test-retest reliability with youth ages 6–18 years \( r = .81–.83 \) (Kielhofner & Tomita, 2006) and high criterion reliability, as the measure accurately discriminated children who were referred for mental health services from those who were not (Achenbach et al., 2011). Composite scores can range from 0–
38, with higher scores indicating less adaptive behavior, however, we reverse scored this instrument in order to interpret it in the same direction as the AIR (with higher scores indicating better adaptive behavior).

**Demographic form.** The demographic form completed by parents included descriptive information about participants, including age and IQ. On this form parents indicated their child’s most recent full scale IQ testing date, the test used, and their child’s full scale score.

**Data Collection**

Data collection for the larger study occurred at three time points: a two-part intake process, a two-part outcome process, and a single follow-up process. However, for the present study, only data from intake and outcome were analyzed (see Figure 1), as we thought it was important to first evaluate immediate outcomes prior to exploring maintenance of changes in self-determination. Descriptive measures, such as the BPM and demographics were collected only during intake. The AIR self-determination scale was completed by the youth and the same parent at all time points.

**Data analysis**

Only participants for whom data were available for all instruments at the explored time points were included in the sample. Subsequently, a total of 30 trainees and eight comparison youth were included in these analyses from a full sample of 40 trainees and ten comparison youth. In the case that up to two responses on the AIR from either time points were missing, data for missing items were carried forward or backwards from the time point for which the data were present. This is considered a conservative approach, in
which no change is assumed (Portney & Watkins, 2009). Up to two data points were carried backwards for two trainees and forward for one trainee. One comparison youth was not included in analysis of parent-reports due to missing data. For the outcome variable of change in self-determination, we examined the data for outliers; we defined outliers as any data point that was greater than three standard deviations from the mean (Tomita, 2006).

All analyses were conducted using SPSS. We used parametric and non-parametric statistics to explore whether the intervention and comparison control groups differed on characteristics at intake. These characteristics included IQ, gender, age, adaptive behavior, race, and socioeconomic status. Identified group differences were used as covariates in subsequent analyses.

In order to identify potential predictors of change in self-determination, continuous variables identified by the literature as related to self-determination (opportunities for self-determined behavior, IQ, adaptive behavior, and age) were correlated with changes in self-determination, as operationalized by the difference between outcome and intake AIR scores. We also explored the relationship between initial self-determination and changes in self-determination. Because self-determination is conceptualized as a set of skills and behaviors, change in self-determination over time may be related to youths’ initial levels of self-determination (Vygotsky, 1978).

To answer research question 1, we completed 2 (group) x time (2) mixed model ANOVAs to examine both youth and parent reports of self-determination over time. Any significant effects were further explored with post-hoc t-tests. Next, we performed mixed
model ANCOVAs to examine youth and parent reported changes in self-determination while controlling for: (a) variables that were significantly correlated with changes in self-determination and/or (b) significant differences between groups. Adjusted and unadjusted means were examined to describe changes in groups over time. To ensure that the data met the assumptions relevant to the analyses, we used Levene’s test for equality of variance and Shapiro Wilk’s test of normality.

Multiple regression analyses were conducted to explore the predictive value of variables correlated with changes in self-determination. We planned to use the intervention group if ANOVAs and ANCOVAs identified significant between group intervention group effects. Otherwise, we planned to use the full sample (trainees and comparison youth) for the regression analyses. Variables selected as predictors were those that were most significantly correlated with change scores. We used simple or multiple regression models depending on the number of predictors. The overall predictive power of the models were examined using $r^2$. Standardized Beta were be examined for significance and the unique amount of variance each variable contributed to changes in self-determination (Portney & Watkins, 2009).

**Results**

Data met the statistical assumptions of all analyses. Parametric and non-parametric tests indicated that groups were similar at baseline for all variables except adaptive behavior (Table 2). Compared to parents of trainees, parents of comparison youth-reported that their children had more challenges with adaptive behavior ($t(36)=2.56, p = .02$).
For youth-reported self-determination, there was no group x time interaction effect 
\( F(1,34) = .58, p = .45 \), and there were neither main effects of group 
\( F(1,34) = .56, p = .46 \) nor time 
\( F(1,34) = 4.00, p = .05 \). For parent-reported self-determination, there was 
neither an interaction effect 
\( F(1,34) = .58, p = .45 \) nor a main effect for group 
\( F(1,34) = 1.06, p = .31 \). However, there was a main effect of time 
\( F(1,34) = 11.06, p < .01 \). Post-hoc analyses showed that parents of trainees reported significant increases in self-
determination \( t(29) = -4.61, p < .001 \) while parents of comparison youth did not \( t(6) = -1.58, p = .17 \) (Table 3).

