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A one-year follow-up study on psychosocial adaptation of college students with disabilities

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Abstract. Of the 97 students with disabilities who completed a questionnaire on adaptation to disability, 39 responded to the same survey one year later. The two purposes of this follow-up study were to examine whether individuals' adaptation scores had significantly changed during the year and whether the results found by Livneh et al. [17] could be replicated. Two distinct statistical analyses were run. The results of a multivariate repeated-measures analysis indicated that there was a not a significant difference in adaptation scores after one year. In a post-hoc repeated-measures analysis, time since injury (TSI) was added as a between-group factor, which resulted in a significant difference in adaptation scores according to TSI but no interaction with time of assessment (the within-group factor). The results of the second analysis, which involved a multiple regression analysis on adaptation, were similar to Livneh et al.'s [17] study in several ways. The implications of this one-year follow-up study were articulated.

Keywords: Disability, student, visibility, denial

1. Introduction

Adaptation to disability is a concept that has been debated and studied in rehabilitation literature for many years [4,5,21,22,24,25]. Though researchers are working to build a consensus theory (e.g., [8,9,11,15]), many issues, such as definitions, empirical measurement of the process of adaptation, and theoretical models of adaptation remain controversial. Adaptation can be viewed as a gradual process that involves longer-term responses and reactions to events, in contrast to the more immediate reactions of coping [2,10]. Coping is a special category of adaptation that involves psychological responses to circumstances that are new, require special efforts, or are unusually taxing [3]. Adaptation is viewed in this study as a multidimensional, nonlinear but hierarchical process that fundamentally consists of 8 reactions to disability, namely shock, anxiety, denial, depression, internalized anger, externalized hostility, acknowledgment, and adjustment [1,11–15]. Of these 8 post-disability reactions, two are reflective of longer-term adaptation to disability in the Livneh and Antonak paradigm: acknowledgment (as a cognitive acceptance of disability) and adjustment (as an emotional and behavioral acceptance of disability). Adaptation includes setting and achieving new goals [15], which may include educational and vocational aspirations.

Numerous researchers have asserted that longitudinal research designs need to be used to examine the process of adaptation to disability, due to the gradual unfolding nature of its elements [8,11,15]. In view of the more long-term structure of adaptation to disability, the first purpose of this research was to conduct a follow-up study among community college students with disabilities to examine whether individuals' adaptation scores had changed significantly one year after initial assessment. According to U.S. Department of Education statistics, in the year 2000, 10.7% of the students attending 2-year public institutions had some kind of disability [7]. Given the facts that significantly less individuals with disabilities enter postsecondary

education than those without disabilities, and 80% of those in postsecondary education report a need for assistance with educational services [19], it is vital to examine disability-related factors, such as adaptation to disability, which may facilitate the pursuit of educational goals.

The second purpose of this study was to evaluate whether the results of Livneh et al.'s [17] study were replicated in a follow-up sample one year after the original assessment. Livneh et al. [17] found that after controlling for demographic, disability-related, and selected psychological variables, denial of disability significantly predicted psychosocial adaptation to disability, while visibility of disability did not predict adaptation. Hence, the second question of this study is: Does denial also predict adaptation in the one-year follow-up study, using the same model of prediction as Livneh et al.'s [17] study?

2. Method

2.1. Participants

Two hundred participants were randomly selected from a pool of 596 individuals, who were registered in a community college's program for students with disabilities in Southern California. Of the 100 returned research instruments, useable data were available for a total of 97 respondents. Of the 97 who completed the first survey, 39 individuals responded to a one-year follow-up survey (40.2% response rate).

This one-year follow-up sample was composed of 56.4% females and 43.6% males. The mean age of the respondents was 38.7 years (SD = 11.6), with a range of 20 to 62 years and a median age of 41.0 years. The ethnic backgrounds reported in this sample included: 48.7% White; 28.2% Hispanic; 15.4% African-American; 2.6% Asian-American; 2.6% American-Indian; and 2.5% other. Marital status of the participants included: 59.0% single; 15.4% married; 15.4% divorced; 7.7% separated; and 2.5% widowed. Educational status was reported as: 50.0% high-school education; 36.8% 1–2 years of college; 7.9% 3 or more years of college; 2.6% bachelor's degree; and 2.6% more than a bachelor's degree.