ANCOVAs were conducted to control for potentially confounding variables and
to examine whether group differences at baseline were associated with changes over time
on the dependent variables. For youth reported self-determination these variables
included age (correlated with youth reported changes in self-determination) and adaptive
behavior (differed at baseline). Inclusion of these covariates did not alter the pattern of
findings. The interaction and main effects remained non-significant [interaction: \( F(1,34) = 1.62, p = .21 \), time: \( F(1,34) = 2.31, p = .14 \), group: \( F(1,34) = 1.28, p = .27 \)]. For parent-
reported self-determination, adaptive behavior (differed at baseline) was the only
covariate. No significant effects were found for parent-reported self-determination
[interaction: \( F(1,34) = .80, p = .38 \), time: \( F(1,34) = 2.12, p = .15 \), group: \( F(1,34) = .63, p = .43 \)].

For both youth- and parent-reported self-determination, a non-significant increase
over time was observed for the estimated marginal means for all groups (Table 3). When
adjusted for adaptive behavior and age, the estimated marginal means of comparison
youths’ self-reported self-determination at outcome increased from 101.6 (unadjusted) to 104.4 (adjusted). However, the other estimated marginal means for youth initial, parent initial, and parent outcome appeared similar before and after covariates were used in the model.

Bivariate correlations suggested weak (Plitcha & Kelvin, 2013), but significant correlations between youth-reported changes in self-determination and the following variables: age and initial-youth reported self-determination. To further explore the factors driving the relationship between initial self-determination and changes in self-determination, we conducted bivariate correlations between each AIR subscale and changes in self-determination. We found that both the initial opportunities ($r = -0.361, p = 0.026$) and initial capacities ($r = -0.392, p = 0.015$) subscales were significantly correlated with changes in self-determination. No investigated variables were significantly correlated with parent-reported changes in self-determination (Table 4).

ANOVAs and ANCOVAs did not suggest significant between group effects. Therefore, the full sample was used for the predictive analyses to explore predictors of change in self-determination. We conducted a regression model with youth-reported self-determination change scores as the dependent variable, with age and composite initial youth-reported self-determination as predictors. Age and initial youth-reported self-determination contributed to a statistically significant predictive model of youth-reported changes in self-determination ($F(2, 35) = 5.17, p = 0.011$). This model predicted 18.4% percent of the observed variance in youth-reported changes in self-determination. However, only initial youth-reported self-determination was a significant predictor (Table
Discussion

We examined the impact of Project TEAM versus a “goal setting only” condition on changes in self-determination as reported by youth and parents. Overall, we found little support for participation in Project TEAM leading to greater increases in self-determination than participation in a goal setting only condition. However, the observed relationships between changes in self-determination and personal and environmental factors provide possible insights about the relationship between these variables. The literature has established a relationship between characteristics such as age and adaptive behavior, and capacity and opportunity for self-determination. We expand that research by proposing a dynamic relationship between individual characteristics, such as age and adaptive behavior, one’s frame of reference, and perceived opportunities and capacity for self-determination.

We define frame of reference as the individualized perspectives and standards that one uses when completing self-reports. Because the AIR does not define standards for each rating category, scores reflect respondents’ frames of reference for self-determination (Schwartz, 1999; Sprangers & Schwartz, 1999). Individual characteristics, such as adaptive behavior and age, may inform youths’ and parents’ frames of reference (Kramer, Liljenquist, & Coster, in press). These frames of references may influence whether or not youth and parents seek opportunities to engage in self-determined
behaviors (Wehmeyer & Bolding, 1999; Shogren et al., 2007) and how these opportunities and capacity for self-determination are perceived (Figure 2).

Our results suggest that youth both the trainee and comparison groups reported increases in self-determination over time. In our study, both groups had the opportunity to engage in self-directed behaviors by working towards personal goal activities in Project TEAM or the comparison condition. Goal-setting is a skill related to self-determination and also draws upon other related and relevant skills, such as identification of interests, self-awareness, self-knowledge, and self-evaluation. Some of these skills are evaluated by the AIR. Therefore, this common experience may be one reason why all youth had perceived increases in self-determination.

Our conceptualization of frame of reference may be used to interpret how the opportunity to engage in self-determined behaviors (in this study, individualized goal-setting) may interact with personal characteristics, and subsequently result in greater perceived changes in self-determination for some youth more than others. In this study, initial self-determination significantly predicted changes in youth-reported self-determination. We propose that those variables for which correlations showed weak, but significant, inverse relationships with changes in self-determination (AIR initial sum score, AIR initial opportunities and capacities subscales, and age) influence frame of reference for self-determination.

Personal characteristics, including age and initial self-determination may inform youths’ frames of reference for self-determination. Youth who are younger and/or have lower initial self-determination (including both opportunities and capacities) may have
different frames of reference for self-determination and related opportunities. These youth may perceive the opportunity to set and work towards goals as more beneficial than youth who were older and/or had higher levels of initial self-determination, and thus, may report greater changes in self-determination. However, these personal characteristics only predicted a small proportion of the variance of changes in youth-reported self-determination and only initial self-determination contributed unique, significant variance. Therefore, it is likely that other factors not examined in this study are related to and predictive of youths’ perceptions of changes in self-determination.

There is an unclear relationship between Project TEAM and parent-reported changes in self-determination over time. There was a significant effect of time for parent-reported self-determination, with parents of Project TEAM trainees reporting significant increases in self-determination over time. However, this effect appeared to be accounted for by group differences in baseline adaptive behavior. Although the loss of a significant effect after including a covariate can suggest a mediating role of that covariate (adaptive behavior) (Pitz, 2005), we also found that adaptive behavior did not predict parent-reported changes in self-determination. Therefore, it is likely that adaptive behavior has a different type of relationship with parent-reported changes in self-determination (Baron & Kenny, 1986). One possibility is that parents’ frames of reference for self-determination may be informed by their children’s adaptive behavior skills, and that these perspectives are reflected in their reports of self-determination.
Limitations and Future Research

There are several limitations to this study. First, the small and unequal sample size reduced statistical power. The sample’s relative homogeneity reduced the possibility of confounding group differences. Future research with a larger and more heterogeneous sample is necessary to attain more generalizable findings. Second, we only included participants who had full outcome and demographic data; our results may have been different had we used intention-to-treat analysis. A related limitation is that we carried data forwards or backwards to account for missing data for three trainees, which reduced the amount of change over time and made our analyses susceptible to Type II error. Third, we used the BPM for youth older than those in the validation sample. Future research should be conducted to identify an appropriate and valid measure to evaluate adaptive behavior in young adults.

It is important to consider the way in which self-determination was evaluated. We only measured opportunity for self-determination using a subscale of our outcome variable (the AIR). Therefore, it was expected that the relationship between opportunity for self-determination and changes in self-determination would mirror the relationship between initial self-determination and changes in self-determination. The AIR only measures opportunities at home and school. However, Project TEAM explicitly focuses on community based goals. Thus, the AIR may not capture the changes in self-determination experienced by Project TEAM participants. Measuring additional relevant contexts beyond home and school (Shogren et al., 2007), specific characteristics of these contexts (e.g., how restrictive the setting is), and/or opportunities to make choices, set
goals, self-monitor, and exercise other skills related to self-determination in these contexts may lead to more specific and meaningful predictive models.

Previous research has documented that the AIR and at least one other instrument (ARC Self-Determination Scale) evaluate different components of the self-determination (Shogren et al., 2008). Therefore, although the AIR was chosen because it is theoretically congruent with the mechanisms of action utilized in Project TEAM, it is possible that in addition to not reflecting opportunities in all relevant environments, the AIR did not capture relevant aspects of self-determination.

It should be noted that the observed correlations and predictive model are both weak. Therefore, future research should explore other personal and/or environmental variables that were not evaluated in this study. Future evaluations of Project TEAM should also evaluate outcomes further after the completion of intervention. It is possible that changes in self-determination are only realized after youth accumulate successful experiences applying the skills learned in Project TEAM. Therefore studies evaluating more distal outcomes should document the use of these skills and relevant experiences that occur between the end of intervention and evaluation. Finally, additional research should evaluate characteristics that inform frames or reference and subsequent expectations for self-determination.