Disability-related demographic information included the following: The mean age of onset of disability was 16.5 years (SD = 14.8) with a range of 0 to 52 years and a median age of onset of 15.0 years. The mean disability duration was 22.0 years (SD = 14.0), with a range of duration from 4 to 55 years and a median duration of 18.5 years. Causes of disability included: 38.5% birth disorders; 17.9% accident; 17.9% illness; and 25.6% other. The type of primary disability reported included: 20.5% physical/visible; 35.9% physical/invisible; 20.5% learning; and 23.1% mental disabilities. In response to the question, "Can an observer tell by looking at you that you have a disability?" 79.5% reported having an invisible disability, while 20.5% reported a visible disability.

2.2. Instruments

The Reactions to Impairment and Disability Inventory (RIDI) [12] is a 60-item multidimensional scale to measure psychosocial adaptation to disabling conditions. It provides scores on the following subscales: Shock, Anxiety, Denial, Depression, Internalized Anger, Externalized Hostility, Acknowledgment, and Adjustment. Cronbach's alpha values for the eight subscales were reported to range from 0.69 to 0.85 [15]. Two of the eight subscales of the RIDI (Acknowledgment and Adjustment) were added together for the adaptation outcome (dependent variable) in the multiple regression analysis in this study, as was justified in Livneh et al.'s ([17], p. 229) study. Further, the dual-faceted operationalization [15] of acceptance of disability (i.e., acknowledgment as the cognitive acceptance, and adjustment as the emotional and behavioral acceptance of disability) gives support to the argument that it is defensible to combine these two variables as a criterion measure of adaptive reactions to disability.

Locus of control was measured by Rotter's [20] Internal-External Locus of Control (I-E LOC) scale, which contained 29 items (6 of which were filler items). The I-E LOC scale assessed individuals' generalized expectancy about control over outcomes. A form requesting demographic data accompanied the psychological instruments and included a question on the type of primary disability and a separate question on visibility of disability, which asked: "Can an observer tell by looking at you that you have a disability?"

2.3. Procedure

The two instruments, the demographics data-sheet, and an informed consent form were mailed to the 97 participants who had completed a questionnaire one year previously. The forms were accompanied by a white envelope that was stamped "confidential" and by an envelope with postage that was addressed to the

community college's program for students with disabilities. To help ensure confidentiality, instructions were included to place the forms in the envelope marked "confidential" and then to return that envelope with the consent form in the stamped, addressed envelope.

3. Results

Two groups of analyses were conducted in this study. The first consisted of multivariate repeated-measures analyses, which examined whether individuals' adaptation scores had significantly changed after one year. Multivariate repeated-measures analysis is a type of analysis of variance (ANOVA) that examines the overall effect of changes in individuals' scores during multiple assessments on the same dependent variables. Because each subject is observed on the same variables at different times, the error that arises from within-subjects differences is eliminated [6]. Consequently, a repeated-measures analysis is a procedure that is often much more powerful than an ANOVA, because the within-group variability is eliminated due to subjects acting as their own control.

In this study's multivariate repeated-measures analysis, the time of assessment was the within-group factor and the eight reactions to disability were the dependent variables. The repeated-measures assumption of sphericity [6] was not violated in this analysis (i.e., according to the Huynh-Feldt and Greenhouse-Geisser epsilons). There was no overall significant difference on the 8 reactions to disability from time 1 to 2, Wilk's $\lambda = 0.838$, $F(8, 31) = 0.747$, $p = 0.65$. An inspection of the univariate tests on within-group differences indicated that each reaction of adaptation to disability did not significantly change from times 1 to 2, though Shock approached significance, $F(1, 38) = 3.427$, $p = 0.072$.