**Conclusions**

When adjusted for adaptive behavior, neither Project TEAM trainees nor comparison youth experienced significant changes in youth- or parent-reported self-determination over time. However, there was a non-significant pattern of increase in self-
determination over time. Our results suggest that for youth with personal factors such as lower initial self-determination and/or are younger, the opportunity to engage in individualized goal setting may exceed expectations, leading to greater perceived increases in self-determination compared to youth have greater initial self-determination and/or are older. Future research should explore the role of these variables on both opportunities for self-determined behavior and frames of reference for self-determination.
Table 1. *The Game Plan and associated self-talk questions’ relationship to self-determination skills*

<table>
<thead>
<tr>
<th>Step</th>
<th>Self-talk question</th>
<th>Related self-determination skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>What activity would I like to do?</td>
<td>Goal setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identification of interests</td>
</tr>
<tr>
<td>Plan Step 1</td>
<td>What parts of the environment help me or make it hard for me?</td>
<td>Self-awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-knowledge</td>
</tr>
<tr>
<td>Plan Step 2</td>
<td>What strategy can I use to change the environment?</td>
<td>Problem solving</td>
</tr>
<tr>
<td>Plan Step 3</td>
<td>Would using this strategy change this activity for other people?</td>
<td>Problem solving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-evaluation</td>
</tr>
<tr>
<td>Do</td>
<td>Who do I talk to about making this change?</td>
<td>Self-advocacy</td>
</tr>
<tr>
<td>Check</td>
<td>Can I do this activity now?</td>
<td>Self-observation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-evaluation</td>
</tr>
</tbody>
</table>
Table 2

Demographic characteristics of participants at intake

<table>
<thead>
<tr>
<th></th>
<th>Trainees (n = 30)</th>
<th>Controls (n = 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age [mean(range)]</strong></td>
<td>17.6 (14.7–20.9)</td>
<td>17.0 (14.4–20.3)</td>
</tr>
<tr>
<td><strong>Gender [N (%)]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19 (63.3%)</td>
<td>5 (62.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>11 (36.7%)</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td><strong>Race [N (%)]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>24 (80.0%)</td>
<td>7 (87.5%)</td>
</tr>
<tr>
<td>Asian</td>
<td>4 (13.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>More than one race</td>
<td>0 (0.0%)</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (6.7%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td><strong>Annual Household Income</strong> [N (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$60,000/year</td>
<td>4 (13.8%)</td>
<td>1 (16.7%)</td>
</tr>
<tr>
<td>&gt;$60,000/year</td>
<td>25 (86.2%)</td>
<td>5 (83.3%)</td>
</tr>
<tr>
<td><strong>Adaptive behavior (BPM)</strong> (mean)</td>
<td>27.2</td>
<td>21.1*</td>
</tr>
<tr>
<td><strong>IQ</strong> (mean)</td>
<td>63.0</td>
<td>70.7</td>
</tr>
<tr>
<td><strong>Youth-reported self-determination (AIR)</strong> (mean)</td>
<td>92.6</td>
<td>94.5</td>
</tr>
<tr>
<td><strong>Youth-reported opportunities for self-determination (AIR)</strong> (mean)</td>
<td>47.2</td>
<td>47.8</td>
</tr>
<tr>
<td><strong>Parent-reported self-determination (AIR)</strong> (mean)</td>
<td>59.6</td>
<td>57.0</td>
</tr>
<tr>
<td><strong>Parent-reported opportunities for self-determination (AIR)</strong> (mean)</td>
<td>43.4</td>
<td>42.0</td>
</tr>
</tbody>
</table>

\(n_{\text{trainees}} = 29, n_{\text{controls}} = 7\)

*This measure was reverse scored: higher scores indicate higher adaptive behavior.

\(n_{\text{trainees}} = 28, n_{\text{controls}} = 7\)

\(n_{\text{trainees}} = 30, n_{\text{controls}} = 7\)

\(*p< .05\)
Table 3

*Estimated marginal means (s.d.) for mixed model ANOVA and ANCOVA*

<table>
<thead>
<tr>
<th>Youth-reported self-determination</th>
<th>Parent-reported self-determination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANOVA</td>
</tr>
<tr>
<td></td>
<td>Pre</td>
</tr>
<tr>
<td>Trainees</td>
<td>92.6</td>
</tr>
<tr>
<td>Controls</td>
<td>94.5</td>
</tr>
</tbody>
</table>