In view of the possible influence of time since injury (i.e., duration of disability) on the often lengthy process of adaptation [16], a post-hoc multivariate repeated-measures analysis was conducted, which involved adding time since injury (TSI) as a between-group factor. In order to use this variable in a repeated measure analysis, TSI was dichotomized at the median into two categories of 19 participants (4–18 years and 19–55 years duration; the value from 1 subject was missing on this variable). Though other categorizations were possible, the small sample size and inspection of a graph of the TSI variable suggested that two categories would be the better choice for this analysis. The repeated-measures assumption of sphericity [6] was not violated in this post-hoc repeated-measures analysis (i.e., according to the Huynh-Feldt and Greenhouse-Geisser epsilons). Hence, the first step of this repeated-measures analysis with a between-subjects factor involved checking the interaction between the between-group variable (TSI) and the within-group variable (time of assessment). There was no significant interaction between the between-group factor and the within-group factor, Wilk's $\lambda = 0.760$, $F(8, 29) = 1.144$, $p = 0.365$. Next, the effects of the within-group and between-group factors were examined separately. There was no significant difference on the within-group factor (i.e., times 1 and 2) on each individual's adaptation scores, Wilk's $\lambda = 0.816$, $F(8, 29) = 0.819$, $p = 0.592$. However, there was an overall significant difference on the between-group factor of TSI on the 8 reactions to disability, Wilk's $\lambda = 0.533$, $F(8, 29) = 3.177$, $p = 0.01$. Univariate tests on the between-group factor indicated that there were significant differences between the two TSI groups on the following 2 reactions to disability: Internalized Anger, $F(1, 36) = 6.443$, $p = 0.016$ and Externalized Hostility, $F(1, 36) = 4.229$, $p = 0.047$. See Table 1 for the group means of the 8 reactions to disability for the two TSI groups.

Table 1
Group means and standard deviations on reactions to disability by time since injury (TSI)

	4–18 years TSI	19–55 years TSI
Shock	12.789 (1.339)	14.605 (1.339)
Anxiety	11.711 (1.084)	14.474 (1.084)
Denial	12.579 (0.983)	12.684 (0.983)
Depression	13.632 (1.098)	14.605 (1.098)
Internalized Anger*	12.053 (1.151)	16.184 (1.151)
Externalized Hostility*	10.632 (1.013)	13.579 (1.013)
Acknowledgment	20.658 (1.105)	20.658 (1.105)
Adjustment	19.895 (1.291)	22.105 (1.291)

* Significant difference at $p < 0.05$.
Note: scores on reactions to adaptation were averaged from Times 1 and 2 for this analysis by TSI.

The second analysis examined whether the results found by Livneh et al. [17] could be replicated. Therefore, the exact same variables and ordering of the variables were used in this analysis as employed by Livneh et al. [17]. Before conducting the analysis, bivariate scatterplots of the criterion variable (Adaptation as the combined Acknowledgment and Adjustment subscales) and the continuous predictor variables were examined in the follow-up data, as well as curve estimations to check for non-linear trends. Denial was the only variable that had a significant non-linear trend, both

Table 2
Multiple regression analysis on adaptation to disability

Predictor variable	$R_{cumulative}$	$R^2_{cummulative}$	R^2_{change}	F_{change}	df	β
Step 1: Demographic variables	0.138	0.019	0.019	0.145	(4, 30)	
Heritage						−0.222
Marital status						−0.060
Education						−0.058
Work experience						0.208
Step 2: Disability-related variables	0.181	0.033	0.014	0.127	(3, 27)	
Disability cause						0.143
Time Since injury (Duration)						0.108
Age of onset						0.498
Step 3: Psychological characteristics	0.571	0.326	0.293	2.497	(4, 23)	
Anxiety						−0.038
Depression						−0.578
Externalized hostility						0.686*
Locus of control						0.247
Step 4: Visibility of disability	0.593	0.351	0.026	0.877	(1, 22)	
Visibility						0.305
Step 5: Denial	0.761	0.580	0.228	11.413**	(1, 21)	
Denial						−0.009
Step 6: Visibility X denial interaction	0.765	0.585	0.006	0.273	(1, 20)	
Interaction						0.793

*$p < 0.05$; **$p < 0.005$.

cubic, $F = 4.52$, $p = 0.009$, and quadratic trends, $F = 6.83$, $p = 0.003$ and thus was transformed. The multiple regression analysis indicated that when the criterion variable was regressed on the first 3 sets of predictors (see Table 2), only the block of psychological variables approached statistical significance, $R^2_{change} = 0.293$, $F_{change}(4, 23) = 2.497$, $p = 0.071$. One variable in the third step, Externalized Hostility ($\beta = 0.686$, $t = 2.413$, $p = 0.026$), was significant, while Depression approached significance ($\beta = -0.578$, $t = -1.866$, $p = 0.077$).

In steps 4 through 6, the only significant change in the variance explained of adaptation occurred with the addition of Denial in step 5, $R^2_{change} = 0.228$, $F_{change}(1, 21) = 11.413$, $p = 0.003$, though the relative contribution of Denial was not significant in this step ($\beta = -0.009$, $t = -0.007$, $p = 0.994$). One explanation for the statistical significance of this fifth step, despite the only variable of this step (Denial) having a non-significant regression coefficient, is that Denial may be acting as a suppressor variable for Depression. Suppressor variables improve prediction by enhancing the effects of other independent variables [23]. Depression had a low zero-order correlation with the criterion variable ($r = -0.055$, $p = 0.378$), yet had a regression coefficient that approached significance ($\beta = -0.578$, $t = -1.866$, $p = 0.077$); whereas Denial had a significant zero-order correlation ($r = 0.508$, $p = 0.001$) and a non-significant regression coefficient ($\beta = -0.009$, $t = -0.007$, $p = 0.994$). Because the regression coefficient of Depression is noticeably larger (though n.s.) than its zero-order correlation, this indicates an enhancement of prediction, which may be a result of the suppression of irrelevant variance by Denial. The signs of the zero-order correlation and the regression coefficient of Denial were opposite, which is one indication of the possible existence of a suppressor variable [23].

Of all 6 steps, only step 5, containing Denial, explained a significant amount of variance in adaptation, $F(13, 21) = 2.229$, $p = 0.049$. For the whole model, all six blocks of variables explained 59% of the variance in Adaptation, $F(14, 20) = 2.017$, $p = 0.074$.

4. Discussion

The two-fold purpose of this study was to assess change in individuals' adaptation scores and to evaluate whether the results found by Livneh et al. [17] were replicated in a follow-up study one year after the original assessment. The results indicated that there was no overall significant difference on the 8 reactions to disability over one year (times 1 and 2). A post-hoc analysis indicated that there was an overall significant difference on the 8 reactions to disability according to time since injury (TSI) and that there were significant differences between two TSI groups on internalized anger and externalized hostility, with the longer TSI group displaying elevated scores.

The results of the multiple regression analysis were similar to the results found by Livneh et al. [17], though more variance in adaptation was explained by the variables in the one-year follow-up study (59%), as compared to the first study (41%). In particular, the following 3 similarities were found between the present study and Livneh et al.'s [17] study: a) Only the block of psychological variables approached significance in steps 1 through 3 of this study, which was similar to Livneh et al.'s findings that only the block of psychological variables approached significance for steps 1 through 3; b) Only externalized hostility was a significant predictor in step 3 of this study's analysis, while Livneh et al. found that anxiety and externalized hostility were the only significant predictors of the psychological variables (step 3); and c) Of the 6 steps of the multiple regression analysis, the only significant change of variance explained in adaptation occurred with the addition of denial in step 5 in both Livneh et al.'s [17] study and the follow-up study. One difference related to this third similarity was that in Livneh et al.'s [17] study, denial was a significant predictor, while in the follow-up study, denial was not a significant predictor of adaptation, though the addition of denial reflected a significant change of the variance explained in adaptation.

Though several similarities were found between Livneh et al.'s [17] study and the follow-up study, the results of the multiple regression analysis in the follow-up sample must be taken tentatively, due to the smaller number of respondents and thus, a lower ratio of subjects to measured variables. Yet, the correspondence of several aspects of the regression analysis of the data from the first assessment and the results of the assessment one year later suggest that the regression findings were relatively stable.

Although the multivariate repeated-measures analysis was not significant, indicating that adaptation scores had not changed significantly for individuals after a year, these non-significant results could be viewed as an indication of the gradual nature of the process of adaptation for each individual. A lengthier amount of time between assessments may be needed, in order to observe significant changes in individuals' adaptation scores.