<sup>a</sup> Age and adaptive behavior (BPM) used as covariates

<sup>b</sup> Adaptive behavior (BPM) used as covariate
Table 4

*Correlation between changes in self-determination (AIR) and baseline characteristics*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Change in parent reported AIR</th>
<th>Change in youth reported AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ score</td>
<td>-.089</td>
<td>-.061</td>
</tr>
<tr>
<td>Adaptive behavior (BPM)</td>
<td>-.022</td>
<td>.197</td>
</tr>
<tr>
<td>Age</td>
<td>.147</td>
<td>-.326*</td>
</tr>
<tr>
<td>Initial parent reported self-determination</td>
<td>-.324</td>
<td>n/a</td>
</tr>
<tr>
<td>(AIR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial youth reported self-determination</td>
<td>n/a</td>
<td>-.427**</td>
</tr>
<tr>
<td>(AIR)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Changes in self-determination were operationalized by the difference between the total outcome and intake AIR scores. Opportunities for self-determination were operationalized by the total of the AIR subscales “what happens at school” and “what happens at home.”*

*p < .05

**p < .01

\[n_{\text{trainees}} = 30, n_{\text{controls}} = 7\]
Table 5

*Predictors of change in youth-reported self-determination*

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Adjusted $r^2$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth reported change in self-determination</td>
<td>.184</td>
<td></td>
</tr>
<tr>
<td>Initial youth reported self-determination</td>
<td>-.364*</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.223</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Changes in self-determination were operationalized by the difference between the total outcome and intake AIR scores.  
*$p < .05$*
Intake Interview
- Demographic form
- BPM
- AIR (self-report and parent)

Intervention Group:
12 week Project TEAM intervention

Control Group:
12 week period with follow up phone calls at 4 and 8 weeks post-intake

Outcome interview
- AIR (parent)
- AIR (youth)

Figure 1. Project TEAM and control assessment timeline
Figure 2. Proposed model for relationship between personal factors and perceived capacities and opportunities for self-determination
References


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CURRICULUM VITAE

Ariel Schwartz

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EDUCATION

Boston University  Sept. 2013–
  Master’s of Occupational Therapy Student  Dec. 2015
  Phi Theta Epsilon honor society member
Thesis: Impact of an environment-focused problem-solving and goal setting intervention on self-determination for transition age youth with developmental disabilities

Wesleyan University  Sept. 2008–
  Bachelor’s of Art, Disability Studies  Dec. 2011
  Bachelor’s of Art, Molecular Biology & Biochemistry
  Graduated with University Honors, High Honors, & Phi Beta Kappa
Honors thesis: Composing the autistic self: Current and emerging autism discourses

RESEARCH EXPERIENCE

Research Assistant  Sept. 2013–
Developing a Youth Self-report Version of the Pediatric Evaluation of Disability Inventory (PEDI)
Youth and Young Adults Empowerment, Leadership, & Learning Lab, Boston University

• Collaborate with PI and youth collaborators to develop a self-report of daily function and participation
• Collect data using a variety of procedures, including interviewing and questionnaires
• Assist with development of activities and strategies to involve and support youth collaborators in research activities
• Collaborate in the design and execution of data collection, research meetings, focus groups, and cognitive interviews
• Manage research program logistics including data tracking and entry, communication, and recruitment
Coding Consultant
Parent-Child Engagement Study
Boston College

- Train research assistants to implement coding scheme co-produced in 2013 to evaluate engagement states of children during parent-child freeplay

Research Analyst II
Useful Speech Study
Vanderbilt Kennedy Center

- Assisted with logistics and data collection for study that evaluated predictors of speech development of children with Autism Spectrum Disorders
- Coded media generated from participants’ visits to evaluate social communication
- Recruited, screened, and scheduled participants
- Assisted with ERP assessments
- Completed assignments such as literature reviews for principle investigator

Research Assistant
Parent-Child Engagement Study
Vanderbilt University

- Co-produced manual for behavioral coding of children with Autism Spectrum Disorders during parent-child-free-play
- Conducted behavioral coding of children’s engagement states during free-play
- Assisted with data entry and management

Research Assistant
Cognitive Development Laboratory, Wesleyan University

- Designed and piloted tasks to assess mathematical cognitive development in typical and Deaf and Hard of Hearing preschoolers
- Performed database research to evaluate children’s use of the number word “two”
- Trained new lab members
- Coded participant performance for a wide variety of assessments run by other lab mates
- Recruited participants and maintained participant database

Research Assistant
Purification and Characterization of MutS Mutants
DNA Laboratory, Wesleyan University

- Sept. 2009–May 2011
• Analyzed DNA binding and ATPase activity in *Thermus aquaticus* DNA Mismatch Repair protein MutS
• Performed all steps of protein purification, beginning with mutagenesis
• Conducted kinetic assays under a variety of conditions to characterize mutant and wildtype enzyme activity

*Co-Primary Investigator*
Charaterization of Actin Polymerization in *alr-1* knockout *C. elegans*
Neuroscience Lab, Thomas Jefferson High School for Science and Technology
Sept. 2007–June 2008

• Responsible for study design, conducting all procedures, and analysis

**PUBLICATIONS, PRESENTATIONS, AND WORKSHOPS**


Kramer, J. & Schwartz, A. *The use of participatory and inclusive methodologies to develop youth self report instruments: Initial development of the self-report PEDI-CAT.* [manuscript in preparation].


**TEACHING AND CURRICULUM DEVELOPMENT**

*Interdisciplinary Course Development Student Committee*  
Fall 2014–present

- Serve on student committee to develop a proposal for “*Critical Thinking Strategies for the Health Care Provider,*” a course for first year students in rehabilitation sciences, physician assistance, density, and medical programs

*Introduction to Disability Studies*  
Spring 2010

Wesleyan University

- Co-designed and co-facilitated for-credit “student forum”
- Supported students in facilitating the course in Spring 2012

*Disability Awareness*  
Summer 2008

Arlington, VA Therapeutic Recreation

- Designed, led, and evaluated disability awareness/acceptance activities for summer campers ages 6–14

**EDUCATIONAL AWARDS**

*Women’s Council Scholarship*  
Boston University  
2014–2015

- Awarded for academic achievement and potential

*Merit Scholarship*  
Sargent College, Boston University  
2013–2015

- Awarded to top incoming Master’s of Occupational Therapy students
University Honors
Wesleyan University
• One of three students in graduating class to receive the highest academic honor awarded by Wesleyan University
• Awarded for outstanding undergraduate thesis, overall academic achievement, and successful verbal defense of thesis and synthesis of undergraduate education

Scott Biomedical Prize
Wesleyan University
• Awarded for demonstration of excellence and interest in biochemistry and applied medicine.

Hughes Summer Research Fellowship
Wesleyan University
• Awarded to support summer research

Research Experience for Undergraduates Fellowship
National Science Foundation
• Awarded to support summer research

Epstein, Becker, & Green Fund for Excellence in Health Care and Life Sciences Research Grant
• Awarded to support senior research project

Arlington Community Foundation Merit Scholarship
• Awarded for academic achievement

Wachovia-Virginia High School League Scholarship
• Awarded for academic, service, and athletic achievements

S.W.I.F.T. Scholarship
• Awarded for academic, service, and athletic achievements

Northern Virginia B’nai B’rith Sports Scholarship
• Awarded for academic, service, and athletic achievements

Nina Pitkin Character Award Scholarship Winner
• Awarded for demonstrated character and outstanding essay describing a role model;

Beau Thompson Scholarship
• Awarded for academic, service, and athletic achievements and contributions to high school community
SERVICE

Summer Interdisciplinary Intensive Stroke Program  June 2014
  • Planned and implemented individual occupational therapy intervention
    sessions for a client with aphasia 2x/week

Wesleyan Students for Disability Rights  2008–2012
Co-leader
  • Organized campus events to raise awareness of issues surrounding
    campus accessibility
  • Developed and implemented a statement of needs and goals to make
    campus more accessible
  • Initiated and facilitated workshops for admissions and faculty members
  • Successfully advocated for university recognition of Disability Studies
    and the creation of a “course cluster”

Arlington TOPSoccer  2002–2008
Founder, Coach, and Volunteer Coordinator
  • Created local soccer program for children with disabilities
  • Trained and supervised volunteers, coached players, and served as a
    community and
    parent liaison
  • Recognized at the national, state, and county level for contributions to
    youth with disabilities through TOPSoccer

Dave Williams Memorial TOPSoccer Festival  2007, 2008
Organizer
  • Initiated, organized, and led regional festival that involved 150 people,
    including athletes with disabilities and volunteers