The post-hoc repeated-measure analysis provided some support – by the significance of the between-group factor of time since injury (TSI) – for the concepts that adaptation is a gradual process and that individuals with a more recent onset of disability should reflect different levels of reactions to disability than individuals with a more distant occurrence of disability. Significant differences were found between the 2 TSI groups on 2 reactions to disability: internalized anger and externalized hostility, which represent two forms of anger. Although other differences in means between the two groups were noted, these differences were not interpreted because they were not statistically significant. The significantly higher scores on internalized anger and externalized hostility among individuals with a longer TSI could be viewed as tentative support for Livneh and Antonak's [12–15] adaptation paradigm, which depicts the process of adaptation to disability as a non-linear, hierarchical, and multidimensional progression through reactions of adaptation. Hence, the trend of significantly higher scores on anger among those with a longer duration of injury may indicate that these individuals are moving toward the distal end of the process of adaptation, in comparison to those with a shorter TSI.

4.1. Limitations

The limitations of this follow-up study were similar to those reported for the first assessment, including that all data were obtained from self-report instruments; that this non-experimental study was correlational in nature and therefore causal relationships could not be assumed; that the sample of this study was restricted to students at a community college; and that the individuals who voluntarily responded to this survey may have been more oriented toward success [17]. One limitation of the current study is that unmeasured factors, such as characteristics of the group or secondary complications of disabilities, may have influenced the significant elevation of group means on some of the reactions to disability noted between the 2 TSI groups (e.g., internalized anger and externalized hostility).

National disability statistics indicated that among 892,000 undergraduate students with disabilities in the United States in 1995–1996, the typical gender split was 50% male and 50% females, and that the majority (80.9%) reported to be White, with the next highest ethnicity reported as Hispanic (7.7%) [18]. Hence, this follow-up study consisted of a higher percentage of females, a lower percentage of Whites, and a higher percentage of Hispanics than the national statistics of undergraduate students with disabilities. Although these demographic differences can be viewed as another limitation of this study, one positive aspect of such ethnic and gender representation is that data in this study reflected the perspectives of some of the more underrepresented groups.

An additional limitation of the follow-up study arises from the lower number of respondents in the one-year follow-up, which restricts the reliability of the results of the multiple regression analysis due to the small sample size. However, the credibility of the results of the repeated measures analyses is not as questionable as the multiple regression, because a repeated measures analysis examines change within each individual's scores and thus is a more statistically powerful test for finding differences in smaller samples [6].

5. Conclusions

This longitudinal study indicated that adaptation scores did not change significantly changed over the course of a year when tracking individual scores in two assessments. If adaptation is viewed as a gradual, lengthy process of integrating a disability cognitively, emotionally, and behaviorally, then these non-significant changes in individuals' scores were not too surprising. Yet, when examining time since injury (TSI), significant differences were found between the two groups overall, with internalized anger and externalized hostility displaying significant elevations among the longer TSI group. These results may be interpreted as partial support for Livneh and Antonak's [12–15] adaptation paradigm, because the more distal reactions to disability (i.e., anger) were significantly higher for the group with a longer time since the onset of a disability. The replication of the multiple regression analysis of Livneh et al.'s [17] study in the one-year follow-up data displayed several important similarities. Some of the differences that were observed may be a result of a reduced sample size in the follow-up study.

Because this study indicated that individuals with a shorter TSI reported significantly different levels on some reactions to disability than those with a longer TSI, this trend suggests that adaptation to disability research should continue to investigate the fluctuations in the process of adaptation in the context of time since the onset of a disability. This research direction is important to explore further, especially because differences have been noted on TSI in research with a different sample [16]. Additional research is also needed to decipher more specifically the role of denial in psychosocial adaptation, because the replication of Livneh et al.'s [17] study provided slightly different results regarding denial in the context of adaptation to disability.

Exploration is needed of the possible factors that may promote an elevation in internalized anger and externalized hostility among undergraduate students with disabilities in the group with a longer TSI. Once these factors are better understood, rehabilitation counselors can provide intervention and assistance that target these factors, so as to lessen the frustration and anger that these students with disabilities may be experiencing and to promote a more full adaptation to life with a disability.

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